

QC Review Page

Remedial Investigation

OU No. 19, Site 84

MCB Camp Lejeune

Jacksonville, North Carolina

Contract Task Order Number - 0219

Contract Number N62470-95-D-6007

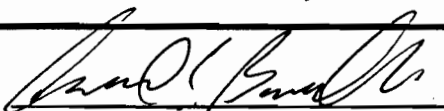
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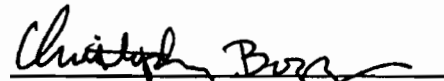
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FINAL

**REMEDIAL INVESTIGATION
OPERABLE UNIT NO. 19
SITE 84 / BUILDING 45 AREA**

**MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

VOLUME I

CONTRACT TASK ORDER 0219

JUNE 2002

Prepared for:

**DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES
ENGINEERING COMMAND
*Norfolk, Virginia***

Under the:

**LANTDIV CLEAN II Program
Contract N62470-95-D-6007**

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LIST OF ACRONYMS AND ABBREVIATIONS

ABS	Absorption Factor
AF	Adherence Factor
ARAR	Applicable or Relevant and Appropriate Requirements
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
AT	Averaging Time
AT _c	Averaging Time, carcinogens
AT _{nc}	Averaging Time, noncarcinogens
ATSDR	Agency for Toxic Substances and Disease Registry
AWQC	Ambient Water Quality Criteria
BAF	Bioaccumulation Factor
BCF	Bioconcentration Factor
Baker	Baker Environmental, Inc.
bgs	below ground surface
BTEX	Benzene, Toluene, Ethyl Benzene, and Xylene
B _v	Soil-to-Plant BCF
BW	Body Weight
CA	Cost Analysis
CAP	Corrective Action Plan
CDIs	Chronic Daily Intakes
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CHF	Contaminant Hazard Factor
CLEAN	Comprehensive Long-Term Environmental Action Navy
CLP	Contract Laboratory Program
cm ²	centimeter squared
CNO	Chief of Naval Operations
CoC	Chain-of-Custody
COC	Chemicals of Concern
COPCs	Chemicals of Potential Concern
cPAHs	Carcinogenic PAHs
CRAVE	Carcinogen Risk Assessment Verification Endeavor
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
CSFs	Carcinogenic Slope Factors
CT	Central Tendency
CTO	Contract Task Order
DADs	Dermally Absorbed Doses
dbh	diameter at breast height
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DoN	Department of Navy
DP	direct push
DRO	Diesel Range Organics
DQO	Data Quality Objective

LIST OF ACRONYMS AND ABBREVIATIONS

(Continued)

ECOC	Ecological Chemicals of Concern
ED	Exposure Duration
EE	Engineering Evaluation
EF	Exposure Frequency
Eh	Reduction Potential
EI	Ecological Investigation
EPH	Extractable Petroleum Hydrocarbon
ERA	Ecological Risk Assessment
ER-L	effects range low
ER-M	effects range medium
F	Fahrenheit
FB	Field Blank
FFA	Federal Facilities Agreement
FS	Feasibility Study
ft/day	feet per day
ft ² /day	square feet per day
FWENC	Foster Wheeler Enviresponse, Inc.
GA	existing or potential source of drinking water for humans
gpd	gallons per day
gpd/ft	gallons per day per foot
gpm	gallons per minute
GRO	Gasoline Range Organics
HA	Health Advisories
HASP	Health and Safety Plan
HEAST	Health Effects Assessment Summary Table
HI	Hazard Index
hrs/day	hours per day
HQ	Hazard Quotient
HQW	High Quality Water
IAS	Initial Assessment Study
ICR	Incremental Lifetime Cancer Risk
ID	inside diameter
IDW	Investigation Derived Waste
ILCR	Incremental Lifetime Cancer Risk
IP/FP	Implementation Plan/Fee Proposal
IR	Installation Restoration
IRIS	Integrated Risk Information System
IT	International Technology, Inc.
J	Analyte was positively identified, value is estimated
K	Estimated Value, biased high
kg	kilogram
K _{oc}	Organic Carbon Adsorption Coefficient
K _{ow}	Octanol/Water Partition Coefficient

LIST OF ACRONYMS AND ABBREVIATIONS

(Continued)

L	Estimated Value, biased low
L/day	Liters per day
LANTDIV	Atlantic Division, Naval Facilities Engineering Command
L/hr	Liters per hour
LNAPL	Light Non-Aqueous Phase Liquid
LOAEL	Lowest Observed Adverse Effect Level
m ³	cubic meters
m ³ /day	cubic meters per day
m ³ /hr	cubic meters per hour
m ³ /kg	cubic meters per kilogram
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCL	Maximum Contaminant Level
MCPA	2-Methyl-4-chlorophenoxyacetic Acid
mg	milligram
mg/cm ²	milligram per square centimeter
mg/day	milligrams per day
mg/kg	milligrams per kilogram
mg/kg/day	milligrams per kilogram per day
mg/L	milligrams per Liter
MI	Mobility Index
MMWR	Morbidity and Mortality Weekly Report
MPF	Migratory Pathway Factor
MS	Matrix Spike
MSD	Matrix Spike Duplicate
msl	mean sea level
MW	Monitoring Well
NA	Not Applicable
NC	North Carolina
NC DENR	North Carolina Department of Environmental and Natural Resources
NCEA	National Center for Environmental Assessment
NCWQS	North Carolina Water Quality Standards
ND	Not Detected
NE	No Criteria Published
NEESA	Naval Energy and Environmental Support Activity
NFESC	Naval Facilities Engineering Service Center
NOAA	National Oceanic and Atmospheric Administration
NOAEL	No Observed Adverse Effect Level
nPAHs	Noncarcinogenic PAHs
NPL	National Priorities List
NREA	Natural Resources and Environmental Affairs
NSW	Nutrient Sensitive Water
NTU	Nephelometric Turbidity Unit
NWI	National Wetlands Inventory
OD	outside diameter
OU	Operable Unit

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

%	percent
PAH	Polynuclear Aromatic Hydrocarbon
PA/SI	Preliminary Assessment/Site Inspection
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PEF	Particulate emissions factor
PID	Photoionization Detector
POTW	Publicly Owned Treatment Works
ppm	parts per million
ppt	parts per thousand
PRG	Preliminary Remediation Goal
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
R	rejected
RA	Risk Assessment (Human Health)
RAGS	Risk Assessment Guidance for Superfund
RBC	Risk-Based Concentration (soils)
RCRA	Resource Conservation Recovery Act
RF	Receptor Factor
RfCs	Reference Concentrations
RfDs	Reference Doses
RFP	Request for Proposal
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RPD	Relative Percent Difference
RRR	Relative Risk Ranking
S	Water Solubility
SA	estuarine water suited for commercial shell fishing and all other tidal saltwater uses
SA	Surface Area
SB	Soil Boring
SC	salt waters protected for secondary recreation, fishing, aquatic life including propagation and survival
SC	Concentration of Chemical in Soil/Sediment
SCS	Soil Conservation Service
SDWA	Safe Drinking Water Act
SERA	Screening-Level Ecological Risk Assessment
SI	Site Inspection
SOP	Standard Operating Procedure
SOW	Statement of Work
SSL	sediment screening level
SSV	Sediment Screening Value
SSSV	Surface Soil Screening Value

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

STSC	Superfund Technical Support Center
S.U.	standard units
SVE	Soil Vapor Extraction
SVOC	Semivolatile Organic Compound
SWSL	surface water screening level
SWSV	Surface Water Screening Value
TAL	Target Analyte List
TB	Trip Blank
TCA	1,1,1-Trichloroethane
TCE	Trichloroethane
TCL	Target Compound List
TCLP	Toxicity Characteristics Leaching Process
TCRA	Time Critical Removal Action
TOC	Total Organic Carbon
TP	test pit
TPH	Total Petroleum Hydrocarbons
U	analyte was not detected
UCL	upper confidence limit
UJ	non-detected compound that had inaccurate or imprecise quantitation limits
µg/kg	micrograms per kilogram
µg/L	micrograms per Liter
USC	United States Code
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound
VP	Vapor Pressure
VPH	Volatile Petroleum Hydrocarbons
WAR	Water and Air Research, Inc.
WMPES	Wellhead Management Program Engineering Study
WQS	Water Quality Standard

EXECUTIVE SUMMARY

INTRODUCTION

This report describes the Remedial Investigation (RI) conducted at OU No. 19, which is comprised of Site 84. Portions of Site 84 have been investigated, beginning with a series of reports related to petroleum contamination in the early 1990's, continuing through this recent body of work which has assembled previous data with recent information. The following summarizes the conclusions and recommendations for Site 84 based on the findings of the RI.

The objectives of the RI include the following:

Original objectives set forth in the RI/FS Project Plans (Baker 2001):

1. Delineate the extent of polychlorinated biphenyl (PCB) contamination of soils.
2. Evaluate whether the shallow water table aquifer and Northeast Creek have been affected by site contamination.

Modifications to the field program that were discussed and agreed upon at the July 18, 2001 Partnering Meeting:

3. Locate the drain line running from former Building 45 to the lagoon and assess the integrity of the line to confirm/deny the presence of potential contamination.
4. Assess potential impacts of site operations as close to the foundation of former Building 45 as possible.

Modifications to the field program that were discussed and agreed upon by the Camp Lejeune Partnering Team during the second 10-day shift of the field investigation (July 30 through August 8, 2001):

5. Delineate the extent of other potential site contaminants including petroleum-based contamination of soils and groundwater. In addition, further characterize two former Underground Storage Tank (UST) basins previously investigated under the UST Program at MCB, Camp Lejeune.

In addition to these field objectives, the broader objective of the RI is to evaluate the nature and extent of the threat to public health and the environment caused by the release or threatened release of hazardous substances, pollutants, or contaminants. The RI also provides data required to establish feasible alternatives for consideration during preparation of the Record of Decision (ROD).

SITE DESCRIPTION AND HISTORY

Site 84 is located approximately 200 yards south of Highway 24 on the main side of MCB, Camp Lejeune, one mile west of the main gate entrance. The northeast edge of the study area runs along railroad tracks and the northwest edge is bordered by Northeast Creek. The site extends to the south and west to encompass former Building 45 (only the foundation remains), and a small, possibly man-made lagoon. Toward the creek, the site is mostly wooded or covered by thick vegetation or grass.

Previous investigations at Site 84/Building 45 Area have been directed towards Underground Storage Tanks (USTs) associated with Building 45. Baker's Relative Risk Ranking System Data Collection Investigation (1995) and Pre-RI Screening Study (1998) were predicated on the discovery of transformers in the lagoon and the detection of PCBs in the soil. Surface soil analyses indicated PCB contamination in the area of the lagoon and towards Building 45. Groundwater analyses indicated benzene, toluene, ethylene, and xylene (BTEX) constituents and chloroform at concentrations exceeding North Carolina Water Quality Standards (NCWQS). Surface water analyses from the lagoon indicated the presence of BTEX constituents below screening values but no PCB contamination. Sediment samples collected from the lagoon exhibited PCB, Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (SVOCs) and diesel range organic constituents above screening standards.

FIELD INVESTIGATION

The RI field program activities consisted of a soil investigation, trenching to locate a buried pipe, and a shallow groundwater investigation. The focus of the soil investigation included the area surrounding Building 45 and northeast of the gravel road leading to Northeast Creek, as contamination in other areas at the site had been delineated in previous investigations. Data collected during the RI field program were combined with historical surface soil, surface water, and sediment data from the Pre-RI Screening Study (Baker 1998) for the purposes of fully delineating contamination at the site and determining potential risks.

NATURE AND EXTENT OF CONTAMINATION

PCB-contaminated surface soil is present around Building 45 and extends approximately 600 feet northwest of the building. In general, low level PCB contamination (1 – 10 ppm) is present at the site with three notable hot spots. One hot spot is located along the north side of the Building 45 foundation. The PCB distribution pattern in the soil around Building 45 may, in part, be related to drainpipes in and around the building. The second hot spot is located immediately north of the underground pipe that runs between the building and the lagoon, and is approximately 200 feet west of the building. The third hot spot is located on the northeast side of the lagoon.

PCBs were detected in subsurface soil samples, but generally at lower concentrations than in surface samples. PCBs are not very soluble in water and are not very mobile in the environment. Thus, assuming a surface release, it is to be expected that shallow soils would exhibit the highest concentration, assuming a surface release. The relatively widespread distribution of PCBs in the surface soil could be related to the mobilization of contaminated soil particles as a result of several factors including wind, application of oils (possibly containing PCBs) for dust suppression, vehicle traffic, and soil erosion.

In addition to the PCB contamination, surface and subsurface soils surrounding the building appear to have been impacted by past operations as a maintenance facility. Several lines of evidence support this:

1. The VOCs detected (benzene and ethylbenzene) are frequently related to the presence of fuel. The SVOCs detected are polynuclear aromatic hydrocarbons (PAHs), which may also be fuel related. Diesel and gasoline range petroleum hydrocarbons have also been detected.
2. The detections of VOCs, SVOCs and total petroleum hydrocarbons (TPH) have generally occurred in soil samples surrounding Building 45 and the former above ground storage tank (AST). This distribution of contaminants in the surface and subsurface soil is suggestive of a pattern of leaks and spills associated with day-to-day operations of a maintenance facility.
3. Metals were detected in every sample analyzed for TAL inorganics. However, only arsenic exceeded the USEPA Region IX Preliminary Remediation Goal (PRG). When the arsenic exceedances were further compared to Base background concentrations (the mean plus two standard deviations), most were above background. That is an indication that arsenic is an inorganic contaminant of concern (COC). Arsenic was detected in samples scattered throughout Site 84, but was reported at the greatest concentration near the former AST and the Building 45 foundation. Arsenic was used in organic pesticides, but there does not appear to be a good correlation between arsenic and pesticide concentrations. Arsenic is a volatile inorganic and would be more mobile than organic pesticides, which could explain why there is not a good correlation between the distribution of arsenic and organic pesticides.
4. The presence of organic pesticides in high concentrations was also observed in surface soils surrounding Building 45. Organic pesticides are not very mobile and continuous application around the building could cause a concentration buildup over time.

Based on the analytical data, there is no evidence to suggest that Northeast Creek has been impacted by past operations at Site 84. PCBs have not been detected in surface water or sediment samples collected from the creek. However, the lagoon located in the wooded area west of Building 45 has been impacted by various, possibly site-related contaminants. Sediment samples collected from the lagoon contain PCBs and fuel-related VOCs. Samples of the surface water exhibited only low concentrations of benzene, toluene, and xylenes and no PCBs.

Impact to groundwater is primarily related to petroleum compounds northeast of former Building 45. Free phase petroleum has been identified in this area, as well as a dissolved-phase plume of petroleum hydrocarbons. This contamination is currently being addressed under the UST program. As the Site 84 non-time critical removal action (TCRA) is implemented to remove the remaining portions of former Building 45 and soil around the foundation, petroleum-impacted soils will also be removed. This action will reduce the source of groundwater contamination, especially as it relates to the BTEX plume identified in this area of Site 84.

Aside from petroleum contamination previously discussed, groundwater contamination at Site 84 is limited. Contamination related to past practices (such as power plant operations, maintenance ect.) at former Building 45 is minimal. Individual contaminant distribution is sporadic over the the site, with no apparent plume. Fuel-related compounds (e.g., benzene and ethylbenzene) are present in groundwater samples from wells in the vicinity of the former AST at concentrations that exceeded screening criteria. These detections appear to be limited to the area surrounding the former AST. Low levels of organic pesticides were also present in groundwater samples above applicable standards. The presence of organic pesticides in groundwater are not associated with any defined contaminant plume, but are observed to be at low concentrations across the study area.

To summarize, groundwater contamination has been defined to include the BTEX plume defined by previous studies under the UST program, several detections of petroleum related compounds in the area of the former AST, and organic pesticides scattered throughout the study area.

As noted, the UST program has addressed. The two former USTs which were located approximately 110-feet northeast of the Building 45 foundation. Petroleum light non-aqueous phase liquid (LNAPL), present in two wells in this portion of the site, appear to be associated with the USTs. The dissolved-phase groundwater plume extends downgradient of the USTs just beyond well 84-MW-21, south of the Building 45 foundation. This portion of the site is being addressed by an active treatment system maintained by J.A. Jones.

BASELINE HUMAN HEALTH RISK ASSESSMENT

A baseline Risk Assessment (RA) was conducted at Site 84 to evaluate potential risks to human health. Current land use scenarios that were evaluated include the military Base personnel and adolescent and adult recreational users. Future land use scenarios that were evaluated include the

adult and child residents, construction worker, and industrial/commercial worker. Two distinct exposure scenarios were evaluated in this baseline RA. One exposure scenario included the soil around the perimeter of Building 45 that will be excavated during the non-TCRA scheduled to begin in February 2002. The second exposure scenario presented the baseline RA excluding the soil that will be excavated during the non-TCRA.

Total site Incremental Lifetime Cancer Risk (ILCR) values calculated in this baseline RA indicate potentially unacceptable carcinogenic risk for the current adult recreational users, future adult and child residents, and future industrial/commercial site worker. The ILCR values that exceeded the USEPA acceptable risk range of 1.0×10^{-6} to 1.0×10^{-4} were primarily from surface soil before the non-TCRA for the current receptors and surface soil before the non-TCRA and shallow groundwater for the future receptors.

Ingestion of and dermal contact with benzo(a)pyrene, heptachlor, and Aroclor-1260 in the surface soil before the non-TCRA contributed to the unacceptable ILCR values. In addition, Aroclor-1260 in soil evaluated after the non-TCRA was the primary contributor to unacceptable carcinogenic risks for the future residential adult and child receptors.

Arsenic in the shallow groundwater also contributed to unacceptable total site ILCR values for the future receptors evaluated for exposure to groundwater. However, it should be noted that it is unlikely for the shallow groundwater aquifer to be used as a source for potable water.

Total site Hazard Index (HI) values calculated in this baseline RA indicate potentially unacceptable noncarcinogenic hazard levels for the current military Base personnel, future adult and child residents, future construction worker, and the future industrial/commercial site worker. The HI values that exceeded the USEPA acceptable hazard level of 1.0 were primarily from surface soil before the non-TCRA for the current receptors and surface soil before the non-TCRA and shallow groundwater for the future receptors.

Ingestion of and dermal contact with heptachlor epoxide, gamma-chlordane, alpha-chlordane, and Aroclor-1254 in the surface soil before the non-TCRA contributed to the unacceptable HI values. Soil evaluated after the non-TCRA did not contribute significantly to unacceptable noncarcinogenic adverse health effects for these receptors.

2-Methyl-4-chlorophenoxyacetic acid (MCPA), arsenic, iron, and thallium in the shallow groundwater also contributed to unacceptable total site HI values for the future receptors evaluated for exposure to groundwater. However, it should be noted that it is unlikely for the shallow groundwater aquifer to be used as a source for potable water.

SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT AND REFINEMENT

A screening-level Ecological Risk Assessment (ERA) and refined risk evaluation were conducted to evaluate potential risks to ecological receptors at the site. Terrestrial habitat, aquatic habitat associated with the lagoon, and aquatic habitat associated with Northeast Creek were evaluated. Two distinct exposure scenarios were evaluated in this ERA. One exposure scenario included the soil around the perimeter of Building 45 that will be excavated during the non-TCRA scheduled to begin in February 2002. The second exposure scenario excluded the soil that will be excavated during the non-TCRA.

VOCs, SVOCs, and PCBs in lagoon sediments may pose unacceptable risks to ecological receptors using the lagoon. PAHs, organic pesticides, PCBs, and inorganics in surface soils were estimated to pose unacceptable risks to the terrestrial ecological community at Site 84. The lagoon area and area along the perimeter of former Building 45 were indicated to be the most hazardous to ecological receptors at Site 84. Although potential risks to terrestrial ecological receptors decreased substantially in the after non-TCRA scenario, unacceptable risks to terrestrial flora, fauna, and upper trophic level terrestrial receptors were still present at the site. For the after non-TCRA scenario, potential risk from most surface soil contaminants to terrestrial receptors were moderate to low; however, Aroclor-1260 continued to pose potentially substantial risks to the terrestrial community. No unacceptable risks were estimated for surface waters or sediment of Northeast Creek. Organic pesticides in groundwater may pose unacceptable risks to ecological receptors in Northeast Creek if dilution upon discharge to the creek is negligible; however, potential risks contributed by groundwater are anticipated to be low.

CONCLUSIONS AND RECOMMENDATIONS

Activities at Site 84 began more than 70 years ago. The site contains multiple sources of contamination including items such as storage tanks, power plant operations, heavy equipment maintenance, etc. The following conclusions and recommendations are made based on the findings of the Remedial Investigation:

1. PCB concentrations are above screening criteria in the subsurface soils primarily in the area immediately surrounding Building 45, in the former AST area, in the open field to the west, and near the lagoon.
2. Soils at Site 84 have also been impacted by VOCs, SVOCs, organic pesticides, TPH, and inorganics. Concentrations of VOCs and TPH are low compared with SVOCs and organic pesticides. Concentrations of SVOCs and organic pesticides decrease significantly with depth.

A non-TCRA involving the demolition of the foundation of former Building 45 and excavation of soils in the immediate area of the foundation is planned. The removal action addresses a major portion of the soil contamination at Site 84 and should reduce site risks.

3. Groundwater sampling completed as part of the RI identified several VOCs, SVOCs, organic pesticides, herbicides and inorganics in groundwater. Only benzene, chloroform, heptachlor epoxide, and gamma-chlordane exceeded screening criteria in a limited number of samples. Petroleum related compounds are present in the surficial aquifer in the area of Building 45, most likely associated with former tanks (which have been removed). Detections of organic pesticides in the surficial aquifer, although more frequent in the area of Building 45 are also observed in other areas of the site. However, the data do not suggest a definable organic pesticide plume.

It is important to note that groundwater has been impacted by petroleum products in the northeast portion of the site. LNAPL is present in the northeast portion of the site near former Building 780. A significant dissolved-phase plume of petroleum hydrocarbons has been associated with the former USTs. This area of the site is being addressed by the UST program with an active treatment system, maintained by J.A. Jones. In addition, suspected soil near Building 45, which may be a continual source of groundwater contamination will be removed doing the non-TCRA.

4. Northeast Creek does not appear to have been impacted by past site operations. Contaminants were not detected in surface water or sediment samples collected from the creek.

5. Sediments in the lagoon contain VOCs and PCBs. The presence of these contaminants is most likely related to the drain pipe that runs from the former building to the lagoon. The line was apparently used to discharge waste material from Building 45. In addition, the presence of PCBs may be related to the reported disposal of transformers in the lagoon.
6. The baseline human health RA for Site 84 evaluated current adolescent and adult recreational users and military Base personnel, and future adult and child residents, construction workers, and industrial/commercial workers. A summary of the potential risk for soil and groundwater is provided below:

- Soil

Total risk values calculated at the site indicate potentially unacceptable carcinogenic risk for the future receptors evaluated under the exposure scenario that included soil from the perimeter around Building 45 (to be excavated in February 2002 as a non-TCRA). Values that exceeded the USEPA acceptable risk range were primarily from ingestion of and dermal contact with benzo(a)pyrene, heptachlor, and Aroclor-1260 in the surface soil, evaluated before the non-TCRA. Aroclor-1260 in soil evaluated after the non-TCRA was the primary contributor to unacceptable carcinogenic risks for the future residential receptors.

Total site HI values calculated indicate potentially unacceptable noncarcinogenic hazard levels for the current Base personnel, future adult and child residents, future construction worker, and future industrial/commercial site worker. The HI values that exceeded the USEPA acceptable hazard level of 1.0 were primarily from ingestion of and dermal contact with heptachlor epoxide, gamma-Chlordane, alpha-Chlordane, and Aroclor-1254 in the surface soil, before the non-TCRA. Soil evaluated after the non-TCRA did not contribute significantly to unacceptable noncarcinogenic adverse health effects for these receptors.

- Groundwater

Arsenic in the shallow groundwater contributed to potentially unacceptable carcinogenic risk values for the future receptors evaluated for exposure to groundwater as drinking water. 2-Methyl-4-chlorophenoxyacetic Acid (MCPA), arsenic, iron, and thallium in the shallow groundwater also contributed to unacceptable total site HI values.

7. Based on the ecological risk assessment, PAHs, organic pesticides, PCBs, and inorganics in surface soils may pose unacceptable risks to the terrestrial ecological community at Site 84. VOCs, SVOCs, and PCBs in lagoon sediments may pose unacceptable risks to ecological receptors using the lagoon. The lagoon area and area along the perimeter of former Building 45 are the most hazardous to ecological receptors at Site 84. Although potential risks to ecological receptors will decrease substantially following the non-TCRA in the vicinity of Building 45, unacceptable risks to terrestrial flora, fauna, and upper trophic level receptors will still exist at the site. After the removal action, potential risk from most surface soil contaminants to terrestrial receptors will be moderate to low; however, Aroclor-1260 will continue to pose substantial risks to the terrestrial community. No unacceptable risks were estimated for surface waters or sediment of Northeast Creek. Organic pesticides in groundwater may pose unacceptable risks to ecological receptors in Northeast Creek if dilution upon discharge to the creek is negligible; however, potential risks contributed by groundwater are anticipated to be low.
8. The FS should be prepared to address the elevated levels of VOCs, SVOCs, PCBs, and several inorganics in the surface and subsurface soils at Site 84.
9. The FS should also present remedial alternatives for impacted groundwater, including a monitoring program and aquifer use restrictions. Chemicals of concern in groundwater are organic pesticides, BTEX, and selected inorganics. The petroleum contamination northeast of former Building 45 is related to former USTs in this portion of the site. Remediation is addressed under the UST program by the operation of a SVE/air sparging system. In addition, the planned removal action for soil and Building 45 foundation materials will include excavation of petroleum contaminated soil in this area, thereby reducing source contamination. The groundwater monitoring program should include a minimum of four rounds of sampling for organic pesticides, BTEX, and natural attenuation parameters. Inorganics, (such as iron, manganese, aluminum ect)

should be compared to Base background concentrations to determine if these constituents exceed established concentrations (i.e., naturally occurring levels). In addition to the monitoring program, an aquifer use restriction is recommended until concentrations reach acceptable levels (i.e., below North Carolina Standards and/or Federal MCLs).

10. The FS should address remedial alternatives, taking into account the planned non-TCRA and various potential land uses at the site. Moving forward, the strategy and clean-up criteria hinges on the future land use (i.e, industrial vs. residential) and the relative restrictions placed on land use. As possible future land use is of particular interest to the Base, a short letter/executive summary was prepared for the Activity in April 2002. This document was used by the Base to provide information to executive managers and decision-makers, concerning the disposition of Site 84. Upon review of this information, the Base intends to continue to use Site 84 for industrial purposes. The FS process will further define the remedial goals based on this type land use, as well as others, and present various alternatives appropriate for the site.
11. Site specific knowledge that will be acquired during the demolition of the Building 45 foundation and the associated non-TCRA will be helpful for future actions at the site. LANTDIV and MCB Camp Lejeune should incorporate any "lessons learned" from the removal action into future evaluations and decisions concerning Site 84.



1.0 INTRODUCTION

Marine Corps Base (MCB) Camp Lejeune was placed on the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) National Priorities List (NPL) effective November 4, 1989 (54 Federal Register 41015, October 4, 1989). Subsequent to this listing, the United States Environmental Protection Agency (USEPA) Region IV, the North Carolina Department of Environment and Natural Resources (NC DENR), the Department of Navy (DoN) and the Marine Corps entered into a Federal Facilities Agreement (FFA) for MCB, Camp Lejeune. The primary purpose of the FFA was to ensure that environmental impacts associated with past and present activities at the Base were thoroughly investigated, and that appropriate CERCLA response and Resource Conservation Recovery Act (RCRA) corrective action alternatives were developed and implemented as necessary to protect the public health and welfare, and the environment (MCB, Camp Lejeune FFA, 1989).

The fiscal year 2002 Site Management Plan for MCB, Camp Lejeune, a primary document referenced in the FFA, identifies 42 sites that require Remedial Investigation/Feasibility Study (RI/FS) activities. These 42 sites have been divided into 21 Operable Units (OUs). Operable units are formed as an incremental step toward addressing individual site concerns and to simplify the specific problems associated with a site or group of sites. This report describes the RI conducted at OU No. 19, which is comprised of Site 84 (Building 45 Area). As shown on Figure 1-1, Site 84 is located near the northern border of MCB, Camp Lejeune, off of Highway 24.

1.1 Purpose

The purpose of the RI Report is to present information and data obtained during the RI field activities. Based on this information, information from previous investigations at the site, and evaluations of the nature and extent of contamination, contaminant fate and transport properties, and potential risk to human health and the environment, recommendations are presented regarding the need, if any, for future activities at the site.

1.2 Objectives

The data collected during the RI field investigation met the objectives presented in the Statement of Work (SOW) provided in the April 9, 2001 Request for Proposal (RFP) prepared by the Atlantic Division, Naval Facilities Engineering Command (LANTDIV). This work was conducted in accordance with the Final Implementation Plan/Fee Proposal (IP/FP) for CTO 0219 (Baker, 2001a), and the Final Site 84 Remedial Investigation/ Feasibility Study Project Plans (Baker, 2001b). The objectives included the following:

Original objectives set forth in the Project Plans (Baker 2001):

1. Delineate the extent of polychlorinated biphenyl (PCB) contamination of soils.
2. Evaluate whether the shallow water table aquifer and Northeast Creek have been affected by site contamination.

Modifications to the field program that were discussed and agreed upon at the July 18, 2001 Partnering Meeting (i.e., meeting between representatives of the USEPA, NC DENR (Superfund and Groundwater Sections), DoN, and the Base's Environmental Management Department [EMD]):

3. Locate the drain line running from former Building 45 to the lagoon and assess the integrity of the line to confirm/deny the presence of potential contamination.
4. Assess potential impacts of site operations as close to the foundation of former Building 45 as possible.

Modifications to the field program that were discussed and agreed upon by the Camp Lejeune Partnering Team during the second 10-day shift of the field investigation (July 30 through August 8, 2001):

5. Delineate the extent of other potential site contaminants including petroleum-based contamination of soils and groundwater. In addition, further characterize two former Underground Storage Tank (UST) basins previously investigated under the UST Program at MCB, Camp Lejeune.

It should be noted that petroleum contamination was not addressed in the initial sampling plan because these contaminants are typically addressed under the UST Program as opposed to the Installation Restoration (IR) Program. The sampling plan was adjusted during the field program to meet the additional objectives identified during the partnering team meetings. Additional consideration was given to overall groundwater conditions as well. This included collecting groundwater data across the site for a more complete understanding of groundwater conditions. As the site history and sampling data indicated that the contaminant of concern at Site 84 was PCBs in the shallow soils, the objectives of the Partnering Team focused on the impact to shallow groundwater.

In addition to these field objectives, the broader objective of the RI was to evaluate the nature and extent of the threat to public health and the environment caused by the release or threatened release of hazardous substances, pollutants, or contaminants. The RI also provides data required to establish feasible alternatives for consideration during preparation of the Record of Decision (ROD). The different media investigations conducted at the site as part of this process are described in Section 2.0 of this report.

1.3 Report Organization

This RI report is divided into eight sections, including:

- Section 1.0 - Introduction
- Section 2.0 - Field Investigation
- Section 3.0 - Regional and Site Characteristics
- Section 4.0 - Nature and Extent of Contamination
- Section 5.0 - Contaminant Fate and Transport
- Section 6.0 - Baseline Human Health Risk Assessment
- Section 7.0 - Screening-Level Ecological Risk Assessment and Step 3a -Refinement
- Section 8.0 - Conclusions and Recommendations

Supporting information is contained within the appendices referenced throughout the document, which include Appendices A through K. All of these appendices are included in Volume II of the RI report.

1.4 Site Description and History

This section summarizes information concerning the general site description and history. Further information of this type can be found in the final Project Plans (Baker, 2001), and more detailed information is provided in future sections of this report as appropriate.

Site 84 is located approximately 200 yards south of Highway 24 on the main side of MCB, Camp Lejeune, one mile west of the main gate entrance (Figure 1-1). A map of the site is presented as Figure 1-2. The site is fenced to prevent general access by the public. The northeast edge of the study area runs along railroad tracks and the northwest edge is bordered by Northeast Creek. The site extends to the south and west to encompass the foundation of Building 45, and a small, possibly man-made lagoon. Toward the creek, the site is mostly wooded or covered by thick vegetation or grass. There is an access road that runs through the site and terminates at Northeast Creek.

Building 45 was a former electric substation, where transformers reportedly containing polychlorinated biphenyls (PCBs) were known to be used and possibly stored. A transformer was discovered in the wooded area east of the substation. Additional transformers (approximately 20) potentially containing PCB oil were discovered and removed from the lagoon. Maintenance personnel who worked at Building 45 indicated that additional transformers may have been buried in areas near the lagoon; however, public works performed limited excavations in the area and did not discover any buried materials (approximate locations of these excavations are shown on Figure 1-2 designated as "hole").

Appendix A includes series of historical drawings from the 1930's. They were discovered a short time prior to the submittal of the draft report (January 2001) and have been included as background information concerning the original layout of the building. These drawings are of interest to the characterization of the site as they show the approximate locations of underground piping, utilities, and provide some indication as to where various operations were performed. For example, three diesel engines were located on the ground floor, the majority of the piping for the cooling system was located in the basement while the cooling towers were located just outside the building to the south. The main entrance, lobby and various offices were located on the north side of the building, facing Highway 24. While it is uncertain where the drains and piping lead to, or their current disposition, the drawings help to explain some of the contamination observed at the site (especially near former Building 45). The drawings also provide some information to help guide the non-TCRA in so far as where buried piping may be found during excavations.

1.5 Previous Investigations

Presented below are summaries of previous investigations performed under the UST or IR Program in the area of Site 84 and/or Building 45. In addition, Figure 1-3 is a timeline that presents a chronological history of the events and associated reports.

1.5.1 Technical Memorandum No. 2 Results of Field Investigation (Dewberry & Davis, 1991)

A preliminary site investigation was conducted in November 1990 by Dewberry and Davis. As part of the preliminary investigation, soil samples were collected from five hand-augered and five mechanically advanced soil borings, and two monitoring wells were installed and sampled. All sampling occurred in the vicinity of aboveground storage tank (AST) S-781 (exact locations unknown). Samples were analyzed for total petroleum hydrocarbons (TPH). Groundwater samples did not indicate TPH contamination, however three soil samples detected TPH above the 1991 North Carolina action level of 10 ppm for gasoline-range organics (GRO). TPH-GRO concentrations ranged from below detection limits to 22,000 ppm.

1.5.2 UST Site Check Investigation Report, Equipment and Maintenance Shop, Building 45, UST S-941-2 (ATEC, 1992)

This investigation was performed to address potential contamination in the shallow groundwater at Building 45 and in the vicinity of underground storage tank (UST) S-941-2 which contained gasoline. Three shallow groundwater monitoring wells were installed and sampled. Figure 1-4 presents the locations of the monitoring wells. Results of this investigation indicated that the shallow groundwater was contaminated by petroleum related hydrocarbons. Table 1-1A presents a summary of the analytical results. During this investigation, shallow groundwater was found to flow generally to the northeast, towards Highway 24 and Northeast Creek.

1.5.3 Site Assessment, Tank S-781, Midway Park (O'Brien and Gere, 1992)

The purpose of the Site Assessment conducted by O'Brien and Gere (1992) was to investigate subsurface contamination in the vicinity of Tank S-781 (176,000 gallon capacity) located near Building 45. The investigation included the collection of groundwater and soil samples. Fourteen monitoring wells (seven nested pairs), four soil borings, and ten hydropunches were completed in the study area. Locations of these sampling points are indicated in Figure 1-4. A summary of analytical results is presented on Table 1-1B. It is noted that shallow monitoring wells are odd-numbered and deep monitoring wells are even numbered. Shallow monitoring wells were installed at depths of between 12 and 20 feet below ground surface (bgs), while deep monitoring wells ranged between 27 and 30 feet bgs.

Soil samples were collected from soil borings and monitoring well borings and were analyzed for TPH. A subset of soil samples were analyzed for Toxicity Characteristics Leaching Procedure (TCLP) characteristics. Results indicated concentrations of TPH in soils ranging from 4.32 mg/kg to 12,000 mg/kg. The highest concentrations were found in soils obtained from MW-4 (255 mg/kg at 14 - 16 feet bgs) and B4 (11,000 mg/kg at 9 - 11 feet bgs and 12,000 mg/kg at 4 - 6 feet bgs). These locations are proximal to and directly downgradient of Tank S-781. It was concluded by O'Brien and Gere that these TPH concentrations are related to the operation of Tank S-781. The TCLP tests are conducted for individual compounds, such as, benzene, toluene and a number of other volatile organics to determine the likelihood of these type of compounds to leach to the groundwater. Results of the TCLP analysis were all below the regulatory requirements for the forty compounds analyzed.

Groundwater samples were analyzed for volatile organic compounds (VOCs). Groundwater from three wells was additionally analyzed for polynuclear aromatic hydrocarbons (PAHs), and groundwater from one well was analyzed for TCLP characteristics. 1,4-Dichlorobenzene and vinyl chloride were detected at concentrations exceeding North Carolina Water Quality Standards (NCWQS). The PAH analysis was compared to NCWQS standards, TCLP does not have regulatory limits but will indicate leaching of certain compounds such as benzene and toluene. Neither detection was considered by O'Brien and Gere likely to be related to past operations of Tank S-781.

1.5.4 Five Well Site Check and Resample One Existing Well (UST 45-1), (R.E. Wright Associates, Inc., 1994)

This study consisted of the installation of five groundwater monitoring wells in the area of UST 45-1 (waste oil) on the south side of Building 45 (Figure 1-4). One soil sample from each well boring (based on PID readings) was submitted for laboratory analysis of oil and grease, and halogenated solvents. Groundwater samples were collected from the five newly installed monitoring wells and existing well MW-16. Groundwater samples were submitted for analysis of volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs) and TCLP metals. Groundwater level measurements were collected, indicating a shallow groundwater flow to the west. [Note: The apparent reversal in groundwater flow direction between this investigation and the ATEC investigation in 1992 may be due to the broader spacing of monitoring wells installed by R.E. Wright. This spacing, as opposed to the closer spacing for the ATEC wells, would give a truer indication of area groundwater flow direction. The ATEC wells only determined flow in a small area, which may be influenced by local variations in lithology and site features.]

Analytical results for soils indicate contamination from oil and grease in the subsurface. Concentrations of benzene (MW-1) and naphthalene (MW-2) were the only organics detected above detection limits in the shallow groundwater; however, these detections were below comparison standards. Table 1-1C presents the detected analytical results for soil and groundwater. Due to the highest concentrations in soil being upgradient of the UST location, R.E. Wright's conclusion was that there is an alternative/additional source of contamination.

1.5.5 Leaking UST Site Assessment Report (UST S-941-2) - Building 45 (Equipment and Maintenance Shop) (Law Engineering, Inc., 1994)

This assessment consisted of the installation of 12 soil borings, with surface and subsurface soil sampling and analysis, and the installation of seven 2-inch diameter groundwater monitoring wells and one 6-inch diameter extraction well used for completion of an aquifer-"pumping" test. Additionally, ten groundwater samples were collected using Hydropunch® technology from the shallow groundwater in the vicinity of the site. Figure 1-4 presents the sampling locations. As noted on the figure, locations for this investigation were generally between Building 45 and Highway 24. Table 1-1D presents a summary of the analytical results. Soil and groundwater samples were analyzed for TPH (GRO and diesel range organics [DRO]) and total lead. No

analytical data is available from this investigation on PCBs. Recommendations from this investigation included: (1) additional soil investigation to better define extent of contamination; (2) define extent of LNAPL hydraulically downgradient from the former UST system; (3) installation of additional groundwater monitoring wells and/or collection of hydropunch samples downgradient of the former UST system to define extent of groundwater contamination; and (4) development of design plans for a LNAPL recovery system.

1.5.6 Relative Risk Ranking System Data Collection Investigation (Baker Environmental, Inc., 1995)

This investigation involved the collection of soil, groundwater, surface water, and sediment samples from Sites 84 and 87 for use in classifying the sites as high, medium, or low risk for LANTDIV's Site Relative Risk Ranking (RRR) System. At Site 84 the investigation focused on the lagoon and surrounding area, and included sampling along the bank of Northeast Creek. Ten soil borings were installed and samples were collected from 0-6 inches bgs and 6-12 inches bgs at each boring. Four surface water and sediment samples were collected from the lagoon and three surface water and sediment samples were collected from Northeast Creek. Three shallow groundwater samples were collected, two from existing monitoring wells and one from a temporary monitoring well installed during the investigation. Samples were analyzed for PCBs only.

Aroclor-1260 was detected in each of the 20 soil samples with concentrations ranging from 360 µg/kg to 12,000 µg/kg. Aroclor-1260 was also detected in sediment from the lagoon in all four samples ranging from 3,700 µg/kg to 17,000 µg/kg. Aroclor-1248 was detected in one of the lagoon sediment samples at 2,700 µg/kg. No PCBs were detected in the surface water of the lagoon, in surface water or sediment of Northeast Creek, or in groundwater.

Three factors are incorporated in the RRR evaluation: Contaminant Hazard Factor (CHF), Migration Pathway Factor (MPF), and Receptor Factor (RF). The CHF was not included in this report. Evaluation of the MPF indicated there is a possibility that contamination may be present in all media examined at the site and that contamination may migrate to a point of exposure. Evaluation of the RF indicated that there is a possibility that human and ecological receptors may be affected by groundwater and human receptors may have access to surface soils, surface water, and sediment. Ecological receptors with access to surface water and sediment were identified.

Table 1-1E presents a summary of analytical data collected as part of the RRR study. These data were incorporated into the Pre-Remedial Investigation Screening Study (discussed in the following section). Sample locations with the analytical results are presented on Figures 1-5 through 1-8.

1.5.7 Corrective Action Plan For the Restoration of Petroleum Contaminated Soil and Groundwater, Building 45, USTs S-941-1 and 2, Equipment and Maintenance Shop (Law Engineering, Inc., 1996)

Based on previous Law Engineering studies at Building 45, a Corrective Action Plan (CAP) was prepared for the remediation of petroleum contaminated soil and groundwater. The extent of TPH soil contamination defined in the previous UST assessment is shown on Figure 1-9. The extent of BTEX in groundwater is shown on Figure 1-10. The extent of PAH and free product in groundwater is shown on Figure 1-11.

This UST system consisted of two steel USTs which were both installed in 1941. Tank S-941-1 was a 6,000-gallon capacity UST which contained diesel fuel and Tank S-941-2 was a 550-gallon capacity UST which contained gasoline. UST S-941-2 failed a leak detection test in June 1990 with a leak rate of 0.10250 gallons per hour. A subsequent tank-only test met the National Fire Protection Association criteria with a change of only 0.01186 gallons per hour, indicating that the leak was in a distribution line. The USTs were removed in October 1992 by Jones and Frank, Inc. The total quantity of soil excavated during the UST closure is estimated to be 105 cubic yards (cy). Closure samples collected below UST S-941-2 confirmed contamination in the soil with TPH concentrations ranging from 52.3 mg/kg to 525 mg/kg. Free product was detected in the excavation for UST S-941-1 and no samples were collected from this excavation. The extent of free product as measured in nearby monitoring wells is shown on Figure 1-11.

An air sparging and soil vapor extraction (SVE) system was installed by J.A. Jones Environmental Services Company (J.A. Jones) as described in a 1997 Work Plan Addendum (J.A. Jones, 1997) with the aim of remediating TPH contamination in soil and groundwater. A target clean-up goal for TPH-GRO in soil was set at 40 mg/kg. The following North Carolina Groundwater Quality standards are the target clean-up goals for groundwater: benzene - 1 µg/L, ethylbenzene - 29 µg/L, toluene - 1,000 µg/L, xylenes (total) - 400 µg/L, and methyl tert-butyl ether (MTBE) - 200 µg/L. The air sparging and SVE system is shown on Figure 1-12 and includes a network of eight air sparging wells, each of 2-inch diameter PVC, paired with eight

soil vapor extraction wells. The air sparging wells are screened over a two foot interval at approximately 40 to 45 feet bgs. The SVE wells are located in the vadose zone about two feet above the seasonal high water table. The wells are constructed of 4-inch diameter PVC pipe. The system is connected by manifold piping and the extracted vapors are discharged to the atmosphere. Water collected in the moisture separation system is conveyed to the publicly owned treatment works (POTW). Clean-up time was expected to be five to ten years with three years of follow up monitoring. The system is still in operation today. Figures 1-13 and 1-14 are J.A. Jones figures that provide detail on the system and its relationship to the soil and groundwater contamination in this part of Site 84.

1.5.8 Pre-Remedial Investigation Screening Study - Sites 12, 68, 75, 76, 84, 85 and 87 (Baker Environmental, Inc., 1998)

As part of the Pre-RI Screening Study, surface soil, groundwater, surface water, and sediment samples were obtained from Site 84 (Building 45 Area). It is noted that the Pre-RI Screening Study incorporated data collected in 1995 as part of the Relative Risk Ranking (RRR) Study (discussed in the previous section).

In 1998 soil samples were collected from 31 soil borings at two depth intervals (0 - 6 inches bgs and 6 - 12 inches bgs). All 62 samples were field-screened for PCBs, and based on the results of the field screening, 28 samples were selected for laboratory analysis. When combined with the 20 samples collected in 1995, a total of 48 surface soil samples were included in the Pre-RI Screening Study. Analysis of the surface soil samples confirmed the presence of PCBs at the site. Figure 1-5 presents surface soil sampling locations and detections (laboratory data only). The area of concern, as shown on Figure 1-5, is defined by concentrations exceeding the conservative USEPA Region III Residential Risk Based Concentration (RBC) for soils (320 µg/kg). [USEPA Region III RBCs were the screening values used at the time this study was conducted. NCDENR currently uses USEPA Region IX preliminary remediation goals (PRGs) as screening criteria.] Figure 1-6 presents the same data with the area of concern defined by the less conservative clean-up standard for low occupancy use (25,000 µg/kg).

Groundwater was collected from two permanent and one temporary monitoring well in 1995 and from six permanent monitoring wells in 1998. Samples were analyzed for PCBs in 1995 and for VOCs in 1998. Figure 1-7 presents sampling locations and positive detections in groundwater. No PCBs were detected in groundwater. VOCs were detected in four of six samples.

In 1995, surface water and sediment samples were collected from four stations in the lagoon and from three stations along the bank of Northeast Creek. These samples were analyzed for PCBs. In 1998, four additional sediment and seven additional surface water samples were collected from the lagoon. Samples from locations one through six were analyzed for PCBs. The sample (only surface water was collected) from location seven was analyzed for VOCs and SVOCs. Figure 1-8 presents positive detections of PCBs in sediment. SVOC and VOC detections in sediment are reported on Table 1-1F. There were no PCB detections in surface water of Northeast Creek or the lagoon. Four VOCs were detected in lagoon surface water sample 84-SW07-98B at concentrations below screening criteria.

Table 1-1F summarizes the analytical results of the Pre-RI Screening Study. The risk assessment performed as part of this study did not identify a potential risk to the receptors considered. Recommendations for Site 84 included an immediate removal action for the sediments in the lagoon and the implementation of a supplemental investigation, which would focus on soil contamination.

1.5.9 Draft Engineering Evaluation/ Cost Analysis (Baker Environmental, Inc., 1998)

An Engineering Evaluation/Cost Analysis (EE/CA) was prepared to present removal action options for the non-TCRA of PCB-contaminated sediments and soil in and near the lagoon at Site 84. The EE/CA calculated a risk-based remediation goal of 1.0 part per million (ppm) PCBs in soils. This remediation goal was based on the results of a human health baseline risk assessment using site-specific exposure information and addressing contaminants of potential concern selected in the Pre-Remedial Investigation. The clean-up goal was designed to be protective of future adult and adolescent recreational users. This report, along with the Draft Action Memorandum (Baker, 1999), was not finalized because the removal action was delayed to allow for more complete PCB delineation at the site.

1.5.10 Draft Action Memorandum, Site 84 - The Building 45 Area (Baker Environmental, Inc. 1999)

The Action Memorandum serves as the decision document for the EE/CA for Site 84 (Baker, 1998). The memorandum describes the removal action and documents the approval of the action by the regulating body and the community. The removal action selected for PCB contaminated

soils at Site 84 was excavation of sediment and soils and treatment with an innovative chemical dechlorination process (Coralplex process); backfilling with remediated soil; and revegetation. Confirmatory sampling was included as part of the removal action, as was off-site disposal of decontamination liquids and surface water from lagoon. The Action Memorandum acknowledged that the source of PCB contamination at Site 84 was uncertain and that the vertical and horizontal extent of contamination had not been completely defined. Further sampling was recommended before the cleanup action was to take place. This memorandum was not finalized and no soil removal had occurred at the site as of the time of the RI field investigation.

1.5.11 GW-UST 12 Report, UST Removal at Building 45 (J.A. Jones, 1999)

J.A. Jones performed a UST removal action at Building 45 for UST 45-1 in July 1999. UST 45-1 was listed as a 500-gallon tank used for storing heating oil. A total of six confirmatory samples were collected and analyzed for TPH-DRO and GRO. Results indicated levels of TPH-DRO between non-detect and 13,000 mg/kg and levels of TPH-GRO between non-detect and 5,800 mg/kg. J.A. Jones concluded that the detected petroleum hydrocarbon contamination might not be from the UST. Based on the long industrial operation history at Building 45, it was suggested that the contamination might have come from other unidentified source(s). No recommendations for further action were given. Locations of the sampling points are shown on Figure 1-4 and analytical results are presented in Table 1-1G.

1.5.12 Concrete Chip and Surface Water Sampling, Building 45 - Former Electric Substation (Baker Environmental, Inc., 1999)

In preparation for razing and off-site disposal of material from the aboveground portions of Building 45, Baker collected five concrete chip samples and four water samples (from sumps within the basement of the building) at the former electric substation building (Building 45) in August 1999. Two of the concrete chip samples were collected from the ground floor of the building and were analyzed for PCBs by EPA method 8082. The other three concrete chip samples were collected from walls (two samples) and a concrete pad (one sample) from the basement of the building. It was originally proposed that sludge samples be collected from drains in the basement of the building. Upon inspection of the drains, no sludge was found. Samples of ponded water from a floor drain and three subbasement floor areas were collected instead. The concrete chip samples were analyzed by TCLP procedures for VOCs, SVOCs and metals.

No VOCs or SVOCs were detected. Concrete samples were also analyzed for PCBs by EPA Method 8082. Aroclor 1260 was detected in four of the five chip samples at concentrations ranging from 54 to 300 µg/kg. Acetone and carbon disulfide were the only VOCs detected in water samples, but at low concentrations. SVOCs were detected in only one sample, BLDG 45-W-03, located in the center subbasement area. This sample contained 15 SVOCs (primarily PAHs). Aroclor 1260 was detected in one water sample (BLDG 45-W-01 from the floor drain) at a concentration of 17 µg/L. A Final Trip Report (Baker, September 1999) was submitted to LANTDIV on these activities. Analytical results are presented in Table 1-1H.

The above ground portions of Building 45 were removed in 1999, with the foundation left in place. Removal of the foundation is planned to take place in 2002. A Draft non-TCRA report has been prepared that details this effort. The non-TCRA will address the foundation and removal of a limited amount of impacted soil local to Building 45.

1.5.13 Conclusions From Previous Investigations

Previous investigations at Site 84/Building 45 Area have been directed toward the USTs/ASTs associated with Building 45 (Equipment and Maintenance Shop). These investigations have concentrated on TPH, VOC, oil and grease, PCB and PAH contamination. The presence of Petroleum contamination and specifically free product east of former Building 45 is especially noteworthy. This portion of the site is being addressed as part of the UST program with an in-situ air sparging/soil vapor extraction system maintained by J.A. Jones. Further, while reviewing the J.A. Jones figures (specifically, Figure 1-13) and historical drawings from 1944 (see Appendix A) it was noted that two septic systems exist at Site 84 that were not investigated as part of the previous work. It may be necessary to collect additional information regarding these features. This would include verifying the existence of the tanks and/or associated leach fields, an assessment of the type(s) of wastewater that entered the system, sludge samples from the tanks (if they exist), and potentially soil/groundwater samples near the tanks and/or leach fields.

Baker's Relative Risk Ranking System Data Collection Investigation (1995) and Pre-RI Screening Study (1998) was predicated on the discovery of transformers in the lagoon and the detection of PCBs in the soil. Surface soil analyses indicated PCB contamination in the area of the lagoon and Building 45. The highest concentrations of Aroclor 1260 in the surface soil were detected approximately midway between the lagoon and Building 45. Groundwater samples were collected from specific existing wells at Site 84. Analysis was initially for PCBs; however,

following review of the initial analytical results, additional groundwater samples were collected from existing wells nearer to Building 45. Initial analyses indicated no PCBs above detection limits. Additional analyses for VOCs indicated BTEX constituents and chloroform above screening standards. Surface water samples collected from the lagoon where transformers were discovered and removed did not exhibit PCB contamination, but did exhibit BTEX concentrations below screening standards. Sediment samples collected from the lagoon exhibited PCB, VOC, SVOC and TPH-DRO above screening standards.

Based on the results of the Pre-RI Screening Study, and results of other previous investigations, it was recommended that a Remedial Investigation/Feasibility Study (RI/FS) be conducted at Site 84/Building 45 Area to assess the extent of potential contamination. CTO-0219 (CLEAN II) was designated for this effort

1.6 References

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United States Environmental Protection Agency (USEPA). 54 Federal Register 41015. October 4, 1989.



TABLES

TABLE 1-1A

**SUMMARY OF PREVIOUS INVESTIGATIONS RESULTS
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJEUNE, NORTH CAROLINA**

<i>UST Site Check Investigation Report, Building 45, UST S-941-2 (ATEC Associates, Inc., 1992)</i>			
Soil Analyses			
Sample Number	TPH (Method 8015)	BTEX	
	(mg/kg)	(µg/kg)	
MW1-S	300	Benzene	6,200
		Toluene	27,000
		Ethylbenzene	3,800
		Total Xylenes	17,000
MW2-S	2,500	Benzene	2,300
		Toluene	1,3000
		Ethylbenzene	3,600
		Total Xylenes	1,900
MW3-S	<1.0	Benzene	180
		Toluene	360
		Ethylbenzene	49
		Total Xylenes	180
Groundwater Analyses			
Sample Number	TPH	BTEX	
	(mg/L)	(µg/L)	
MW1-W	6.5	Benzene	9,800
		Toluene	16,000
		Ethylbenzene	1,000
		Total Xylenes	4,700
MW2-W	0.53	Benzene	290
		Toluene	69
		Ethylbenzene	<5
		Total Xylenes	83
MW3-W	<10.0	Benzene	10
		Toluene	<5
		Ethylbenzene	<5
		Total Xylenes	22

TABLE 1-1B

**SUMMARY OF PREVIOUS INVESTIGATIONS RESULTS
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA**

Site Assessment, Tank S-781, Midway Park (O'Brien and Gere, 1992)

Soil Analyses		
Sample Number	TPH (mg/kg)	
B 1 (4-6 feet)	11.1	
B 1 (9-11 feet)	6.84	
B 2 (4-6 feet)	8.12	
B 2 (11-13 feet)	9.57	
B 3 (4-6 feet)	7.89	
B 4 (4-6 feet)	12,000	
B 4 (9-11 feet)	11,000	
MW2 (9-11 feet)	18.6	
MW2 (14-16 feet)	14.6	
MW4 (9-11 feet)	15.4	
MW4 (14-16 feet)	255.0	
MW6 (9-11 feet)	14.0	
MW6 (14-16 feet)	12.6	
MW8 (0-2 feet)	6.72	
MW8 (4-6 feet)	22.8	
MW10 (4-6 feet)	16.7	
MW10 (9-11 feet)	8.38	
MW12 (4-6 feet)	7.32	
MW12 (9-11 feet)	9.11	
MW14 (0-2 feet)	4.32	
MW14 (2-4 feet)	11.4	
Groundwater Analyses (Hydropunch)		
Sample Number	Volatile Organic Compounds (µg/L)	
H5	1,3-Dichlorobenzene	6
	1,4-Dichlorobenzene	84

TABLE 1-1C

SUMMARY OF PREVIOUS INVESTIGATIONS RESULTS
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJEUNE, NORTH CAROLINA

<i>Five Well Site Check and Resample One Existing Well (R.E. Wright Associates, Inc., 1994)</i>								
Soil Analyses								
Sample Number	Oil and Grease	Halogenated Solvents	Naphthalene	1,2,4-Trimethylbenzene	Semivolatiles	Volatiles	Inorganics	
MW-1 (4-6')	1,200	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-2 (4-6')	2,400	BDL	0.008	0.010	BDL	BDL	BDL	BDL
MW-3 (6-8')	4,700	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-3 (Duplicate)	2,300	BDL	BDL	BDL	NA	NA	NA	NA
MW-4 (6-8')	420	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-5 (6-8')	2,400	BDL	BDL	BDL	BDL	BDL	BDL	BDL
MW-5 Duplicate	1,300	BDL	BDL	BDL	NA	NA	NA	NA
Groundwater Analyses								
Sample Number	Total VOCs	Benzene	Total PAHs	Naphthalene	RCRA Metals			
MW-1	BDL	5.4	BDL	BDL	BDL			
MW-2	BDL	BDL	BDL	8	BDL			
MW-2 (Duplicate)	BDL	BDL	BDL	10	BDL			
MW-3	BDL	BDL	BDL	BDL	BDL			
MW-3 (Duplicate)	BDL	BDL	BDL	BDL	BDL			
MW-4	BDL	BDL	BDL	BDL	BDL			
MW-5	BDL	BDL	BDL	BDL	BDL			
MW-16	BDL	BDL	BDL	BDL	BDL			

TABLE 1-1D

SUMMARY OF PREVIOUS INVESTIGATIONS RESULTS
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJEUNE, NORTH CAROLINA

<i>Leaking UST Site Assessment Report, Building 45, UST S-941-2 (Law Engineering, Inc., 1994)</i>									
Soil Analyses									
Sample Location	Sample ID Number	Sample Depth (feet)	Laboratory Results				pH		
			TPH-GRO (mg/kg)	TPH-DRO (mg/kg)	Total Lead (mg/kg)	TCLP Lead (µg/L)			
MW-4	S-1	3.0 - 4.5	ND	ND	8.3	47	4.9		
MW-4	S-2	8.5 - 10.0	ND	ND	NA	NA	NA		
MW-5	S-3	3.5 - 4.0	ND	ND	ND	NA	NA		
MW-5	S-4	8.5 - 10.0	ND	ND	NA	NA	NA		
MW-7	S-5	1.5 - 3.0	ND	ND	7.5	40	6.5		
MW-8	S-6	3.0 - 4.5	ND	ND	NA	NA	NA		
MW-10	S-7	1.5 - 3.0	ND	ND	9.9	NA	NA		
PW-1	S-8	1.5 - 3.0	ND	ND	8.5	70	5.6		
SB-1	S-9	1.5 - 3.0	ND	ND	9.7	NA	7.0		
SB-2	S-10	1.5 - 3.0	ND	ND	NA	NA	NA		
SB-3	S-11	3.0 - 4.5	700	190	6.2	NA	6.8		
SB-4	S-12	3.0 - 4.5	ND	ND	ND	NA	7.4		
Groundwater Analyses									
Well #	Screened Interval (ft.)	Laboratory Analyses ^U					Lead		
		Benzene	Ethylbenzene	Toluene	Total Xylenes	MTBE			
MW-4	6 - 21	ND	ND	ND	ND	ND	59		
MW-5	4.5 - 19.5	ND	ND	ND	ND	ND	---		
MW-6	45 - 50	ND	ND	ND	ND	ND	---		
MW-7	3 - 23	ND	ND	ND	ND	ND	84		
MW-8	4 - 19	ND	ND	ND	ND	ND	20		

**SUMMARY OF PREVIOUS INVESTIGATIONS RESULTS
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA**

Notes:	All results are µg/L
(1)	Monitoring Well Location
MW	Soil Boring Location
SB	Pumping Well Location
PW	Hydropunch Location
HP	Not Detected
ND	Not available
NA	Sample not analyzed for this parameter
----	Methyl tert-butyl ether
MTBE	

TABLE 1-1E

**SUMMARY OF PREVIOUS INVESTIGATIONS RESULTS
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA**

<i>Relative Risk Ranking System Data Collection Investigation (Baker Environmental, Inc., 1995)</i>	
Soil Analyses	
Sample Number	PCBs (µg/kg) Aroclor-1260
CL-84-S-1 (0-6 inches)	12000
CL-84-S-2 (6-12 inches)	1700
CL-84-S-3 (0-6 inches)	4400
CL-84-S-4 (6-12 inches)	12000
CL-84-S-5 (0-6 inches)	5300
CL-84-S-6 (6-12 inches)	5700
CL-84-S-7 (0-6 inches)	6200
CL-84-S-8 (6-12 inches)	2300
CL-84-S-9 (0-6 inches)	5000
CL-84-S-A (6-12 inches)	4300 P
CL-84-S-B (0-6 inches)	1300 P
CL-84-S-C (6-12 inches)	2800
CL-84-S-D (0-6 inches)	360 P
CL-84-S-E (6-12 inches)	880
CL-84-S-F (0-6 inches)	2500
CL-84-S-G (6-12 inches)	6100
CL-84-S-H (0-6 inches)	12000
CL-84-S-I (6-12 inches)	10000
CL-84-S-J (0-6 inches)	1100
CL-84-S-K (6-12 inches)	7500
Groundwater Analysis – No detections	
Surface Water Analysis – No detections	
Sediment Analyses (0-6 inches bgs)	
Sample Number	PCBs (µg/L)
CL-84-E-1	No detections
CL-84-E-2	No detections
CL-84-E-4	No detections
CL-84-E-5	Aroclor-1248 2800 Aroclor-1260 20000
CL-84-E-6	Aroclor-1260 8100
CL-84-E-7	Aroclor-1260 17000
CL-84-E-8	Aroclor-1260 3700

TABLE 1-1F

**SUMMARY OF PREVIOUS INVESTIGATIONS RESULTS
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIATION INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA**

Pre-RI Screening Study (Baker Environmental, Inc., 1998)								
Media	Fraction	Detected Contaminants or Analytes	Comparison Criteria	Min.	Max.	Location of Maximum Detection	Detection Frequency	Detections Above Screening Standard
Surface Soil (0-6") Surface Soil (6-12") Groundwater	PCBs	Aroclor-1260	320 / 1,000 ⁽¹⁾	110J	26,000	84-SB27	19/24	19/24 – 7/24
	PCBs	Aroclor-1260	320 / 1,000 ⁽¹⁾	62J	200,000	84-SB27	18/24	18/24 – 11/24
	Volatiles	Chloroform	0.19 / NE ⁽²⁾	16	16	AST781-GW11-98B AST781-GW12-98B	2/7	2/7 – NE
		Benzene	1.0 / 5.0 ⁽²⁾	1.5J	3.4J	AST781-GW03-98B	3/7	3/7 – 0/7
Ethylbenzene		29 / 700 ⁽²⁾	3.6J	6.7J	AST781-GW04-98B	3/7	0/7 – 0/7	
Surface Water	PCBs	ND	NA	ND	ND	ND	0/7	NA
	Volatiles	Acetone	NE	5.6J	5.6J	84-SW07	1/1	NA
		Benzene	53 ⁽³⁾	1.2J	1.2J	84-SW07	1/1	0/1
		Toulene	175 ⁽³⁾	2.7J	2.7J	84-SW07	1/1	0/1
Sediment		Xylenes (total)	NE	3.5J	3.5J	84-SW07	1/1	NA
		ND	NA	ND	ND	ND	0/1	NA
		ND	NA	ND	ND	ND	0/9	NA
	Volatiles	Xylenes (total)	NE	910J	910J	84-SD07	1/1	NA
		Naphthalene	160 ⁽⁴⁾	2,000	2,000	84-SD07	1/1	1/1
		Phenanthrene	240 ⁽⁴⁾	2,500	2,500	84-SD07	1/1	1/1
	Diesel Range Organics	Bis(2-Ethylhexyl)phthalate	NE	2,400J	2,400J	84-SD07	1/1	NA
		TOTAL	NE	3500	14000	84-SD01	NA	NA
		2-Methylnaphthalene	70 ⁽⁴⁾	10,000	10,000	84-SD07	1/1	1/1
	PCBs	Aroclor-1248	22.7 ⁽⁴⁾⁽⁵⁾	2,800	2,800	84-SD05	1/11	1/11
Aroclor-1260		22.7 ⁽⁴⁾⁽⁵⁾	3,700	49,000	84-SD01	8/11	8/11	
Notes: - Concentration are presented in µg/kg for solids (ppb).								

Notes: - Concentration are presented in $\mu\text{g/kg}$ for solids (ppb).

NA - Not applicable

NE - Not established

ND - Not detected

⁽¹⁾ USEPA Region III Residential RBCs/TSCA (Toxic Substances Control Act) Clean-up Criteria

⁽²⁾ NC WQC (North Carolina Water Quality Criteria) for groundwater / USEPA Maximum Contaminant Level

⁽³⁾ Supplemental Guidance to RAGS: Region 4 Bulletins Ecological Risk Assessment

⁽⁴⁾ Long, et. al., 1995

⁽⁵⁾ Value for Total PCBs

TABLE 1-1G

**SUMMARY OF PREVIOUS INVESTIGATIONS RESULTS
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJEUNE, NORTH CAROLINA**

<i>GW-UST 12 Report, UST Removal at Building 45 (J.A. Jones, Inc., 1999)</i>						
Soil Analyses						
Sample ID	Date	Depth (ft)	FID (ppm)	PID (ppm)	TPH-DRO (ppm)	TPH-GRO (ppm)
Bldg. 45	7/22/99	6" below UST	2.0	0.0	220	BDL
45 - 1	8/5/99	8" below UST	--	--	BDL	BDL
45 - 2	8/5/99	9" below UST	--	--	100	3.9
45 - 3	8/5/99	12" below UST	--	--	37	BDL
45 - 4	8/5/99	15" below UST	--	--	110	2.5
45 - 5	8/5/99	12" below UST	--	--	13,000	5,800

TABLE 1-1H

SUMMARY OF PREVIOUS INVESTIGATIONS RESULTS
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

<i>Trip Report, Site 85 - Building 45 Area (Baker Environmental, Inc., 1999)</i>						
Concrete Analyses						
Sample ID	Date	TCLP VOCs (mg/L)	TCLP SVOCs (mg/L)	TCLP Metals (mg/L)	TCLP Mercury (mg/L)	PCBs (µg/kg)
BLDG 45-C-01	8/19/99	ND	ND	ND	ND	AR 1260 (160)
BLDG 45-C-02	8/19/99	ND	ND	ND	ND	AR 1260 (300)
BLDG 45-C-03	8/19/99	ND	ND	CR (0.23)	ND	AR 1260 (220)
BLDG 45-C-04	8/19/99	ND	ND	ND	ND	ND
BLDG 45-C-05	8/19/99	ND	ND	ND	ND	AR 1260 (54)

Aqueous Analyses						
	BLDG 45-W-01	BLDG 45-W-02	BLDG 45-W-03	BLDG 45-W-04		
<i>Volatiles (µg/L):</i>						
Acetone	ND	ND	43	ND		
Carbon Disulfide	1.5	3.5	ND	ND		
<i>Semivolatiles (µg/L):</i>						
Acenaphthene	ND	ND	68	27		
Dibenzofuran	ND	ND	50	23		
2,4-Dinitrotoluene	ND	ND	ND	17		
Fluorene	ND	ND	70	27		
Phenanthrene	ND	22	390	130		
Anthracene	ND	ND	100	38		
Fluoranthene	ND	26	480	140		
Pyrene	ND	15	250	91		
Benzo(a)anthracene	ND	ND	180	59		
Bis(2-Ethylhexyl)phthalate	ND	ND	ND	10		
Chrysene	ND	11	200	66		
Benzo(b)fluoranthene	ND	ND	140	49		
Benzo(k)fluoranthene	ND	ND	180	58		
Benzo(a)pyrene	ND	ND	150	50		

TABLE 1-1H (Continued)

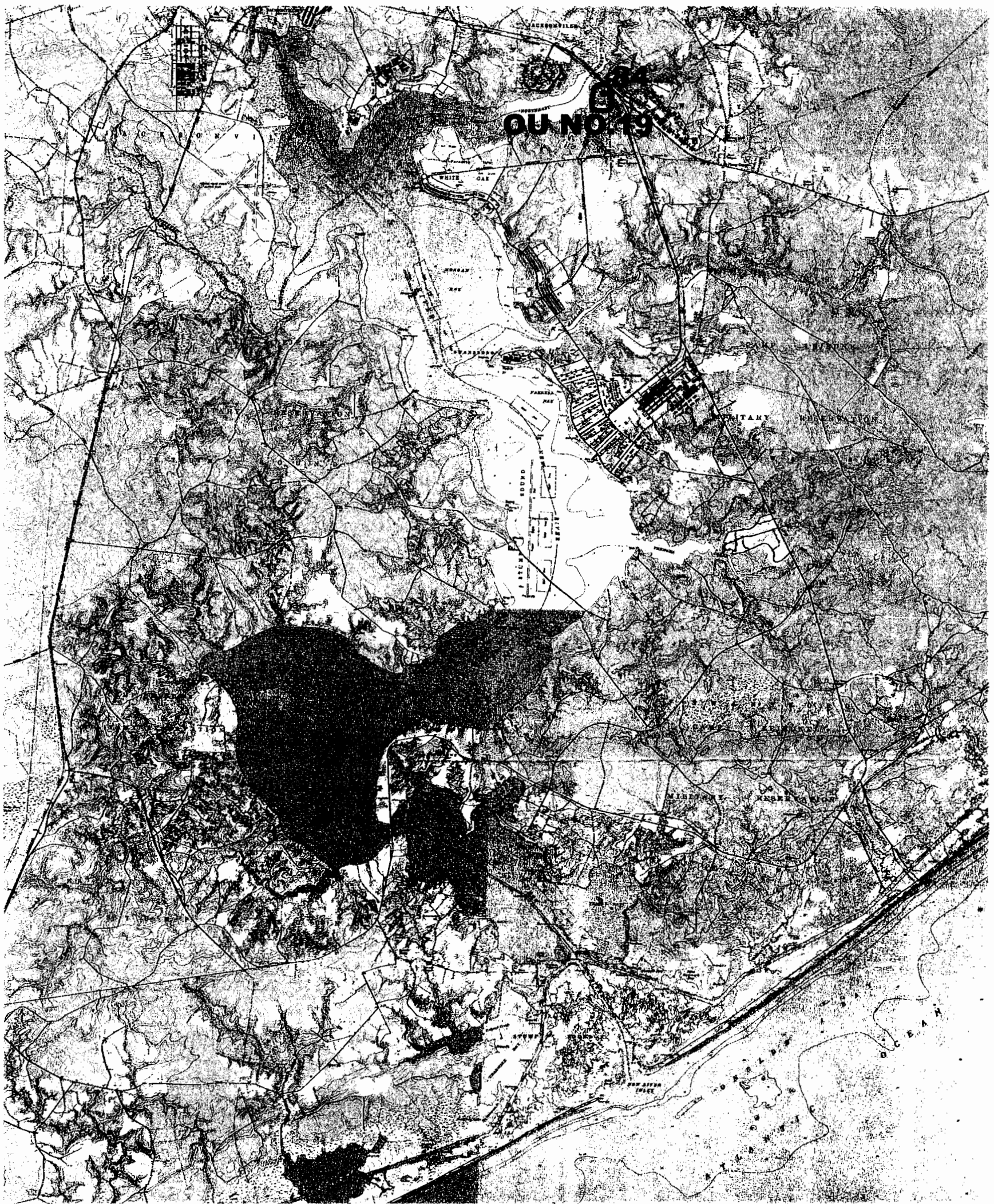
SUMMARY OF PREVIOUS INVESTIGATIONS RESULTS
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJEUNE, NORTH CAROLINA

Aqueous Analyses				
	BLDG 45-W-01	BLDG 45-W-02	BLDG 45-W-03	BLDG 45-W-04
Indeno(1,2,3-cd)pyrene	ND	ND	75	22
Benzo(g,h,i)perylene	ND	ND	71	17
Carbazole	ND	ND	180	73
PCBs ($\mu\text{g/L}$):				
Aroclor 1260	17	ND	ND	ND
Metals (mg/L):	Various	Various	Various	Various

NOTES:

ND – non-detect

FIGURES



8000 0 4000 8000
1 inch = 8000 ft.

Baker
Baker Environmental, Inc.

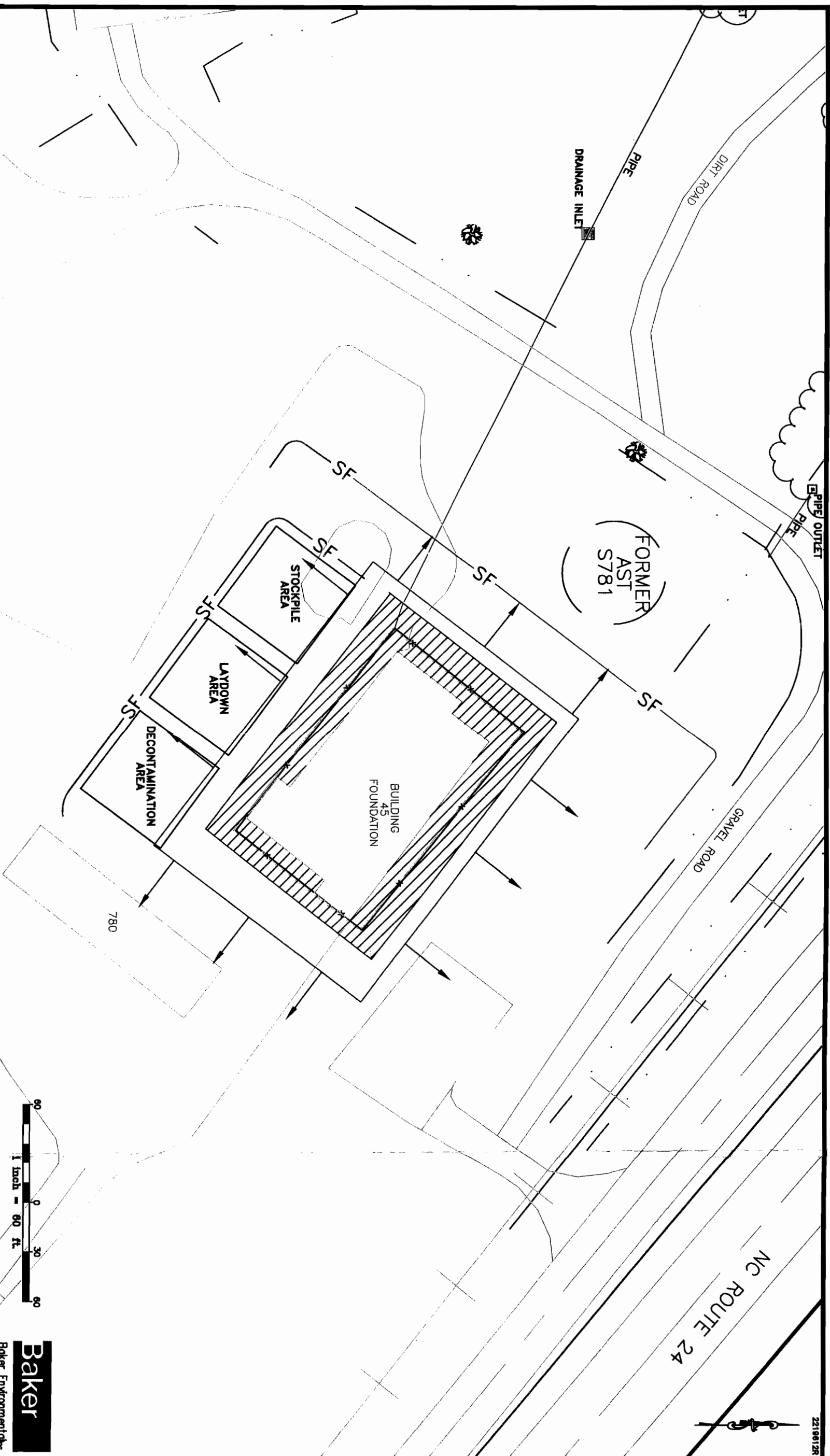
2219540R

LEGEND

**FIGURE 1-1
SITE LOCATION MAP
SITE 84 - REMEDIAL INVESTIGATION
CTO - 0219**

SOURCE: U.S.G.S. QUADRANGLES JACKSONVILLE SOUTH, CAMP LEJEUNE, SNEADS FERRY AND NEW RIVER INLET.

**MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA**



2219612R

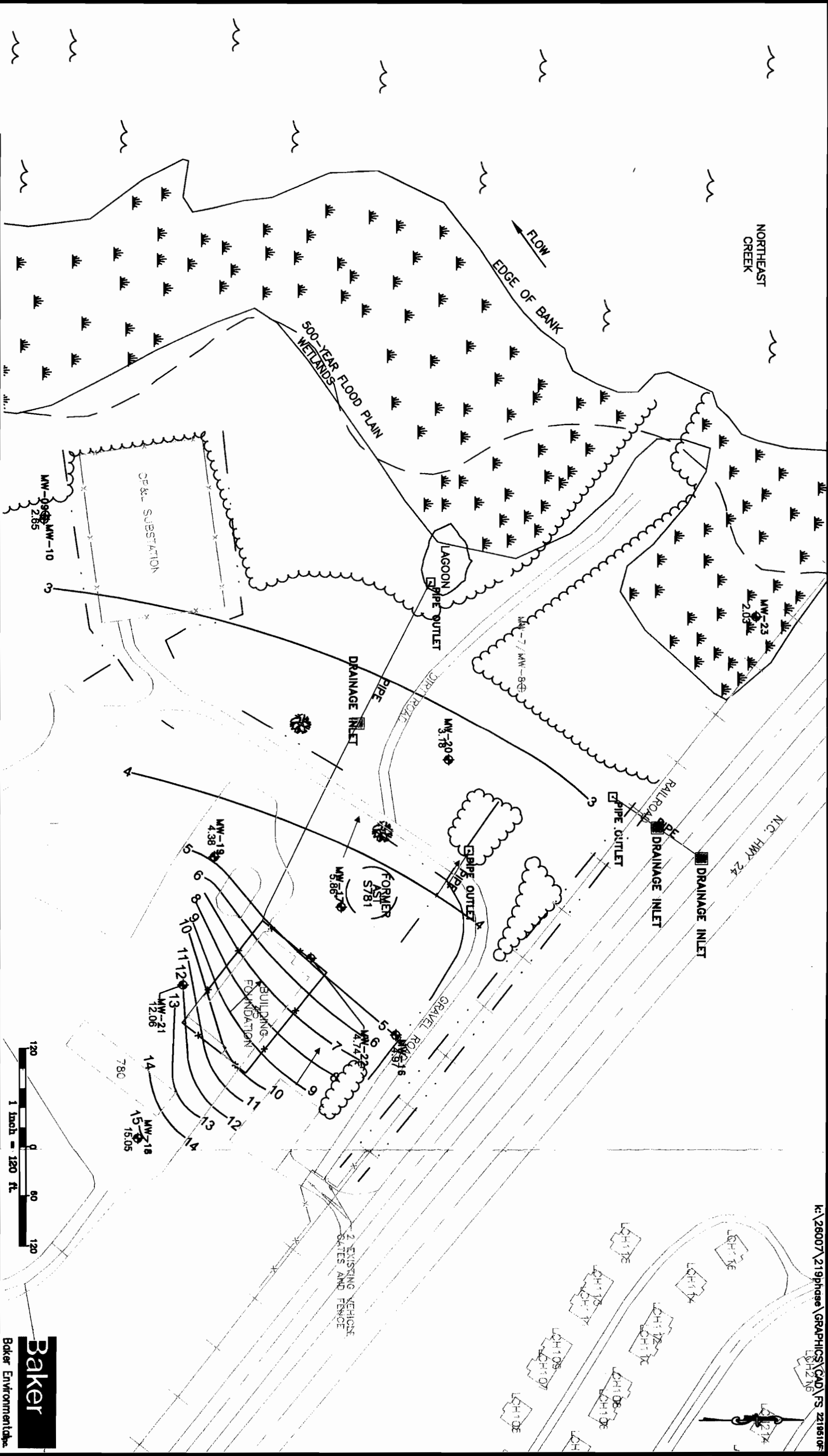
Baker
Baker Environmental Inc.

LEGEND

- ASSUMED EXCAVATION AREA
- TEMPORARY SAFETY FENCE
- TEMPORARY SILT FENCE
- FENCE TO BE REMOVED
- LIMITS OF EXCAVATION (NO EXCAVATION TO BE DONE BEYOND THIS LIMIT)

FIGURE 1-2

**BUILDING 45 FOUNDATION DEMOLITION
INTERIM RESPONSE ACTION
SITE 84
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA**



LEGEND

- INTERMITTENT DRAINAGE SWALE
- TREE LINE
- WETLANDS
- TREE
- GRAVEL ROAD
- FORMER BUILDING
- APPROXIMATE WETLAND BOUNDARY
- FENCE
- RAIL ROAD

- EXISTING MONITORING WELL (1992)
- NEW MONITORING WELL (2001)
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- 14-- GROUNDWATER ELEVATION (FT. ABOVE, MSL)

NOTE:
* GROUNDWATER ELEVATIONS FROM MW-17 WERE NOT
USED DURING GROUNDWATER CONTOUR CALCULATIONS

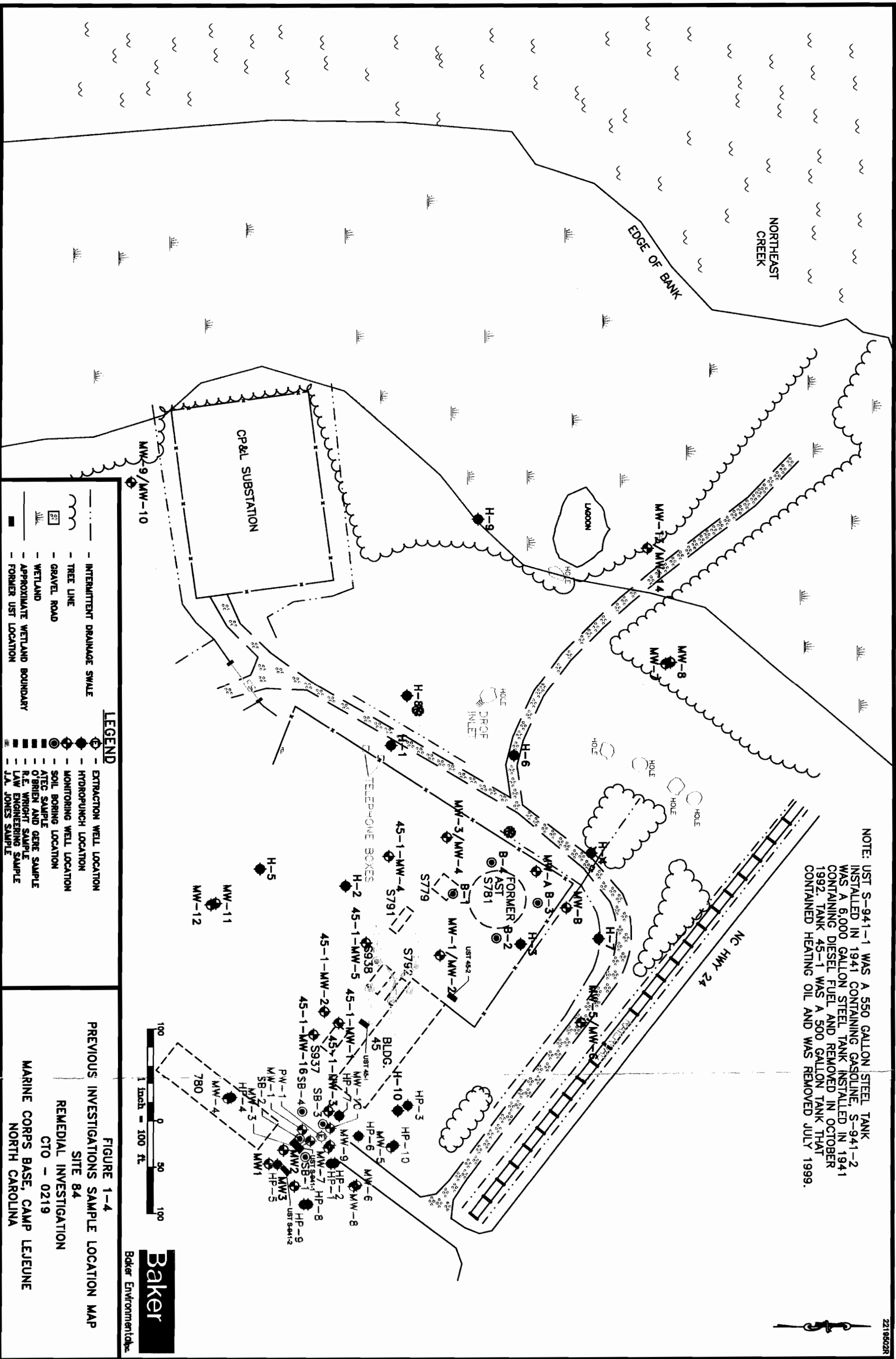
FIGURE 1-3

**GROUNDWATER CONTOUR MAP
SITE 84 FEASIBILITY STUDY**

**CTO 0219
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA**

Baker
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NOTE: UST S-941-1 WAS A 550 GALLON STEEL TANK
INSTALLED IN 1941 CONTAINING GASOLINE. S-941-2
WAS A 6,000 GALLON STEEL TANK INSTALLED IN 1941
CONTAINING DIESEL FUEL AND REMOVED IN OCTOBER
1992. TANK 45-1 WAS A 500 GALLON TANK THAT
CONTAINED HEATING OIL AND WAS REMOVED JULY 1999.



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Baker Environmental

NORTHEAST
CREEK

EDGE OF BANK

LOCATION	SB28-00
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB28-01
DATE SAMPLED	4/23/98
DEPTH	0.5-1.0'
AROCLOR-1260	ND

LOCATION	SB28-00
DATE SAMPLED	4/16/98
DEPTH	0-0.5'
AROCLOR-1260	3900

LOCATION	SB28-00
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	5800

LOCATION	SB28-00
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	1500 J

LOCATION	SB28-00
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	1000

LOCATION	SB28-01
DATE SAMPLED	4/23/98
DEPTH	0.5-1.0'
AROCLOR-1260	110

LOCATION	SB01A
DATE SAMPLED	10/26/95
DEPTH	0-0.5'
AROCLOR-1260	12000

LOCATION	SB01B
DATE SAMPLED	10/26/95
DEPTH	0.5-1.0'
AROCLOR-1260	1700

LOCATION	SB09A
DATE SAMPLED	10/26/95
DEPTH	0-0.5'
AROCLOR-1260	12000

LOCATION	SB09B
DATE SAMPLED	10/26/95
DEPTH	0.5-1.0'
AROCLOR-1260	10000

LOCATION	SB03-00
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	4300

LOCATION	SB08-01
DATE SAMPLED	4/23/98
DEPTH	0.5-1.0'
AROCLOR-1260	120

LOCATION	SB10A
DATE SAMPLED	10/26/95
DEPTH	0-0.5'
AROCLOR-1260	1100

LOCATION	SB31-00
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB31-01
DATE SAMPLED	4/23/98
DEPTH	0.5-1.0'
AROCLOR-1260	ND

LOCATION	SB04-00
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	6200

LOCATION	SB04A/B
DATE SAMPLED	4/23/98
DEPTH	0.5-1.0'
AROCLOR-1260	2300

LOCATION	SB15-00
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	6800

LOCATION	SB15-01
DATE SAMPLED	4/23/98
DEPTH	0.5-1.0'
AROCLOR-1260	530 J

LOCATION	SB03-00
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	5300

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB04A/B
DATE SAMPLED	4/23/98
DEPTH	0.5-1.0'
AROCLOR-1260	2300

LOCATION	SB04A/B
DATE SAMPLED	4/23/98
DEPTH	0.5-1.0'
AROCLOR-1260	2300

LOCATION	SB04A/B
DATE SAMPLED	4/23/98
DEPTH	0.5-1.0'
AROCLOR-1260	2300

LOCATION	SB04A/B
DATE SAMPLED	4/23/98
DEPTH	0.5-1.0'
AROCLOR-1260	2300

LOCATION	SB04A/B
DATE SAMPLED	4/23/98
DEPTH	0.5-1.0'
AROCLOR-1260	2300

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LOCATION	SB06A/B
DATE SAMPLED	4/23/98
DEPTH	0-0.5'
AROCLOR-1260	ND

LEGEND

- SOIL SAMPLING LOCATION - OCTOBER 1995 (RRR STUDY)
- SOIL SAMPLING LOCATION - MARCH 1998 (PRE-RI STUDY)
- SOIL SAMPLE NOT ANALYZED AT FIXED BASE LABORATORY
- HOLE
- SWALE
- GRAVEL ROAD
- TREE LINE



FIGURE 1-5

RESULTS OF PRE-RI SCREENING STUDY-PCBs IN SURFACE SOILS
AREA OF CONCERN DEFINED BY USEPA REGION III RBCs

REMEDIAL INVESTIGATION
SITE 84

CTO - 0219

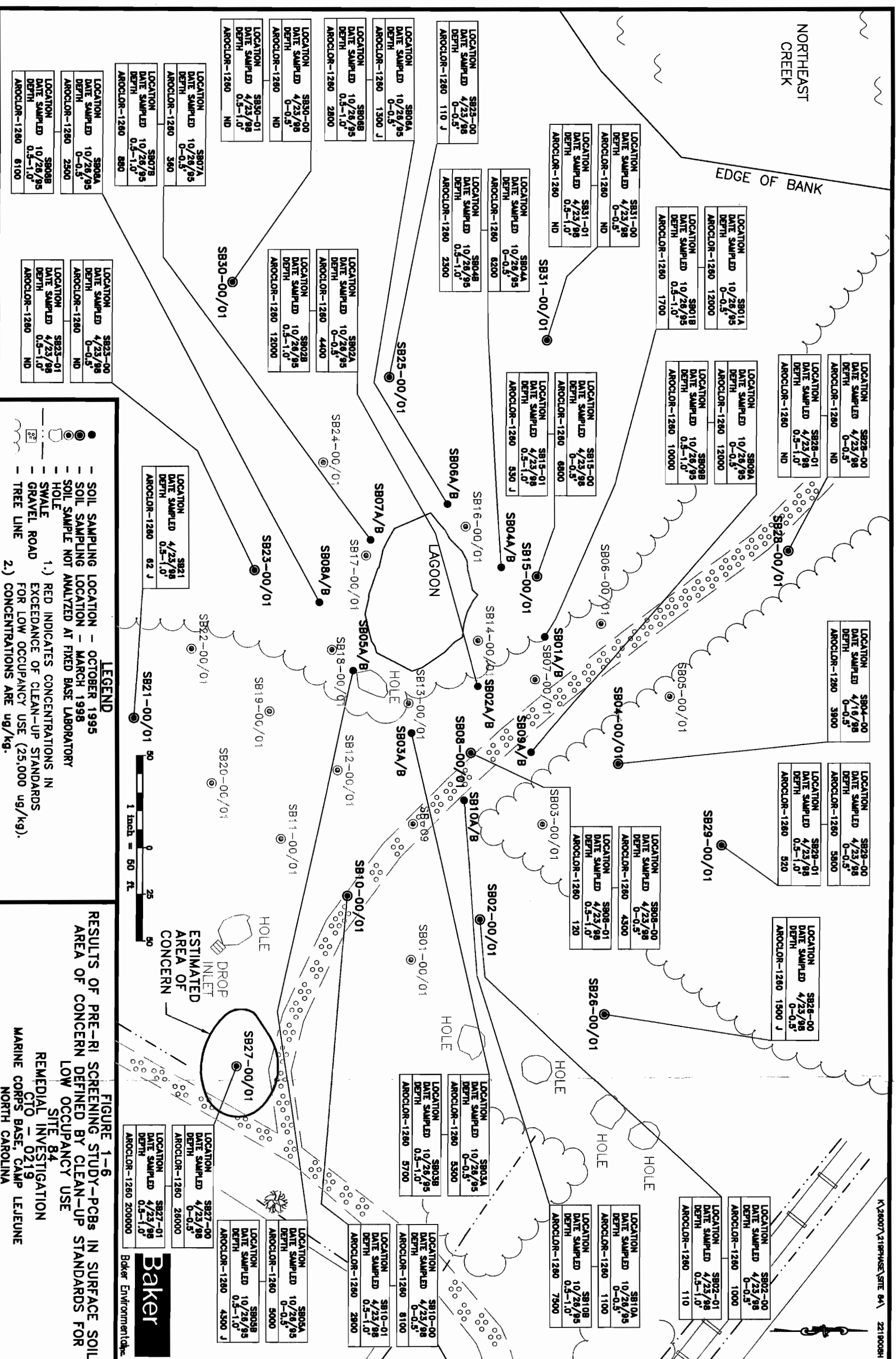
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

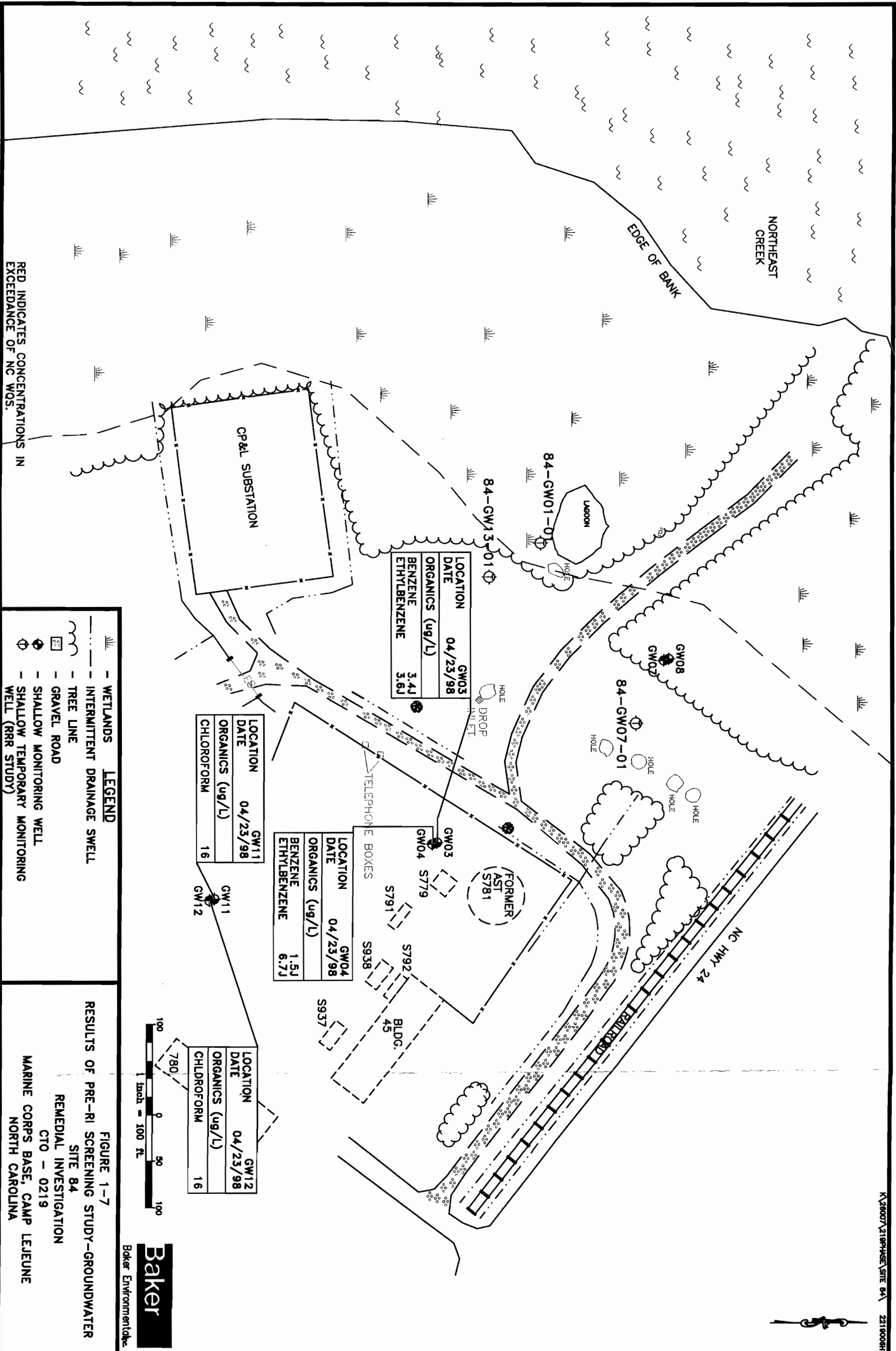
Baker

Baker Environmental

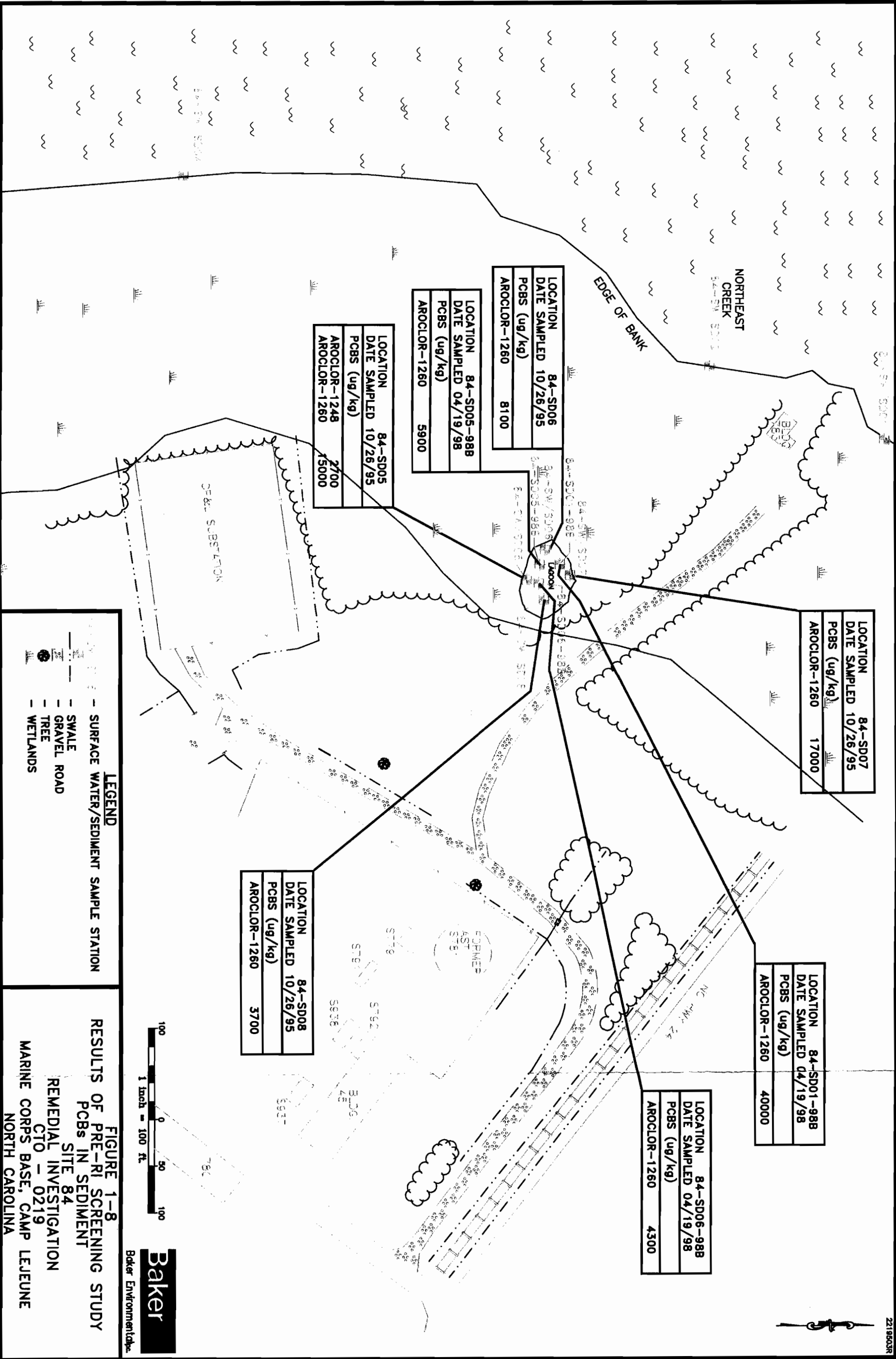
NORTHEAST
CREEK

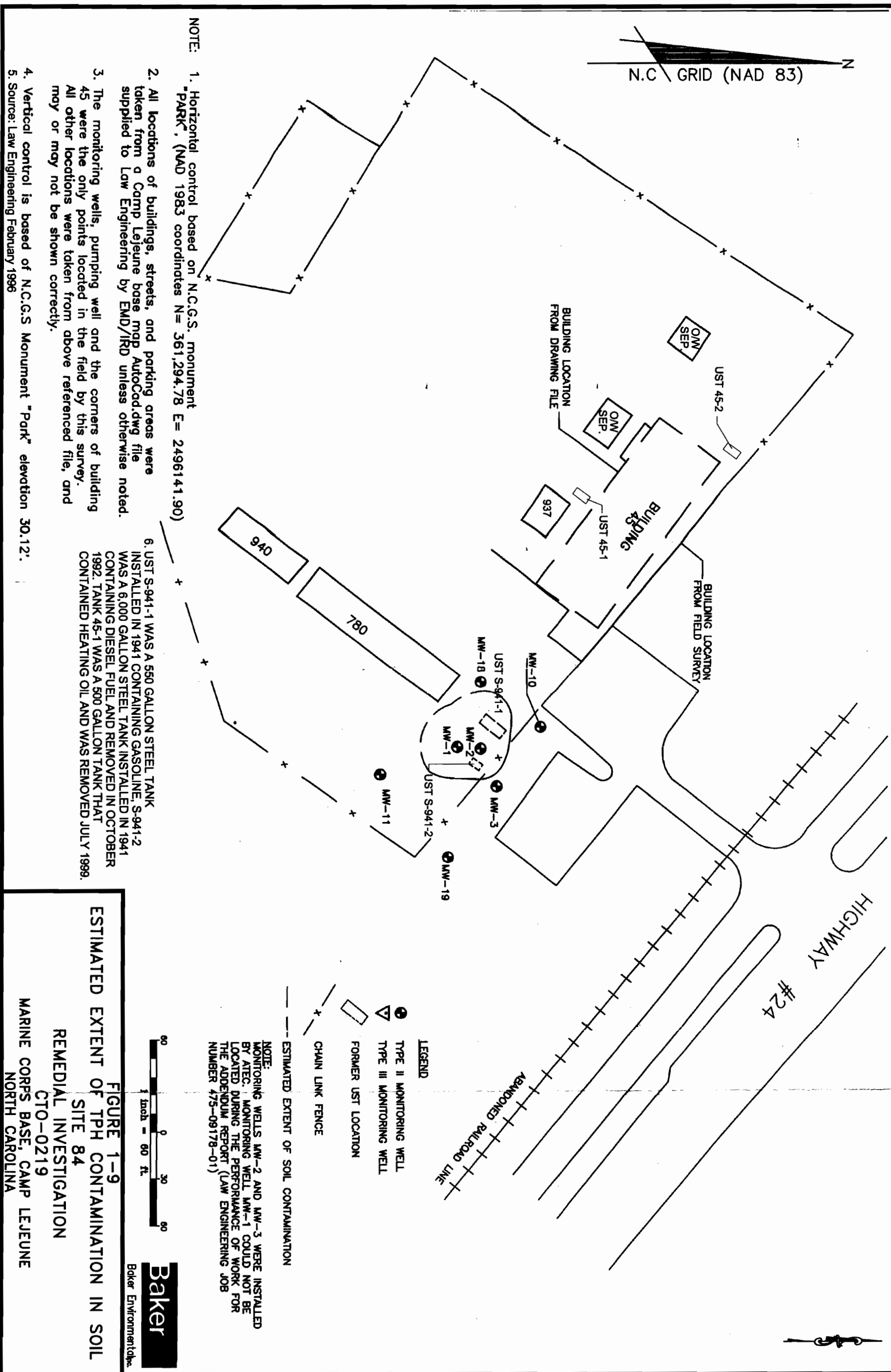
EDGE OF BANK

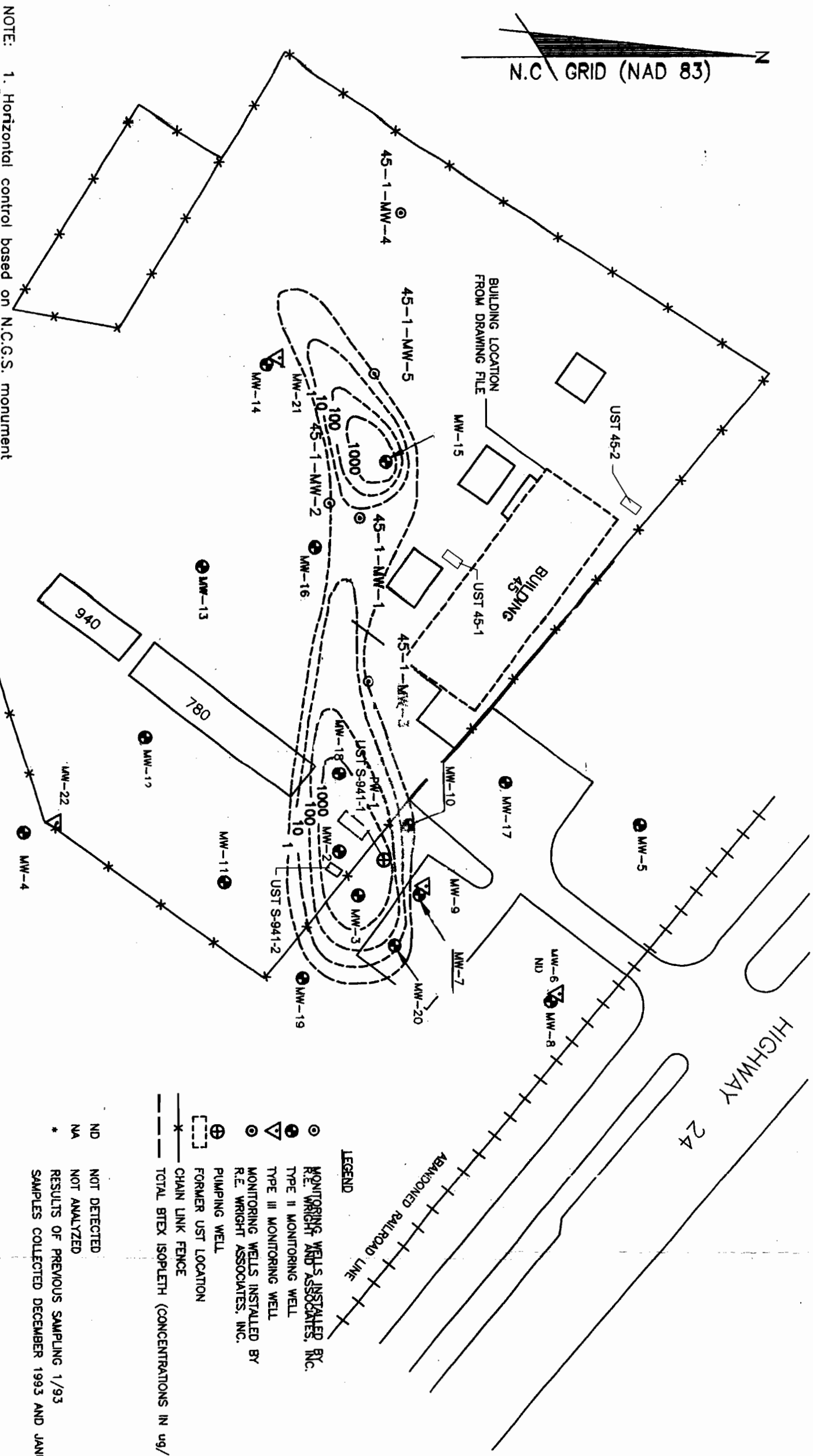




RED INDICATES CONCENTRATIONS IN EXCEEDANCE OF NC WQS.







NOTE: 1. Horizontal control based on N.C.G.S. monument "PARK", (NAD 1983 coordinates N= 361,294.78 E= 2496141.90)

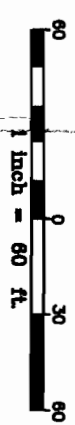
- 2. All locations of buildings, streets, and parking areas were taken from a Camp Lejeune base map AutoCad.dwg file supplied to Law Engineering by EMD/RKD unless otherwise noted.
- 3. The monitoring wells, pumping well and the corners of building 45 were the only points located in the field by this survey. All other locations were taken from above referenced file, and may or may not be shown correctly.

- 4. Vertical control is based of N.C.G.S. Monument "Park" elevation 30.12'.
- 5. Source: Law Engineering February 1996

6. UST S-941-1 WAS A 550 GALLON STEEL TANK INSTALLED IN 1941 CONTAINING GASOLINE. S-941-2 WAS A 6,000 GALLON STEEL TANK INSTALLED IN 1941 CONTAINING DIESEL FUEL AND REMOVED IN OCTOBER 1992. TANK 45-1 WAS A 500 GALLON TANK THAT CONTAINED HEATING OIL AND WAS REMOVED JULY 1999.

ND NOT DETECTED
NA NOT ANALYZED
* RESULTS OF PREVIOUS SAMPLING 1/93
SAMPLES COLLECTED DECEMBER 1993 AND JANUARY 1994

LEGEND
○ MONITORING WELLS INSTALLED BY R.E. WRIGHT ASSOCIATES, INC.
● TYPE II MONITORING WELL
▽ TYPE III MONITORING WELL
○ MONITORING WELLS INSTALLED BY R.E. WRIGHT ASSOCIATES, INC.
⊕ PUMPING WELL
□ FORMER UST LOCATION
--- CHAIN LINK FENCE
--- TOTAL BTEX ISOPLETH (CONCENTRATIONS IN ug/l)



Baker
Baker Environmental

FIGURE 1-10
ESTIMATED EXTENT OF TOTAL BTEX IN GROUNDWATER
SITE 84
REMEDIAL INVESTIGATION
CTO-0219
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

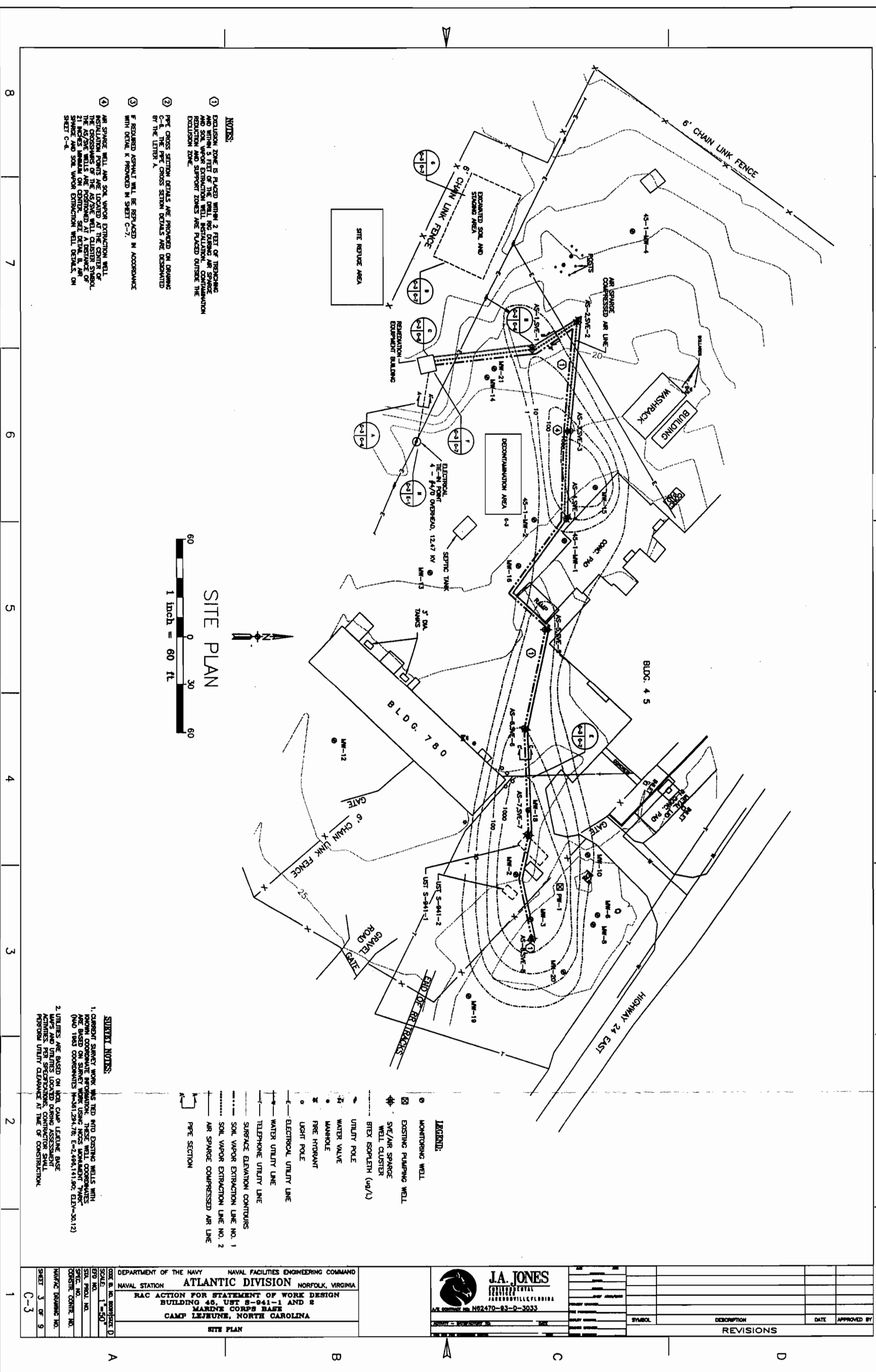


NOTE: 1. Horizontal control based on N.C.G.S. monument

2. All locations of buildings, streets, and parking areas were taken from a Camp Lejeune base map AutoCad.dwg file supplied to Law Engineering by EMD/IRD unless otherwise noted.
3. The monitoring wells (except 45-1-MW-5), pumping well and the corners of building 45 were the only points located in the field by this survey. All other locations were taken from above referenced file and may or may not be shown correctly.
4. Vertical control is based of N.C.G.S Monument "Park" elevation 30.12'.
5. Source: Law Engineering February 1996

FIGURE 1-11
ESTIMATED EXTENT OF FREE PRODUCT AND PAHS IN GROUNDWATER

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA



2.0 FIELD INVESTIGATION

This section discusses the RI field activities that were conducted at Site 84 in 2001 to fulfill the objectives identified in Section 1.2. The RI field program activities consisted of a soil investigation, trenching to locate a drain line from former Building 45 to the lagoon, and a shallow groundwater investigation. The focus of the soil investigation included the area surrounding Building 45 and northeast of the gravel road leading to Northeast Creek, as contamination in other areas at the site had been delineated in previous investigations. Field activities were conducted over two field events. The first event took place from July 16 to July 23, 2001 and the second field event occurred from July 30 through August 8, 2001. The sections that follow detail the various investigation activities that were implemented during the RI. It is noted that the investigative procedures and methodologies for the field investigations conducted at Site 84 were previously discussed in detail within Section 6.0 of the Final Project Plans for CTO-0219 (Baker, 2001).

The investigation followed the direction and intent of the Final Project Plans, however, additional scope items were required to meet expanded objectives of the MCB, Camp Lejeune Partnering Team. Additional items were implemented at the mid-point of the field investigation to respond to objectives set by the Partnering Team. In short, the additional items included an expanded investigation beyond PCB contamination, the inclusion of previously identified petroleum contamination, an expanded groundwater program, complete characterizations of previously uncharacterized UST basins, and defining the exact location and disposition of the drain line via trenching. This additional work increased the total number of borings/monitoring wells and analytical parameters from the original scope.

Summaries of surface and subsurface soils, groundwater, surface water, sediment, and quality assurance/quality control (QA/QC) samples collected during the RI are provided in Tables 2-1, 2-2, 2-4, 2-5, and 2-6. These tables include samples collected during the RI field investigation and surface soil, groundwater, surface water, and sediment samples collected as part of Pre-RI field activities. Data from the Pre-RI are incorporated with RI data for the purposes of fully delineating contamination at the site and determining potential risks. Locations of samples sent to the analytical laboratory are indicated on Figure 2-1. Tables and figures referenced in Section 2.0 are provided at the end of the section.

2.1 Surface and Subsurface Soil Investigation

The RI soil investigation at Site 84 consisted of direct push (DP) sampling, test pit sampling (TP), soil borings (SB), and monitoring well borings (MW). All soil samples were classified in the field using the Unified Soil Classification System (USCS) by the visual-manual methods described in American Society for Testing and Materials (ASTM) D-2488. Lithologic descriptions were recorded in a field logbook and later entered into boring log records. Soil classification included characterization of soil type, grain size, color, moisture content, and other pertinent information such as indications of fill material and contamination. A summary of lithologic descriptions of the site soils is provided in Appendix B.

Methods of soil collection and the samples obtained are described in the following sections. A summary of surface soil samples collected and analyses performed is provided on Table 2-1. Results of the soil investigation are discussed in Section 4.0 of this report.

2.1.1 Direct Push Sampling

Parratt-Wolff, Inc. of Hillsborough, North Carolina performed the DP sampling using a Ford tractor outfitted with a Geoprobe® sampling system. Soil samples were collected using a 2-inch outside diameter (OD) split-spoon sampling techniques or a "Macro-Core sampler", a 48-inch long, stainless-steel tube with a 2-inch outside diameter (OD). A 1-1/2-inch inside diameter (ID) cutting shoe is threaded to the base of the tube. The macro-core soil samples were collected in a 45-inch long by 1-1/2-inch wide acetate liner that is inserted into the tube. The split-spoon sampler was pushed hydraulically using the Geoprobe® system. Soil samples were collected near the water table using the "Macro-Core sampler" and acetate sleeves. Between samples, the split-spoon samplers were decontaminated with a Liquinox soap wash, distilled water rinse, nitric acid rinse and an acetone rinse. Following completion of the DP sampling, the boreholes were sealed with sodium bentonite granules.

During the first field event (July 16 to July 23, 2001), DP soil samples were collected from 74 soil borings at the site including 11 borings advanced around the perimeter of Building 45. Sample locations were identified by laying out a 50-foot grid pattern. The majority of soil borings were obtained using a Geoprobe® system exceeding to a maximum depth of 14 feet below ground surface. A hand auger was used at select locations, primarily those at which access for the GeoProbe® system was limited. From each soil boring, samples were collected from the

interval of 0 - 1 feet below ground surface (bgs). At DP locations, samples were also collected from a one-foot interval within 6 inches of the water table. If the depth to the water table exceeded five feet or if contamination was evident at intermediate depths, additional soil samples were collected from intermediate depths of the boring. Soil samples were field screened for PCBs using an immunoassay kit provided by EnSys™. This information was used to laterally define the extent of PCB contamination during the field program. The field team collected additional surface soil samples at locations situated between nodes of the original grid that yielded adjacent positive-detect and non-detect PCB results. A total of 127 soil samples were collected from the 74 borings.

The EnSys™ PCB immunoassay field test kit was used to screen soil samples collected from 0 - 1' bgs interval of direct push samples DP01 to DP07, DP09 to DP44, DP56 to DP58, and DP60 to DP73. The EnSys™ field test kit was also used to screen five subsurface samples (DP18-02, DP28-01, DP63-01, DP64-01, and DP65-02) in select areas where surface contamination was suspected. Approximately 30% of the soil samples on which EnSys™ tests were run were also sent to a fixed-base laboratory for confirmatory analysis of PCBs. Eighteen samples collected from the 11 soil boring locations around the perimeter of Building 45 (locations DP45 through DP55) were not tested with EnSys™ kits, but were analyzed at the fixed base laboratory for analyses of Target Compound List (TCL) VOCs, TPH (GRO and DRO), SVOCs, organic pesticides, PCBs, cyanide, and Target Analyte List (TAL) metals.

During the second field event, DP soil samples were collected at locations selected based on data gaps that were identified during the first 10-day RI field sampling event. Eleven additional DP locations were sampled. Twenty-two DP soil samples were collected and sent to the fixed base laboratory for analyses of VOCs, SVOCs, organic pesticides, PCBs, herbicides, Volatile Petroleum Hydrocarbons (VPH), Extractable Petroleum Hydrocarbons (EPH), and TAL metals. It should be noted that as opposed to the first field event, requested analyses during the second event included VPH and EPH and did not include GRO, DRO, or cyanide. These changes were made in response to the Camp Lejeune Partnering Team's request made during the field program that petroleum contamination should be delineated at the site according to North Carolina UST guidance, in addition to PCB delineation. The VPH and EPH analyses replaced the GRO and DRO analyses and complied with North Carolina UST guidance.

2.1.2 Test Pit Sampling

Two soil samples were collected from each of three test pit locations along the suspected and confirmed location of a drainage pipe leading from Building 45 to the lagoon. The first test pit was excavated with a track hoe close to Building 45 and soil boring location DP36 where concrete chips and a void were encountered. The top of a two-foot diameter concrete pipe was found at approximately 4-5 feet bgs. One soil sample was collected from the side of the pipe ("A" sample) and one from underneath the pipe ("B" sample). Due to the depth of the excavation, samples were collected from soils contained in the track hoe bucket. As shown on Figure 2-1, two more test pits (TP-02 and TP-03) were excavated downgradient of a catch basin, and at the outlet of the pipe at the lagoon. Samples were collected adjacent to and from underneath the pipe with a shovel. Soil samples collected from the test pits were sent to the fixed base laboratory for analysis of PCBs.

2.1.3 Soil and Monitoring Well Borings

All of the soil borings were advanced using 3-1/4 inch ID hollow stem auger and split-spoon sampling methods in general accordance with procedures outlined in ASTM Standard Method for Penetration Test and Split-Barrel Sampling of Soils (Designation D 1586). Split-spoons of 24-inch (nominal) length and 2-inch OD were used throughout the investigation. Soil samples were collected from the ground surface (0 - 1 foot bgs) and from immediately above the water table. All drilling and soil sampling activities were performed in Level D personal protective equipment. The decontamination fluids generated during the investigation were managed in accordance with the procedures outlined in Section 2.6.

During drilling, ambient monitoring for airborne contaminants in the vicinity of the borehole was performed with a PID. In addition, split-spoon soil samples were screened with a PID to measure for the presence of volatile organic vapors. Measurements obtained in the field were recorded in a field logbook and later transposed onto the Test Boring and Well Construction Records which are provided in Appendix B. Prior to daily monitoring, the field instruments were calibrated and documentation was recorded in a field logbook and on calibration forms.

Soil boring samples and monitoring well boring samples were collected during the second field event. Split spoon samples were obtained from borings for monitoring wells MW-16, MW-17, MW-18, MW-19, MW-20, and MW-23 at the 0 to 6 inch interval and from the interval directly

above the water table. Soil borings around two of the monitoring wells (MW-21 and MW-22) were collected using DP methods. A total of eight borings were installed with a total of eight soil samples collected. All soil samples collected during the second field event were sent to the fixed base laboratory for analyses of TCL VOCs, SVOCs, organic pesticides, PCBs, herbicides, VPH, EPH, and TAL metals.

2.2 Groundwater Investigation

A groundwater investigation was conducted at Site 84 to determine the presence or absence of contamination in the shallow aquifer, which may have resulted from past site activities. The activities associated with the groundwater investigation included monitoring well installations, groundwater level measurements, groundwater sampling, and in-situ aquifer testing using rising head "slug tests". A summary of groundwater samples collected and analyses performed for the Pre-RI and RI is provided on Table 2-2. Results of the groundwater investigation are discussed in Section 4.0 of this report. The following sections describe the groundwater investigation activities.

2.2.1 Monitoring Well Installation

Eight shallow wells were installed, screening the uppermost portion of the surficial aquifer. Wells MW-16, MW-17, MW-18, MW-19, MW-20, MW-21, MW-22, and MW-23 were constructed utilizing a 10 foot screen length which was installed to a approximate depth of seven feet below the water table. The wells were constructed using 2-inch diameter, schedule 40 polyvinyl chloride (PVC) riser and screen (0.01-inch slots).

Standard well construction practices were followed for installation of sand filter pack, bentonite seal, grouting, and surface completion. Monitoring wells MW-16, MW-18, MW-19, MW-21, and MW-22 were completed using flush-mount covers; while monitoring wells MW-17, MW-20, and MW-23 were completed with a 4-feet by 4 feet by 0.5 foot concrete pad, steel bollards, and a steel protective locking stickup cover. Monitoring well construction details are shown on Table 2-3. For monitoring well construction diagrams, please refer to Appendix B.

All permanent monitoring wells were developed prior to sampling using an inertial displacement (Watterra®) pump in accordance with the procedures outlined in Section 6.0 of the Final Field Sampling and Analysis Plan (contained within the Final Project Plans, Baker, 2001).

2.2.2 Groundwater Level Measurements

Static water level measurements were obtained from the eight newly installed wells in addition to 14 existing wells. The measurements were taken to within 0.01 feet utilizing a Waterra® Static Water Level Meter and the readings were recorded in a field log book. These measurements were used to generate a groundwater potentiometric surface map of the surficial aquifer (see Section 3.0).

2.2.3 Groundwater Sampling

Groundwater samples were obtained using USEPA Region IV's low flow purging and sampling technique. This technique requires that the groundwater be purged at less than 0.33 gallons per minute (gpm) by means of either a submersible or peristaltic pump. In this case, Baker personnel utilized a peristaltic pump system. A dedicated length of polyethylene tubing was used for each well sampled. This tubing was disposed of following completion of well sampling activities. While the well was being purged, pH, conductivity, temperature and turbidity measurements were obtained. Water quality data are provided on Table 2-4. Once water quality readings stabilized (i.e., two consecutive readings within 10 % of each other), a groundwater sample was collected at the same flow rate used for the well purge. One round of groundwater sampling was conducted for the RI.

Groundwater samples were collected from the 12 monitoring wells highlighted on Figure 2-1. In addition to sampling from the eight newly installed monitoring wells, four existing wells were sampled (MW-07, MW-08, MW-09, and MW-10). Samples were analyzed for TCL VOCs, SVOCs, TAL metals, PCBs, organic pesticides, herbicides, VPH, and EPH, in accordance with Contract Laboratory Protocol (CLP).

2.2.4 Slug Tests

The hydraulic properties of the surficial aquifer were characterized by performing rising head slug tests in six of the newly installed groundwater monitoring wells and two existing groundwater monitoring wells. The tests were performed on August 7, 2001. An electronic data logger (In Situ Hermit® Model 3000) and pressure transducer were used to record the recovery of groundwater in the monitoring wells to static level. All data were recorded in logarithmic scale to more closely monitor initial changes in groundwater elevation. The data resulting from the slug tests were converted into time (in minutes) and the corresponding change in water level

displacement (in feet). Results from the rising head slug tests were analyzed using HydroSOLVE, Inc.'s AQTESOLV for Windows computer program for performing quantitative groundwater assessments. The Bouwer and Rice solution for slug tests in unconfined aquifers was used to evaluate all test data. The input parameters and plots generated from the slug tests are contained in Appendix C. The results of the aquifer characterization are discussed in Section 3.0 of this report.

2.3 Surface Water and Sediment Sampling

No surface water or sediment was collected as part of the RI field investigation. Data from the Pre-RI were available for evaluation. Summaries of surface water and sediment samples collected from the Pre-RI and requested analyses are provided on Tables 2-5 and 2-6, respectively.

2.4 Survey

The site surveys performed for the Site 84 RI included: (1) the location of the three test trenches excavated along the buried pipeline; (2) the soil sampling locations; (3) the locations of the groundwater monitoring wells; and (4) a topographic land survey to assist in the evaluation of surface water drainage patterns. This information was used to create base mapping that was used throughout the investigation. The horizontal coordinates and vertical elevation (referenced to mean sea level [msl]) of each final sample point was surveyed. For monitoring wells, the elevation of the surrounding ground surface (or top of well cover for flush mount monitoring wells), and top of PVC casing were surveyed. All locations were surveyed to within a horizontal accuracy of 0.1 feet and a vertical accuracy of 0.01 feet. Elevations were recorded in feet above msl. All surveying was referenced to the North Carolina State Plane Coordinates System, and was conducted by MSA (formerly Miller Stephenson), a licensed professional surveyor in the State of North Carolina.

2.5 Quality Assurance/ Quality Control Samples

Field Quality Assurance and Quality Control (QA/QC) samples were collected during the investigation in order to: (1) ensure that decontamination procedures were properly implemented (e.g., equipment rinsate samples); (2) evaluate field methodologies (e.g., field duplicates and field blanks); and/or (3) evaluate whether cross-contamination occurred during sampling and/or shipping (e.g., trip blanks). Data quality objectives (DQOs) for the QA/QC samples were

implemented in accordance with DQO Level IV, as defined in the Environmental Compliance Branch standard operating procedures (SOPs) and Quality Assurance Manual, (USEPA Region IV, 1996). The DQO Level III is equivalent to Naval Facilities Engineering Service Center (NFESC) DQO Level C, as specified in the Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Programs document (NEESA, 1988).

Definitions for the four different types of field QA/QC samples are provided below (USEPA, 1996).

- Duplicate Sample: Two or more samples collected simultaneously into separate containers from the same source under identical conditions. Field duplicate samples are collected at a frequency of 10 percent of the environmental samples.
- Equipment Rinsate Blanks: Equipment field blanks (or rinsate blanks) are defined as samples that are obtained by running organic-free water over/through sample collection equipment after it has been cleaned. These samples are used to determine if decontamination procedures are adequate. Equipment blanks were collected as required, based on field activities and were analyzed for those parameters that environmental samples were to be analyzed for.
- Field Blanks: Field blanks were collected of the potable water used for decontamination of equipment and the laboratory grade water used for the equipment rinsate blanks. Field blanks were collected at the beginning of each sampling event and were analyzed for the same parameters that environmental samples were to be analyzed for. Additional field blanks were collected in cases when additional analyses were requested based on decisions made by the Partnering Team during the field event.
- Trip Blanks: Trip blanks were prepared prior to the sampling event in the actual sample container and were kept with the investigative samples throughout the sampling event. They were then packaged for shipment with the other samples and sent for analysis. At no time after preparation are trip blank sample containers opened before they return to the laboratory. Field sampling teams utilize VOC trip blanks to determine if samples were contaminated during storage and transportation back to the laboratory. Trip blanks are included in each cooler that contains samples to be analyzed for VOCs.

- Additionally, matrix spike (MS) and matrix spike duplicate (MSD) samples were collected for soil and groundwater. Samples of this type are collected using the same procedures/methods as duplicate samples, and analyzed for the same parameters as standard investigative samples. The MS/MSD samples are used by the analytical laboratory for internal QA/QC. MS/MSDs are collected at a frequency of 5 percent of the environmental samples.

Duplicate samples are indicated in the Soil Sample Summary Table (Table 2-1) and Groundwater Sample Summary Table (Table 2-2). The remaining QA/QC samples (MS/MSD, field blanks, equipment rinsates, and trip blanks) and requested analyses are summarized on Table 2-7. Duplicate sample results are considered separate environmental samples (soils and groundwater) in Section 4.0, Nature and Extent of Contamination. The remainder of the QA/QC samples are summarized separately within that section.

2.6 Decontamination Procedures

Decontamination procedures in accordance with USEPA Region IV SOPs were utilized during the RI (USEPA, 1996). Sampling and drilling equipment were divided into two decontamination groups: heavy equipment and routine sample collection equipment. Heavy equipment includes drill rigs, hollow stem augers, and drill and sampling rods. Routine sample collection equipment included direct push samplers, split-spoons, stainless steel spoons, spatulas and bowls.

For heavy equipment, the following procedures were implemented:

- Removal of caked-on soil with a brush;
- Steam cleaning with high-pressure steam; and
- Air drying.

For routine sample collection equipment, the following procedures were implemented:

- Clean with distilled water and laboratory detergent (Liquinox soap);
- Rinse thoroughly with distilled water;
- Rinse with nitric acid;
- Rinse with Propanol;
- Air dry; and
- Wrap in aluminum foil, if appropriate.

A temporary decontamination pad, constructed of wood framing and polyethylene sheeting, was used to minimize spillage onto the ground. The decontamination pad was constructed to the northeast of Building 45. Decontamination fluids generated during the field investigation were containerized and handled according to the procedures outlined in Section 2.7.

2.7 Investigation Derived Waste (IDW) Handling

Field investigation activities for the RI at Site 84 resulted in the generation of Investigation Derived Waste (IDW). This IDW included soil cuttings, well development and purge water, and solutions used to decontaminate non-disposable sampling equipment. The general management techniques for the IDW were:

- Collection and containerization of IDW material (i.e., soil cuttings, development and purge water, and decontamination fluids);
- Temporary storage of IDW while awaiting confirmatory analytical data; and
- Soil cuttings returned to site;
- Final disposal of aqueous IDW material at the groundwater treatment facility at Lot 203.

The management of the IDW was performed in accordance with guidelines discussed in the Final Project Plans.

2.8 Data Management and Tracking

Analytical data generated during the RI was submitted for third-party validation to Heartland Environmental Services, Inc. (Heartland), of St. Charles, Missouri. Procedures established by the National Functional Guidelines for Organic (USEPA, 1991) and Inorganic (USEPA, 1988) Analyses were followed during the validation process. Validation of the analytical data through established procedures served to reduce the inherent uncertainties associated with its usability. Data qualified as "J" were retained as estimated. Estimated analytical results within a data set are common and considered usable by the USEPA. Data may be qualified as estimated for several reasons including: an exceedance of holding times; high or low surrogate recovery; intra-sample variability; or the reported value is below the Contract Required Detection Limit (CRDL) or the Contract Required Quantitation Limit (CRQL).

Additional data qualifiers were employed during the validation of data. The "NJ" qualifier denotes that a compound was tentatively identified, but the reported value may not be accurate or precise. Compounds which were not detected and had inaccurate or imprecise quantitation limits were assigned the "UJ" qualifier. The "B" qualifier identifies a compound that was detected in the method blank associated with the sample. If the sample result has serious deficiencies with regard to the ability to analyze the sample and meet quality control criteria, the compound is assigned the "R" qualifier and the data is rejected.

The management and tracking of data, from time of field collection to receipt of validation report, is of primary importance to the overall quality of laboratory analytical results. Identification codes for samples collected for on-site analysis were recorded in a field log book and on the sample container. Sample identification of those samples analyzed at the fixed based laboratory were recorded on chain-of-custody forms, provided in Appendix D. Chain-of-custody forms were reviewed by data management personnel to verify that appropriate laboratory analyses had been requested. Upon receipt of laboratory analytical results, a further comparison was performed to verify that each sample received by the laboratory was analyzed for the correct parameters.

The management and tracking of data from the time of sample collection until receipt of the analytical results was completed to determine the following items:

- Identify and correct chain-of-custody discrepancies prior to laboratory analysis;
- Verify the receipt of all samples by the laboratory;
- Confirm that requested sample analyses were performed; and
- Ensure the delivery of a complete data set.

2.9 References

Baker, 2001b. Final Remedial Investigation/ Feasibility Study Project Plans. Operable Unit 19, Site 84/Building 45 Area. Baker Environmental, Inc. June 4, 2001.

USEPA. 1996. United States Environmental Protection Agency Region IV. Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual. Environmental Services Division. May 1996.

USEPA 1992, Guide to Management of Investigation - Derived Wastes. Office of Emergency and Remedial Response Hazardous Site Control Division, Washington, D.C., OS-220W. April 1992.

U.S. Navy, NEESA. 1988 Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program. Prepared by Martin Marietta Energy Systems, Inc. for U.S. Department of Energy, Contract No. DE-AC05-84OR21400. Neesa 20.2-047B. June 1988.

TABLES

TABLE 2-1
SOIL SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample ID		Date	Depth (bgs)	Time (hours)	Laboratory Sample ID	Field Analysis		Laboratory Analysis			
						Ensys TM PCB (ppm)	PCBs	Grain size, Total Organic Carbon	TCL VOC, SVOC, Pesticides, PCBs, GRO, DRO, TAL Metals, Cyanide	TCL VOCs, SVOCs, Pesticides, Herbicides, PCBs, VPH, EPH, TAL Metals	
DIRECT PUSH SAMPLES											
IR84-DP01-00		7/17/01	0-1'			< 1.0					
IR84-DP01-02		7/17/01	3-5'								
IR84-DP02-00		7/17/01	0-1'			< 1.0					
IR84-DP02-03		7/17/01	5-7'								
IR84-DP03-00		7/17/01	0-1'			1.0 - 10.0					
IR84-DP03-02		7/17/01	3-5'								
IR84-DP04-00		7/17/01	0-1'			< 1.0					
IR84-DP04-04		7/17/01	7-9'								
IR84-DP04-05		7/17/01	9-11'								
IR84-DP05-00		7/17/01	0-1'			< 1.0					
IR84-DP05-04		7/17/01	7-9'								
IR84-DP05-05		7/17/01	9-11'								
IR84-DP06-00		7/17/01	0-1'	1611	IR84-DP06-00	< 1.0	X				
IR84-DP07-00		7/17/01	0-1'			< 1.0					
IR84-DP08-00		7/17/01	0-1'								
IR84-DP08-05		7/17/01	9-11'								
IR84-DP09-00		7/18/01	0-1'			1.0 - 10.0					
IR84-DP09-03		7/18/01	5-7'								
IR84-DP09-04		7/18/01	7-9'								
IR84-DP10-00		7/18/01	0-1'			1.0 - 10.0					
IR84-DP10-02		7/18/01	3-5'								
IR84-DP10-05		7/18/01	9-11'								
IR84-DP11-00		7/18/01	0-1'			< 1.0					
IR84-DP11-02		7/18/01	3-5'								
IR84-DP12-00		7/18/01	0-1'			10.0 - 50.0					
IR84-DP12-02		7/18/01	3-5'								
IR84-DP13-00		7/18/01	0-1'			1.0 - 10.0					
IR84-DP13-03		7/18/01	5-7'								
IR84-DP14-00		7/18/01	0-1'			< 1.0					
IR84-DP14-02		7/18/01	3-5'								
IR84-DP14-03		7/18/01	5-7'								
IR84-DP15-00		7/18/01	0-1'			< 1.0					
IR84-DP15-02		7/18/01	3-5'								
IR84-DP15-03a		7/18/01	5-7'	1429	IR84-DP15-03				X		

TABLE 2-1
SOIL SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIATION INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample ID	Date	Depth (bgs)	Time (hours)	Laboratory Sample ID	Field Analysis		Laboratory Analysis		
					Ensys™PCB (ppm)	PCBs	Grain size, Total Organic Carbon	TCL VOC, SVOC, Pesticides, PCBs, GRO, DRO, TAL Metals, Cyanide	TCL VOCs, SVOCs, Pesticides, Herbicides, PCBs, VPH, EPH, TAL Metals
IR84-DP15-03b	7/18/01	5-7'							
IR84-DP16-00	7/18/01	0-1'			< 1.0				
IR84-DP16-04	7/18/01	7-9'							
DIRECT PUSH SAMPLES (cont.)									
IR84-DP17-00	7/19/01	0-1'			< 1.0				
IR84-DP17-02	7/19/01	3-5'							
IR84-DP18-00	7/19/01	0-1'	0752	IR84-DP18-00	10.0 - 50.0	X			
IR84-DP18-02	7/19/01	3-5'	0756	IR84-DP18-02	> 50.0	X			
IR84-DP19-00	7/19/01	0-1'			1.0 - 10.0				
IR84-DP19-01	7/19/01	1-3'							
IR84-DP20-00	7/19/01	0-1'	0831	IR84-DP20-00	< 1.0	X			
IR84-DP20-02	7/19/01	3-5'							
IR84-DP21-00	7/19/01	0-1'			1.0 - 10.0				
IR84-DP21-04	7/19/01	7-9'		IR84-DP22-00					
IR84-DP22-00	7/19/01	0-1'	1036	DP22-00-D	< 1.0	X			
IR84-DP23-00	7/19/01	0-1'			1.0 - 10.0				
IR84-DP24-00	7/19/01	0-1'			< 1.0				
IR84-DP25-00	7/19/01	0-1'			10.0 - 50.0				
IR84-DP26-00	7/19/01	0-1'			1.0 - 10.0				
IR84-DP26-01	7/19/01	1-3'							
IR84-DP26-02	7/19/01	3-5'							
IR84-DP27-00	7/19/01	0-1'	1254	IR84-DP27-00	1.0 - 10.0	X			
IR84-DP28-00	7/19/01	0-1'			10.0 - 50.0				
IR84-DP28-01	7/19/01	1-3'			< 1.0				
IR84-DP29-00	7/19/01	0-1'	1315	IR84-DP29-00	1.0 - 10.0	X			
IR84-DP29-01	7/19/01	1-3'							
IR84-DP30-00	7/19/01	0-1'			< 1.0				
IR84-DP30-03	7/19/01	5-7'							
IR84-DP31-00	7/19/01	0-1'			1.0 - 10.0				
IR84-DP32-00	7/20/01	0-1'			> 50.0				
IR84-DP33-00	7/20/01	0-1'	1000	IR84-DP33-00	1.0 - 10.0	X			
IR84-DP33-01	7/20/01	1-3'							
IR84-DP34-00	7/20/01	0-1'			< 1.0				
IR84-DP34-01	7/20/01	1-3'							

TABLE 2-1
SOIL SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

					Field Analysis	Laboratory Analysis			
Sample ID	Date	Depth (bgs)	Time (hours)	Laboratory Sample ID	Ensys™PCB (ppm)	PCBs	Grain size, Total Organic Carbon	TCL VOC, SVOC, Pesticides, PCBs, GRO, DRO, TAL Metals, Cyanide	TCL VOCs, SVOCs, Pesticides, Herbicides, PCBs, VPH, EPH, TAL Metals
IR84-DP35-00	7/20/01	0-1'			1.0 - 10.0				
IR84-DP35-03	7/20/01	5-7'							
IR84-DP36-00	7/20/01	0-1'	1112	IR84-DP36-00	1.0 - 10.0	X	X		
IR84-DP36-03	7/20/01	5-7'							
IR84-DP37-00	7/20/01	0-1'	1335	IR84-DP37-00	<1.0	X			
IR84-DP37-04	7/20/01	7-9'							
DIRECT PUSH SAMPLES (cont.)									
IR84-DP37-06	7/20/01	11-13'							
IR84-DP38-00	7/20/01	0-1'			<1.0				
IR84-DP39-00	7/20/01	0-1'			<1.0				
IR84-DP40-00	7/20/01	0-1'			<1.0				
IR84-DP41-00	7/20/01	0-1'	1545	IR84-DP41-00	10.0 - 50.0	X			
				IR84-DP42-00					
IR84-DP42-00	7/20/01	0-1'	1610	DP42-00D	1.0 - 10.0	X			
IR84-DP43-00	7/20/01	0-1'			1.0 - 10.0				
IR84-DP44-00	7/20/01	0-1'			1.0 - 10.0				
IR84-DP45-00	7/21/01	0-1'	0845	IR84-DP45-00				X	
IR84-DP45-03	7/21/01	5-7'	0850	IR84-DP45-03				X	
IR84-DP46-00	7/21/01	0-1'	0915	IR84-DP46-00				X	
IR84-DP46-02	7/21/01	3-5'	0930	IR84-DP46-02				X	
IR84-DP47-00	7/21/01	0-1'	0935	IR84-DP47-00				X	
IR84-DP47-01	7/21/01	1-3'	0940	IR84-DP47-01				X	
IR84-DP48-00	7/21/01	0-1'	0955	IR84-DP48-00				X	
IR84-DP49-00	7/21/01	0-1'	1010	IR84-DP49-00				X	
IR84-DP49-01	7/21/01	1-3'	1012	IR84-DP49-01				X	
IR84-DP50-00	7/21/01	0-1'	1028	IR84-DP50-00				X	
IR84-DP50-01	7/21/01	1-3'	1030	IR84-DP50-01				X	
IR84-DP51-00	7/21/01	0-1'	1043	IR84-DP51-00				X	
IR84-DP51-01	7/21/01	1-3'	1045	IR84-DP51-01				X	
IR84-DP52-00	7/21/01	0-1'	1055	IR84-DP52-00				X	
IR84-DP52-01	7/21/01	1-3'	1100	IR84-DP52-01				X	
IR84-DP53-00	7/21/01	0-1'	1130	IR84-DP53-00				X	
IR84-DP54-00	7/21/01	0-1'	1140	IR84-DP54-00				X	
IR84-DP55-00	7/21/01	0-1'	1150	IR84-DP55-00				X	
IR84-DP56-00	7/21/01	0-1'			1.0 - 10.0				

TABLE 2-1
SOIL SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

					Field Analysis	Laboratory Analysis			
Sample ID	Date	Depth (bgs)	Time (hours)	Laboratory Sample ID	Ensys™PCB (ppm)	PCBs	Grain size, Total Organic Carbon	TCL VOC, SVOC, Pesticides, PCBs, GRO, DRO, TAL Metals, Cyanide	TCL VOCs, SVOCs, Pesticides, Herbicides, PCBs, VPH, EPH, TAL Metals
IR84-DP56-01	7/21/01	1-3'							
IR84-DP57-00	7/21/01	0-1'			< 1.0				
IR84-DP58-00	7/22/01	0-1'			1.0 - 10.0				
IR84-DP58-01	7/22/01	1-3'							
IR84-DP59-00	7/22/01	0-1'							
IR84-DP59-01	7/22/01	1-3'							
IR84-DP60-00	7/22/01	0-1'			1.0 - 10.0				
IR84-DP60-01	7/22/01	1-3'							
IR84-DP61-00	7/22/01	0-1'			1.0 - 10.0				
DIRECT PUSH SAMPLES (cont.)									
IR84-DP61-01	7/22/01	1-3'							
IR84-DP62-00	7/22/01	0-1'			1.0 - 10.0				
IR84-DP62-01	7/22/01	1-3'							
IR84-DP63-00	7/22/01	0-1'	1200	IR84-DP63-00	10.0 - 50.0	X			
IR84-DP63-01	7/22/01	1-3'	1205	IR84-DP63-01	1.0 - 10.0	X			
IR84-DP64-00	7/22/01	0-1'			> 50.0				
IR84-DP64-01	7/22/01	1-3'			1.0 - 10.0				
IR84-DP65-00	7/22/01	0-1'	1224	IR84-DP65-00	10.0 - 50.0	X			
IR84-DP65-02	7/22/01	3-5'	1228	IR84-DP65-02	1.0 - 10.0	X			
IR84-DP66-00	7/22/01	0-1'			< 1.0				
IR84-DP66-02	7/22/01	3-5'							
IR84-DP67-00	7/22/01	0-1'			10.0 - 50.0				
IR84-DP68-00	7/22/01	0-1'			< 1.0				
IR84-DP69-00	7/22/01	0-1'	1505	IR84-DP69-00 DP69-00D	< 1.0	X			
IR84-DP70-00	7/22/01	0-1'			< 1.0				
IR84-DP71-00	7/22/01	0-1'	1525	IR84-DP71-00	1.0 - 10.0	X			
IR84-DP72-00	7/23/01	0-1'			< 1.0				
IR84-DP73-00	7/23/01	0-1'			< 1.0				
IR84-DP74-00	8/2/01	0-1'	1030	IR84-DP74-00					X
IR84-DP74-04	8/2/01	7-9'	1050	IR84-DP74-04					X
IR84-DP75-00	8/2/01	0-1'	1105	IR84-DP75-00					X
IR84-DP75-05	8/2/01	9-11'	1140	IR84-DP75-05					X
IR84-DP76-00	8/2/01	0-1'	1155	IR84-DP76-00					X
IR84-DP76-04	8/2/01	7-9'	1205	IR84-DP76-04					X

TABLE 2-1
SOIL SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample ID	Date	Depth (bgs)	Time (hours)	Laboratory Sample ID	Field Analysis		Laboratory Analysis			
					Ensys™CB (ppm)	PCBs	Grain size, Total Organic Carbon	TCL VOC, SVOC, Pesticides, PCBs, GRO, DRO, TAL Metals, Cyanide	TCL VOCs, SVOCs, Pesticides, Herbicides, PCBs, VPH, EPH, TAL Metals	
IR84-DP77-00	8/5/01	0-1'	1750	IR84-DP77-00						X
IR84-DP77-03	8/5/01	5-7'	1755	IR84-DP77-03						X
IR84-DP78-00	8/5/01	0-1'	1720	IR84-DP78-00						X
IR84-DP78-03	8/5/01	5-7'	1735	IR84-DP78-03						X
IR84-DP79-00	8/5/01	0-1'	1650	IR84-DP79-00						X
IR84-DP79-02	8/5/01	3-5'	1705	IR84-DP79-02 DP79-02D						X

TABLE 2-1
SOIL SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Field Analysis					Laboratory Analysis				
Sample ID	Date	Depth (bgs)	Time (hours)	Laboratory Sample ID	Ensys™TCB (ppm)	PCBs	Grain size, Total Organic Carbon	TCL VOC, SVOC, Pesticides, PCBs, GRO, DRO, TAL Metals, Cyanide	TCL VOCs, SVOCs, Pesticides, Herbicides, PCBs, VPH, EPH, TAL Metals
DIRECT PUSH SAMPLES (cont.)									
IR84-DP80-00	8/5/01	0-1'	1630	IR84-DP80-00					X
IR84-DP80-02	8/5/01	3-5'	1640	IR84-DP80-02					X
IR84-DP81-00	8/5/01	0-1'	1455	IR84-DP81-00					X
IR84-DP81-04	8/5/01	7-9'	1515	IR84-DP81-04					X
IR84-DP82-00	8/5/01	0-1'	1530	IR84-DP82-00					X
IR84-DP82-04	8/5/01	7-9'	1545	IR84-DP82-04					X
IR84-DP83-00	8/5/01	0-1'	1600	IR84-DP83-00					X
IR84-SP83-03	8/5/01	5-7'	1610	IR84-DP83-03					X
IR84-DP84-00	8/3/01	0-1'	1015	IR84-DP84-00					X
TEST PIT SAMPLES									
IR84-TP01A	7/23/01		1145	IR84-TP01A		X			
IR84-TP01B	7/23/01		1145	IR84-TP01B		X			
IR84-TP02A	7/23/01		1145	IR84-TP02A		X			
IR84-TP02B	7/23/01		1145	IR84-TP02B		X			
IR84-TP03A	7/23/01		1200	IR84-TP03A		X			
IR84-TP03B	7/23/01		1200	IR84-TP03B		X			
MONITORING WELL BORINGS									
IR84-MW15-00	7/31/01	0-1'	0730	IR84-MW15-00					X
IR84-MW15-04	7/31/01	7-9'	0810	IR84-MW15-04					X
IR84-MW16-00	7/31/01	0-1'	0930	IR84-MW16-00		X			
IR84-MW16-07	7/31/01	13-15'	1000	IR84-MW16-07		X			
IR84-MW17-00	7/31/01	0-1'	1325	IR84-MW17-00					X
IR84-MW17-07	7/31/01	13-15'	1435	IR84-MW17-07					X
IR84-MW18-00	8/1/01	0-1'	0710	IR84-MW18-00		X			
IR84-MW18-04	8/1/01	7-9'	0736	IR84-MW18-04		X			
IR84-MW19-00	8/1/01	0-1'	0938	IR84-MW19-00		X			
IR84-MW19-06	8/1/01	11-13'	1010	IR84-MW19-06		X			
				IR84-MW20-00	IR84				
IR84-MW20-00	8/1/01	0-1'	1300	MW20-00D					X
IR84-MW21-04	8/2/01	7-9'	0815	IR84-MW21-04					X
IR84-MW22-02	8/3/01	3-5'	1200	IR84-MW22-02					X
IR84-MW23-01	8/3/01	1-3'	0925	IR84-MW23-01					X

TABLE 2-1
SOIL SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample ID	Date	Depth (bgs)	Time (hours)	Laboratory Sample ID	Field Analysis	Laboratory Analysis			
					Ensys™PCB (ppm)	PCBs	Grain size, Total Organic Carbon	TCL VOC, SVOC, Pesticides, PCBs, GRO, DRO, TAL Metals, Cyanide	TCL VOCs, SVOCs, Pesticides, Herbicides, PCBs, VPH, EPH, TAL Metals
SOIL BORINGS									
IR84-SB01-02	8/2/01	3-5'	1450	IR84-SB01-02					X
IR84-SB02-02	8/2/01	3-5'	1435	IR84-SB02-02					X
IR84-SB03-02	8/2/01	3-5'	1230	IR84-SB03-02					X
IR84-SB04-02	8/2/01	3-5'	1500	IR84-SB04-02					X
IR84-SB05-01	8/3/01	1-3'	1240	IR84-SB05-01					X
IR84-SB06-01	8/2/01	1-3'	1525	IR84-SB06-01					X
IR84-SB07-01	8/2/01	1-3'	1545	SB06-01D					X
IR84-SB08-01	8/2/01	1-3'	1555	IR84-SB07-01					X
IR84-SB08-01	8/2/01	1-3'		IR84-SB08-01					X
1998 SOIL BORINGS									
IR84-SB02-00	4/16/98	0-6"		IR84-SB02-00		X			
IR84-SB02-01	4/16/98	6-12"		IR84-SB02-01		X			
IR84-SB04-00	4/16/98	0-6"		IR84-SB04-00		X			
IR84-SB04-01	4/16/98	6-12"		IR84-SB04-01		X			
IR84-SB08-00	4/16/98	0-6"		IR84-SB08-00		X			
IR84-SB08-01	4/16/98	6-12"		IR84-SB08-01		X			
IR84-SB10-00	4/16/98	0-6"		IR84-SB10-00		X			
IR84-SB10-01	4/16/98	6-12"		IR84-SB10-01		X			
IR84-SB15-00	4/16/98	0-6"		IR84-SB15-00		X			
IR84-SB15-01	4/16/98	6-12"		IR84-SB15-01		X			
IR84-SB21-00	4/16/98	0-6"		IR84-SB21-00		X			
IR84-SB21-01	4/16/98	6-12"		IR84-SB21-01		X			
IR84-SB23-00	4/16/98	0-6"		IR84-SB23-00		X			
IR84-SB23-01	4/16/98	6-12"		IR84-SB23-01		X			
IR84-SB25-00	4/16/98	0-6"		IR84-SB25-00		X			
IR84-SB25-01	4/16/98	6-12"		IR84-SB25-01		X			
IR84-SB26-00	4/23/98	0-6"		IR84-SB26-00		X			
IR84-SB26-01	4/23/98	6-12"		IR84-SB26-01		X			
IR84-SB27-00	4/23/98	0-6"		IR84-SB27-00		X			
IR84-SB27-01	4/23/98	6-12"		IR84-SB27-01		X			
IR84-SB28-00	4/23/98	0-6"		IR84-SB28-00		X			
IR84-SB28-01	4/23/98	6-12"		IR84-SB28-01		X			
IR84-SB29-00	4/23/98	0-6"		IR84-SB29-00		X			
IR84-SB29-01	4/23/98	6-12"		IR84-SB29-01		X			

TABLE 2-1
SOIL SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample ID	Date	Depth (bgs)	Time (hours)	Laboratory Sample ID	Field Analysis				Laboratory Analysis			
					Ensys	TCB (ppm)	PCBs	Grain size, Total Organic Carbon	TCL VOC, SVOC, Pesticides, PCBs, GRO, DRO, TAL Metals, Cyanide	TCL VOCs, SVOCs, Pesticides, Herbicides, PCBs, VPH, EPH, TAL Metals		
IR84-SB30-00	4/23/98	0-6"		IR84-SB30-00			X					
IR84-SB30-01	4/23/98	6-12"		IR84-SB30-01			X					
IR84-SB31-00	4/23/98	0-6"		IR84-SB31-00			X					
1995 SOIL BORINGS												
IR84-SB31-01	4/23/98	6-12"		IR84-SB31-01			X					
84-SB01A	10/26/95	0-6"		84-SB01A			X					
84-SB01B	10/26/95	6-12"		84-SB01B			X					
84-SB02A	10/26/95	0-6"		84-SB02A			X					
84-SB02B	10/26/95	6-12"		84-SB02B			X					
84-SB03A	10/26/95	0-6"		84-SB03A			X					
84-SB03B	10/26/95	6-12"		84-SB03B			X					
84-SB04A	10/26/95	0-6"		84-SB04A			X					
84-SB04B	10/26/95	6-12"		84-SB04B			X					
84-SB05A	10/26/95	0-6"		84-SB05A			X					
84-SB05B	10/26/95	6-12"		84-SB05B			X					
84-SB06A	10/26/95	0-6"		84-SB06A			X					
84-SB06B	10/26/95	6-12"		84-SB06B			X					
84-SB07A	10/26/95	0-6"		84-SB07A			X					
84-SB07B	10/26/95	6-12"		84-SB07B			X					
84-SB08A	10/26/95	0-6"		84-SB08A			X					
84-SB08B	10/26/95	6-12"		84-SB08B			X					
84-SB09A	10/26/95	0-6"		84-SB09A			X					
84-SB09B	10/26/95	6-12"		84-SB09B			X					
84-SB10A	10/26/95	0-6"		84-SB10A			X					
84-SB10B	10/26/95	6-12"		84-SB10B			X					

NOTES:

ID = Identification
TAL = Target Analyte List
TCL = Target Compound List
VOC = Volatile Organic Compound
SVOC = Semivolatile Organic Compound
PCB = Polychlorinated biphenyl
GRO = Gasoline Range Organics
DRO = Diesel Range Organics

TABLE 2-1
SOIL SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample ID	Date	Depth (bgs)	Time (hours)	Laboratory Sample ID	Field Analysis				Laboratory Analysis			
					Ensys	TPCB (ppm)	PCBs	Grain size, Total Organic Carbon	TCL VOC, SVOC, Pesticides, PCBs, GRO, DRO, TAL Metals, Cyanide	TCL VOCs, SVOCs, Pesticides, Herbicides, PCBs, VPH, EPH, TAL Metals		

VPH = Volatile Petroleum Hydrocarbon
EPH = Extractable Petroleum Hydrocarbon

TABLE 2-2
GROUNDWATER SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample ID		Date	Time (hours)	Laboratory Sample ID	PCBs	Laboratory Analysis	
						TCL VOCs	TCL VOC, SVOC, Pesticides, PCBs, Herbicides, TAL Metal, VPH, EPH
2001 GROUNDWATER SAMPLES							
IR84-MW07-01C		8/6/01	1200	IR84-MW07-01C			X
IR84-MW08-01C		8/6/01	1140	IR84-MW08-01C			X
IR94-MW09-01C		8/5/01	1145	IR94-MW09-01C			X
IR84-MW10-01C		8/5/01	1135	IR84-MW10-01C			X
IR84-MW16-01C		8/4/01	0935	IR84-MW16-01C			X
IR84-MW17-01C		8/6/01	0925	IR84-MW17-01C			X
IR84-MW18-01C		8/4/01	1115	IR84-MW18-01C			X
IR84-MW19-01C		8/4/01	1310	IR84-MW19-01C			X
				IR84-MW20-01C			
IR84-MW20-01C		8/5/01	1915	IR84-MW20-01CD			X
IR84-MW21-01C		8/5/01	1000	IR84-MW21-01C			X
IR84-MW22-01C		8/5/01	1410	IR84-MW22-01C			X
IR84-MW23-01C		8/6/01	1445	IR84-MW23-01C			X
1998 GROUNDWATER SAMPLES							
AST781-GW03-98B		4/23/98	--	AST781-GW03-98B		X	
AST781-GW04-98B		4/23/98	--	AST781-GW04-98B		X	
AST781-GW07-98B		4/22/98	--	AST781-GW07-98B		X	
AST781-GW08-98B		4/22/98	--	AST781-GW08-98B		X	
AST781-GW11-98B		4/23/98	--	AST781-GW11-98B		X	
AST781-GW12-98B		4/23/98	--	AST781-GW12-98B		X	
1995 GROUNDWATER SAMPLES							
84-GW01-01		11/7/95	--	84-GW01-01	X		
84-GW07-01		11/7/95	--	84-GW07-01	X		
84-GW13-01		11/26/95	--	84-GW13-01	X		

NOTES:

ID = Identification

TAL = Target Analyte List

TCL = Target Compound List

VOC = Volatile Organic Compound

SVOC = Semivolatile Organic Compound

PCB = Polychlorinated biphenyl

GRO = Gasoline Range Organics

DRO = Diesel Range Organics

VPH = Volatile Petroleum Hydrocarbon

EPH = Extractable Petroleum Hydrocarbon

TABLE 2-3

WELL CONSTRUCTION DETAILS
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Well Identification	Date Installed	Top of PVC Casing Elevation (feet above msl)	Ground Surface Elevation (feet above msl)	Boring Depth (feet bgs)	Well Depth (feet bgs)	Screen Interval (feet bgs)	Sand Pack Interval (feet bgs)	Bentonite Interval (feet bgs)	Finished Well Appearance
84-MW16	07/31/01	19.84	20.13	20.0	20.0	10.0 - 20.0	8.0 - 20.0	6.0 - 8.0	Flush Mount
84-MW17	07/31/01	18.73	16.53	17.5	17.5	7.5 - 17.5	5.5 - 17.5	2.5 - 5.5	Stick Up
84-MW18	08/01/01	22.56	22.75	15.0	15.0	5.0 - 15.0	3.0 - 15.0	1.0 - 3.0	Flush Mount
84-MW19	08/01/01	18.00	18.26	19.0	19.0	9.0 - 19.0	7.0 - 19.0	5.0 - 7.0	Flush Mount
84-MW20	08/01/01	11.41	8.61	12.0	12.0	2.0 - 12.0	1.0 - 12.0	0.0 - 1.0	Stick Up
84-MW21	08/02/01	21.05	21.44	15.0	15.0	5.0 - 15.0	3.0 - 15.0	1.0 - 3.0	Flush Mount
84-MW22	08/03/01	19.52	19.91	22.0	22.0	12.0 - 22.0	10.0 - 22.0	8.0 - 10.0	Flush Mount
84-MW23	08/03/01	8.52	5.34	12.0	12.0	2.0 - 12.0	0.0 - 12.0	Surface	Stick Up

Notes:

PVC = Polyvinyl Chloride

msl = Mean sea level

bgs = Below ground surface

TABLE 2-4
SUMMARY OF GROUNDWATER FIELD PARAMETERS - AUGUST 2001
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Well Number Sample Date	Measuring Time	Well Volumes	Field Parameters			
			Temperature (°C)	pH (S.U.)	Specific Conductance (umhos/cm)	Turbidity (N.T.U.)
84-MW16 08/04/01	0850	1.0	20.9	5.72	245.5	462.0
	0855	2.0	20.5	5.49	243.5	783.0
	0857	3.0	20.4	5.44	243.2	545.0
	0859	4.0	20.4	5.57	246.8	516.0
	0901	5.0	20.3	5.54	245.9	489.0
	0903	6.0	20.5	5.58	244.9	381.0
	0905	7.0	20.4	5.59	244.4	300.0
	0907	8.0	20.5	5.59	248.8	283.0
	0909	9.0	20.6	5.58	256.0	179.0
	0911	10.0	20.5	5.56	249.6	93.8
	0913	11.0	20.6	5.50	248.9	46.9
	0915	12.0	20.6	5.56	248.1	24.2
	0917	13.0	20.6	5.55	246.5	18.7
	0920	14.0	20.7	5.51	246.0	11.9
	0923	15.0	20.7	5.50	245.4	9.52
84-MW17 08/06/01	0755	1.0	23.4	6.60	198.8	22.1
	0759	2.0	23.3	6.53	211.5	15.8
	0804	3.0	23.1	6.50	215.3	16.8
	0809	4.0	23.3	6.51	216.3	16.8
	0815	5.0	23.3	6.48	220.2	16.2
	0820	6.0	23.4	6.52	218.8	17.6
	0825	7.0	23.3	6.51	222.2	17.0
	0831	8.0	23.5	6.54	219.6	16.3
	0837	9.0	23.8	6.50	220.1	15.6
	0845	10.0	23.7	6.51	221.8	15.0
	0851	11.0	23.5	6.49	223.6	12.9
	0900	12.0	24.1	6.46	221.7	12.7
	0912	13.0	23.8	6.46	223.8	13.0
	0922	14.0	23.8	6.53	225.4	12.2
84-MW18 08/04/01	1025	1.0	23.7	5.50	573.0	236.0
	1030	2.0	23.4	5.61	565.0	373.0
	1035	3.0	23.3	5.36	560.0	279.0
	1040	4.0	23.5	5.53	559.0	397.0
	1050	5.0	23.4	5.24	541.0	177.0
	1100	6.0	23.4	5.14	528.0	42.4
	1110	7.0	23.5	5.08	515.0	7.56
84-MW19 08/04/01	1240	1.0	21.5	6.21	395.5	113.0
	1245	2.0	21.2	5.89	387.8	64.0
	1250	3.0	21.2	5.88	389.9	21.9
	1255	4.0	21.1	5.85	386.2	14.7
	1300	5.0	21.2	6.01	386.0	10.25
84-MW20 08/05/01	1305	6.0	21.5	5.98	380.2	5.98
	1855	1.0	20.9	6.26	354.0	91.8
	1901	2.0	20.6	6.34	388.6	39.7
	1907	3.0	20.9	6.40	405.2	11.7
84-MW21 08/05/01	1913	4.0	20.5	6.45	411.1	7.38
	0906	1.0	22.9	5.94	851.0	24.5
	0912	2.0	22.5	5.91	854.0	31.2
	0918	3.0	22.3	5.88	848.0	18.8
	0926	4.0	22.6	5.85	835.0	14.5
	0933	5.0	22.8	5.74	812.0	11.8
	0940	6.0	22.3	4.80	772.0	10.23
84-MW21 08/05/01	0950	7.0	22.4	4.65	693.0	8.15

TABLE 2-4
SUMMARY OF GROUNDWATER FIELD PARAMETERS - AUGUST 2001
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Well Number Sample Date	Measuring Time	Well Volumes	Field Parameters			
			Temperature (°C)	pH (S.U.)	Specific Conductance (umhos/cm)	Turbidity (N.T.U.)
84-MW22 08/05/01	1330	1.0	22.3	6.20	362.1	15.2
	1337	2.0	21.5	6.18	363.6	32.5
	1344	3.0	21.5	6.19	364.4	39.5
	1355	5.0	21.8	6.35	368.2	14.4
	1402	6.0	21.6	6.33	366.9	9.7
84-MW23 08/06/01	1355	1.0	19.0	4.07	279.1	182.0
	1401	2.0	18.6	4.22	268.9	140.0
	1414	3.0	18.3	4.99	267.6	120.0
	1425	4.0	18.6	4.60	266.4	55.0
	1440	5.0	18.6	4.58	266.1	34.0
84-MW07 08/06/01	1043	1.0	20.1	6.73	647.0	34.9
	1052	2.0	19.9	6.70	650.0	36.9
	1102	3.0	19.8	6.75	639.0	19.1
	1115	4.0	20.0	6.65	645.0	17.0
	1132	5.0	20.2	6.50	628.0	15.0
	1158	6.0	21.4	6.68	615.0	16.2
84-MW08 08/06/01	1057	1.0	18.4	6.75	443.7	16.5
	1117	2.0	18.1	6.72	429.0	8.16
	1138	3.0	18.2	6.40	421.9	4.27
84-MW09 08/05/01	1055	1.0	22.4	6.15	43.4	172.0
	1100	2.0	22.3	5.53	39.8	36.6
	1105	3.0	22.2	5.47	40.8	21.1
	1110	4.0	22.5	5.49	38.3	17.0
	1115	5.0	22.5	5.46	38.3	15.3
	1120	6.0	22.5	5.44	38.5	13.5
	1125	7.0	22.4	5.51	42.2	12.0
	1130	8.0	22.7	5.58	38.5	11.4
	1135	9.0	22.7	5.50	38.4	10.81
84-MW10 08/05/01	1140	10.0	22.5	5.51	40.2	10.00
	1105	1.0	19.6	4.77	184.4	91.3
	1120	2.0	19.7	4.75	184.1	1.52
	1135	3.0	19.9	4.82	184.2	0.99

Notes:

°C = Degrees Centigrade
S.U. = Standard Units
umhos/cm = micro ohms per centimeter
mg/L = milligrams per liter
N.T.U. = Nephelometric Turbidity Units

TABLE 2-5
SURFACE WATER SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample ID	Date	Time (hours)	Laboratory Sample ID	Laboratory Analysis	
				PCBs	TCL VOCs, SVOCs
1998 SURFACE WATER SAMPLES					
IR84-SW01-98B	4/19/98		IR84-SW01-98B	X	
IR84-SW02-98B	4/19/98		IR84-SW02-98B	X	
IR84-SW03-98B	4/19/98		IR84-SW03-98B	X	
IR84-SW04-98B	4/19/98		IR84-SW04-98B	X	
IR84-SW05-98B	4/19/98		IR84-SW05-98B	X	
IR84-SW06-98B	4/19/98		IR84-SW06-98B	X	
IR84-SW07-98B	4/23/98		IR84-SW07-98B		X
1995 SURFACE WATER SAMPLES					
84-SW01-01	10/26/95		84-SW01-01	X	
84-SW02-01	10/26/95		84-SW02-01	X	
84-SW03-01			inaccessible		
84-SW04-01	10/26/95		84-SW04-01	X	
84-SW05-01	10/26/95		84-SW05-01	X	
84-SW06-01	10/26/95		84-SW06-01	X	
84-SW07-01	10/26/95		84-SW07-01	X	
84-SW08-01	10/26/95		84-SW08-01	X	

NOTES:

ID = Identification
TCL = Target Compound List
VOC = Volatile Organic Compound
SVOC = Semivolatile Organic Compound
PCB = Polychlorinated biphenyl

TABLE 2-6
SEDIMENT SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample ID	Date	Depth	Laboratory Sample ID	Laboratory Analysis		
				Diesel Range Organics, pH, percent moisture	TCL VOC, SVOC, pH, percent moisture	PCBs
1998 SEDIMENT SAMPLES						
IR84-SD01-98B	4/19/98	0-6" bgs	IR84-SD01-98B			
IR84-SD05-98B	4/19/98	0-6"	IR84-SD05-98B	X		X
IR84-SD06-98B	4/19/98	0-6"	IR84-SC06-98B	X		X
IR84-SD07-98B	4/23/98	0-6"	IR84-SD07-98B		X	
1995 SEDIMENT SAMPLES						
84-SD01-01	10/26/95	0-6"	84-SD01-01			X
84-SD02-01	10/26/95	0-6"	84-SD02-01			X
84-SD03-01			inaccessible			
84-SD04-01	10/26/95	0-6"	84-SD04-01			X
84-SD05-01	10/26/95	0-6"	84-SD05-01			X
84-SD06-01	10/26/95	0-6"	84-SD06-01			X
84-SD07-01	10/26/95	0-6"	84-SD07-01			X
84-SD08-01	10/26/95	0-6"	84-SD08-01			X

NOTES:

ID = Identification
TCL = Target Compound List
VOC = Volatile Organic Compound
SVOC = Semivolatile Organic Compound
PCB = Polychlorinated biphenyl

TABLE 2-7
QUALITY ASSURANCE QUALITY CONTROL SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample ID	Date	Time (hours)	Laboratory Sample ID	Laboratory Analysis					Comments
				PCBs	TCL VOC	TCL VOC, SVOC, PCBs, pesticides, herbicides, metals	TCL VOC, SVOC, PCBs, pesticides, GRO, DRO, CN, metals	TCL VOCs, SVOCs, pesticides, herbicides, PCBs, VPH, EPH, TAL metals	
MATRIX SPIKE/ MATRIX SPIKE DUPLICATE SAMPLES									
IR84-DP41-00	7/20/01	1545	IR84-DP41-00MS IR84-DP41-00MSD	X					
IR84-DP71-00	7/22/01	1525	IR84-DP71-00MS IR84-DP71-00MSD	X					
IR84-SB05-01	8/3/01	1240	IR84-SB05-01MS IR84-SB05-01MSD					X	
IR84-MW07-01C	8/6/01	1200	IR84-MW01-01CMS IR84-MW07-01CMSD					X	
FIELD BLANKS									
IR84-FB01	7/17/01	0830	IR84-FB01	extract and hold					DI water
IR84-FB02	7/17/01	0843	IR84-FB02	extract and hold					Drillers' water
IR84-FB03	7/21/01	0745	IR84-FB03			X			DI water
IR84-FB04	7/21/01	0730	IR84-FB04			X			Drillers' water
IR84-FB05	8/1/01	1400	IR84-FB05					X	
IR84-FB06	8/3/01	1500	IR84-FB06					X	
EQUIPMENT RINSATES									
IR84-ER01	7/17/01	0836	IR84-ER01	extract and hold					split spoon rinse
IR84-ER02	7/18/01	0720	IR84-ER02	X					acetate sleeve rinse
IR84-ER03	7/19/01	0705	IR84-ER03	X					metal spoon rinse
IR84-ER04	7/20/01	0910	IR84-ER04	extract and hold					split spoon rinse
IR84-ER05	7/21/01	0730	IR84-ER05			X			split spoon rinse
IR84-ER06	7/22/01	1000	IR84-ER06	X					
IR84-ER07	7/23/01	0715	IR84-ER07	X					
IR84-ER08	7/31/01	1655	IR84-ER08					X	
IR84-ER09	8/1/01	1530	IR84-ER09					X	
IR84-ER10	8/2/01	1630	IR84-ER10					X	
IR84-ER11	8/3/01	1430	IR84-ER11					X	
IR84-ER12	8/6/01	1630	IR84-ER12					X	
IR84-ER13	8/7/01	1630	IR84-ER13					X	

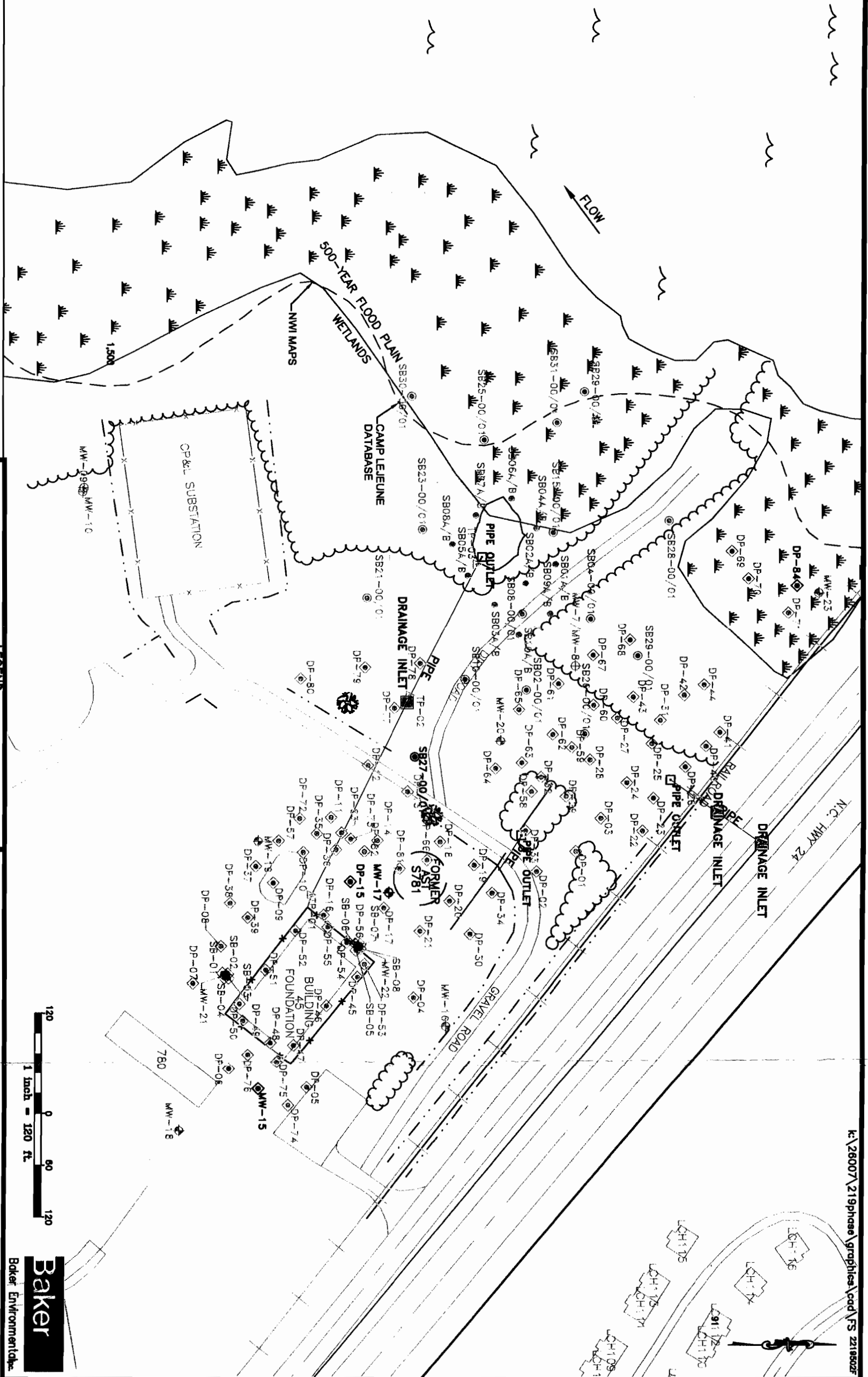
TABLE 2-7
QUALITY ASSURANCE QUALITY CONTROL SAMPLE SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Sample ID	Date	Time (hours)	Laboratory Sample ID	Laboratory Analysis					Comments
				PCBs	TCL VOC	TCL VOC, SVOC, PCBs, pesticides, herbicides, metals	TCL VOC, SVOC, PCBs, pesticides, GRO, DRO, CN, metals	TCL VOCs, SVOCs, pesticides, herbicides, PCBs, VPH, EPH, TAL metals	
TRIP BLANKS									
IR84-TB01	7/21/01	--	TRIP BLANK		X				"Trip Blanks" on CoC
IR84-TB02	7/17/01	0800	IR84-TB02		X				CoC said 7/16/01 (error)
IR84-TB03	7/31/01	1700	IR84-TB03		X				
IR84-TB04	8/1/01	--	IR84-TB04		X				
IR84-TB05	8/2/01	--	IR84-TB05		X				
IR84-TB06	8/3/01	--	IR84-TB06		X				
IR84-TB07	8/6/01	--	IR84-TB07		X				
IR84-TB08	8/7/01	--	IT84-TB08		X				
TBIR84-TB03	7/31/01	--	TBIR84-TB03		X				

NOTES:

ID = Identification
TAL = Target Analyte List
TCL = Target Compound List
VOC = Volatile Organic Compound
SVOC = Semivolatile Organic Compound
PCB = Polychlorinated biphenyl
GRO = Gasoline Range Organics
DRO = Diesel Range Organics
VPH = Volatile Petroleum Hydrocarbon
EPH = Extractable Petroleum Hydrocarbon

FIGURES



NOTES:
- DP-05, DP-15, DP-22, DP-68, DP-73, TP-01, TP-02 ARE APPROXIMATE LOCATIONS NOT BASED ON SURVEY DATA
- MW-15 IS A SOIL BORING

- LEGEND**
- DIRECT PUSH SOIL BORING (2001)
 - EXISTING MONITORING WELL (1992)
 - TEST PIT (2001)
 - NEW MONITORING WELL (2001)
 - SOIL SAMPLING LOCATION (1998)
 - SOIL SAMPLING LOCATION (1995)

FIGURE 2-1
RESTRICTED LAND USE
SITE 84
FEASIBILITY STUDY
CTO - 0219
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

Baker
Baker Environmental

3.0 REGIONAL AND SITE CHARACTERISTICS

This section describes the regional and site-specific environmental settings. A discussion of climate/meteorology, topography, soil associations, surface hydrology and drainage, water supplies, geology, hydrogeology, natural resources and ecological features is presented for MCB, Camp Lejeune and OU No. 19, Site 84. The tables and figures for Section 3.0 are presented at the end of the section.

3.1 Characteristics of MCB, Camp Lejeune

This section presents a discussion of the physical characteristics of MCB, Camp Lejeune. The discussion details the topography and surface features, hydrology, geology, hydrogeology, land usage, climatology, water supply, ecology, wetlands, and threatened and endangered species. This information was obtained from the available literature about MCB, Camp Lejeune.

3.1.1 Climatology

Although coastal North Carolina lacks distinct wet and dry seasons, there is some seasonal variation in average precipitation. July receives the most precipitation and rainfall amounts during summer are generally the greatest. Daily showers during the summer are common, and so are periods of one or two weeks without rain. Convective showers and thunderstorms also contribute to the variability of precipitation during the summer months. October receives the least amount of precipitation, on average. Throughout the winter and spring months precipitation occurs primarily as migratory low pressure storms. MCB, Camp Lejeune's average yearly rainfall is approximately 52 inches. Table 3-1 presents a climatic summary of data collected during 35 years (January 1955 to December 1990) of observations at Marine Corps Air Station (MCAS) New River.

MCB, Camp Lejeune experiences hot and humid summers, however, ocean breezes frequently produce cooling effects. The winter months are mild, with occasional brief cold spells. Average daily temperatures range from 38°F to 58°F in January and 72°F to 86°F in July. The average relative humidity, between 75 and 85 percent, does not vary greatly from season to season.

3.1.2 Topography and Surface Features

The generally flat topography of MCB, Camp Lejeune is typical of the North Carolina Coastal Plain. Elevations on the Base vary from sea level to 72 feet above msl; however, the elevation of most of MCB, Camp Lejeune is between 20 and 40 feet msl.

Drainage at Camp Lejeune is generally toward the New River, except in areas near the coast that drain through the Intracoastal Waterway. In developed areas, natural drainage has been altered by asphalt cover, storm sewers, and drainage ditches. Approximately 70 percent of Camp Lejeune is in broad, flat interstream areas. Drainage is poor in these areas and the soils are often wet (WAR, 1983). The U.S. Army, Corps of Engineers has mapped the limits of the 100-year floodplain at Camp Lejeune at 7.0 feet above msl in the upper reaches of the New River increasing downstream to 11 feet above msl near the coastal area (WAR, 1983).

3.1.3 Surface Soil Associations

The soil survey report for MCB, Camp Lejeune was prepared by the Soil Conservation Service (SCS) in 1984. Since that time, an updated report for Onslow County was issued by the SCS in 1992. Information provided in this section was obtained from these two reports.

Figure 3-1 shows the general soil associations in Onslow County, which includes MCB, Camp Lejeune. A soil association is a landscape that exhibits a distinctive pattern based on soils, drainage and relief. These associations consist of one or more major soil types and at least one minor soil type. The association is then named for the major soil(s). A soil type from one association can exist in other associations, but commonly in a different pattern or percentage.

The two terms, loam and muck, are specifically used to describe soils. A loam is a soil that contains less than 52 percent sand, 28 to 50 percent silt, and 7 to 27 percent clay. A muck is a dark, finely layered, well decomposed soil that contains organic material.

Six soil associations occur at MCB, Camp Lejeune. The Baymeade-Forest-Stallings soil association is the most widely distributed soil group at the Base. The other soil associations that are present are the Leon-Murville-Kureb, Muckalee-Dorovan, Wando-Pactolus, Norfolk-Goldsboro-Onslow and Bohicket-Newman. Two other soil associations occur in Onslow County but, not present at MCB, Camp Lejeune (Croatan and Rains-Woodington-Torhunta Associations);

however, individual soil types from these last two associations are found at MCB, Camp Lejeune. Detailed information on the specific associations are provided in Appendix B of the Background Study Report for Camp Lejeune (Baker 2001).

3.1.4 Subsurface Geology

MCB, Camp Lejeune is within the Tidewater region of the Atlantic Coastal Plain physiographic province. The sediments of the Atlantic Coastal Plain consist mostly of interbedded sands, silts, clays, calcareous clays, shell beds, sandstone and limestone. These sediments are layered in interfingering beds and lenses that gently dip and thicken to the southeast to a combined thickness of approximately 1,500 feet. They were deposited in marine or near-shore environments and range in age from early Cretaceous to Quaternary time. Regionally, the sediments comprise 10 aquifers and nine confining units that overlie igneous and metamorphic basement rocks of the pre-Cretaceous age.

Seven of these aquifers and their associated confining units are present in the MCB, Camp Lejeune area (Cardinell, et al., 1993). Table 3-2 presents a generalized stratigraphic column for Jones and Onslow Counties, North Carolina. Hydrogeologic section location plan and hydrogeologic cross-sections of the MCB, Camp Lejeune area are presented in the Hydrogeologic Framework of U.S. Marine Corps Base at Camp Lejeune, North Carolina (Cardinell, et al, 1993). The following paragraphs provide a description of the lithology of the surficial, Castle Hayne, Beaufort, and Pee Dee aquifers as presented in Cardinell et al. 1993.

The surficial aquifer consists of interfingering beds of sand, clay, sandy clay, and silt of Quaternary and Miocene age that contain some peat and shells. The sand beds that make up the surficial aquifer are part of the Belgrade Formation (Table 3-2). The clay, sandy clay, and silt beds observed within the surficial aquifer are thin and discontinuous, and have limited lateral continuity. The general lithology of the surficial aquifer and the absence of any thick, continuous clay beds are indications of good vertical conductivity within the aquifer.

The confining unit for the Castle Hayne aquifer is composed of clay, silt, and sandy clay beds. These beds form a unit across the Base that may be represented by one or more geological units such as the Quaternary or Miocene deposits at the bottom of the surficial aquifer, the uppermost beds of the River Bend Formation or the uppermost beds of the Castle Hayne Formation. In general, the Castle Hayne confining unit at MCB, Camp Lejeune may be described as a group of

less permeable beds at the top of the Castle Hayne aquifer that have been partly eroded. This confining unit may only be partly effective in retarding the vertical movement of groundwater between the surficial and Castle Hayne aquifers.

The Castle Hayne aquifer consists of soils from the Castle Hayne Formation of Eocene age and some lower beds of the River Bend Formation of Oligocene age. This aquifer primarily consists of sand, shell rock, and limestone beds. The upper part of the aquifer consists primarily of calcareous sand with some continuous and discontinuous thin clay and silt beds (generally 10 to 15 feet thick). The calcareous sand becomes more limey with depth. The lower part of the aquifer primarily consists of consolidated or poorly consolidated limestone and sandy limestone interbedded with clay and sand.

The Beaufort confining unit overlies the Beaufort aquifer and consists of clay, silt, and sandy clay or the uppermost sediments of the Beaufort Formation and the lowermost clay and silt beds of the overlying Castle Hayne Formation. The general silty character of this confining unit is very similar to the Castle Hayne confining unit. Although the deeper unit is slightly thicker and is not known to be discontinuous, it also is likely to be only partly effective in retarding the vertical exchange of groundwater between the Beaufort and Castle Hayne aquifers.

The Beaufort aquifer underlies the Beaufort confining unit and the Castle Hayne aquifer and is composed of Paleocene aged soils. These deposits consist of fine to medium glauconitic sand, clayey sand, and clay beds of marine origin, with a few thin (3 to 6 feet) shell and limestone beds. As with other hydrogeologic units, the Beaufort aquifer is not necessarily restricted to a single formation and may include permeable beds of older Cretaceous formations that are in hydraulic connection with the aquifer.

The confining unit for the Peedee aquifer is composed of clay, silt, and sandy clay beds that form the uppermost units of the Peedee Formation. In some places, the confining unit may also include the lowermost beds of the Beaufort Formation.

The Peedee aquifer underlies the Peedee confining unit and the Beaufort aquifer. It is composed primarily of sand of the Peedee Formation (Cretaceous age). A few thin beds of calcareous sandstone, limestone, clay and silt are interlayered with the sand within the Peedee Formation.

The Black Creek confining unit, which underlies the Peedee aquifer, is composed of clay, silty clay and sandy-clay beds. The confining unit's beds belong to the lowermost Peedee Formation and uppermost Black Creek Formation.

The Black Creek aquifer, primarily composed of units from the Black Creek Formation, is formed from thinly-laminated clays interlayered with sands, clean sands and clays and layers including lignitized wood. This aquifer occurs throughout the MCB, Camp Lejeune area, but contains saltwater.

The Black Creek aquifer is underlain by the Upper Cape Fear confining unit and the Upper Cape Fear aquifer. The Upper Cape Fear confining unit is composed of clay and silt beds with local thin sand lenses from layers belonging to the lower Black Creek Formation and the Upper Cape Fear Formation.

The Upper Cape Fear aquifer is present throughout the MCB, Camp Lejeune area and also contains saltwater. The Upper Cape Fear aquifer is composed of 3 to 5 foot layers of sand and clay. The sands in the aquifer range from fine to coarse with some gravel.

Below the Upper Cape Fear lies the Lower Cape Fear confining unit and the Lower Cape Fear aquifer. The Lower Cape Fear confining unit is beds of silt and clay from the Cape Fear Formation. However, the Upper and Lower Cape Fear aquifers are defined by a difference in head pressure and chloride content. The Lower Cape Fear confining unit may not completely separate these two aquifers.

The lower Cape Fear aquifer contains saltwater and underlies the entire MCB, Camp Lejeune area. The sediments that form the lower Cape Fear aquifer are similar to those in the upper Cape Fear but include thin limestone beds.

3.1.5 Hydrogeology

The following paragraphs discuss the hydrogeologic conditions at MCB, Camp Lejeune. The information presented within this section is from literature published by the United States Geological Survey (USGS) (Harned, et al., 1989 and Cardinell, et al., 1993). Additionally, information was collected from a technical memorandum prepared by Baker summarizing groundwater data and aquifer characteristics for MCB, Camp Lejeune (provided as Appendix E). Table 3-3 provides a summary of estimated hydraulic properties for the Castle Hayne aquifer.

USGS studies at MCB, Camp Lejeune indicate that the area is underlain by sand and limestone aquifers separated by confining units of silt and clay. These aquifers include the surficial (water table), Castle Hayne, Beaufort, Peedee, Black Creek, and upper and lower Cape Fear. Less permeable clay and silt beds function as confining units or semi-confining units that separate the aquifers and impede the flow of groundwater between aquifers.

The surficial unit consists of interfingering beds of sand, clay, sandy clay and silt that contain some peat and shells of Quaternary and Miocene age. These sediments commonly extend to depths of 50 to 100 feet below ground surface (bgs). The thickness of the surficial aquifer in the MCB, Camp Lejeune area ranges from zero to 73 feet, and typically average 25 feet (Cardinell, et al., 1993). The aquifer is generally thickest in the interstream divide areas and may be absent where it is cut by the New River and its tributaries. The clay, sandy clay, and silt beds that occur in the surficial aquifer are thin and discontinuous throughout. A semi-confining unit is found in the surficial aquifer within some portions of MCB, Camp Lejeune.

Recharge to the surficial aquifer is by rainfall. The aquifer receives more recharge in the winter than in the summer when much of the water evaporates or is transpired by plants before it can reach the water table. Most of the surficial groundwater is discharged to local streams, but some water passes through the underlying semiconfining unit. Recharge for the surficial aquifer is based on an average rainfall of 52 inches per year and an average recharge of 30 percent, or an annual recharge of approximately 16 inches per year. The remaining 70 percent of the rainfall is lost as surface runoff or evapotranspiration. Sixteen inches of recharge equates to 7,600,000 gallons per day (gpd) per square mile or approximately 114,000,000 gpd for all of MCB, Camp Lejeune (based on 150 square miles of recharge area). Water levels in the wells tapping the surficial aquifer vary seasonally. The water table is generally highest in the winter and spring, and lowest in the summer and early fall. The lateral hydraulic conductivity for the surficial aquifer was estimated by the USGS at 50 feet per day (ft/day) based on a general soil composition of fine sand mixed with some silt and clay (Cardinal, et al., 1993).

A study of data from aquifer pumping tests conducted at MCB, Camp Lejeune was conducted by Baker in 1994 to evaluate aquifer characteristics and production capacities (Appendix E). The information contained in this memorandum pertains primarily to the surficial aquifer. Based on information available at the time the memorandum was written, the average pumping rates for the surficial aquifer are from 0.5 to three gallons per minute (gpm); transmissivity ranges from 7.1 to 7,100 square feet per day (ft²/day); storativity ranged from 1.5×10^{-3} to 7.5×10^{-2} ; and hydraulic

conductivity ranged from approximately 0.5 to 1.4 ft/day. These data indicate that the estimated lateral hydraulic conductivity reported by USGS may be higher than actual conditions in the vicinity of MCB, Camp Lejeune.

Although the aquifer is classified by NCDENR as GA (i.e., existing or a potential source of drinking water supply for humans), it is not used as a potable water source at MCB, Camp Lejeune. The primary reason for its non-use is because of its low yielding production rates which are typically less than three gpm.

The principal water supply aquifer for MCB, Camp Lejeune is the Castle Hayne aquifer. This aquifer primarily resides within the River Bend Formation, which consists of sand, cemented shells and limestone. Buried paleostream channels containing various deposits exist within the aquifer. The top of the aquifer ranges from 10 feet above msl to 70 feet below msl and is irregular over most of the northern portion of MCB, Camp Lejeune. The aquifer is more regular in areas southeast of the New River, where it slopes southeastward. The Castle Hayne thickens to the east, from 160 feet in the Camp Geiger area to more than 400 feet at the eastern boundary of MCB, Camp Lejeune.

The vertical hydraulic conductivity of the Castle Hayne confining unit was estimated to range from 0.0014 to 0.41 ft/d. These values are comparable to those determined for silts and clays; therefore, this unit may only be partly effective at retarding the vertical movement of groundwater between the surficial and Castle Hayne aquifers (Cardinell, et al., 1993).

Estimated transmissivity, hydraulic conductivity and storage coefficient values (unitless) for the Castle Hayne aquifer range from 6,100 to 183,300 gpd/ft, 14 to 91 ft/d and 2×10^{-4} to 1.9×10^{-3} , respectively. An aquifer pumping test conducted by ESE (1990) in the Hadnot Point Industrial Area (HPIA), using an existing water supply well (HP642), indicates an average transmissivity and storage coefficient of 9,600 gpd/ft and 8.8×10^{-4} , respectively (ESE, 1990). Table 3-3 summarizes the previously stated information.

Recharge of the Castle Hayne aquifer at MCB, Camp Lejeune is primarily received from the surficial aquifer. Natural discharge is to the New River and its major tributaries. The Castle Hayne aquifer provides roughly seven million gallons of water per day to MCB, Camp Lejeune. Groundwater pumping has not significantly affected natural head gradients in the aquifer.

MCB, Camp Lejeune lies in an area where the upper part of the Castle Hayne aquifer contains freshwater. Saltwater is found in the bottom of the aquifer in the region and in the New River estuary; both are of concern in managing water withdrawals from the aquifer. Over pumping the deeper parts of the aquifer or in areas hydraulically connected to estuarine streams could cause saltwater intrusions. The aquifer underlying most of the area contains water having less than 120 milligrams per liter (mg/L) of chloride.

3.1.6 Water Supply

Potable water for MCB, Camp Lejeune is supplied entirely by groundwater. Groundwater usage is roughly seven million gallons per day (gpd) (Cardinell, et al., 1993). Groundwater is pumped from approximately 77 of 90 water supply wells located within the boundaries of MCB, Camp Lejeune. According to Base personnel, groundwater is treated at five plants located at Hadnot Point, Holcomb Boulevard, MCAS New River, Courthouse Bay, and Onslow Beach having a total capacity of 15.8 million gpd.

All of the water supply wells are constructed within the Castle Hayne aquifer. The Castle Hayne aquifer is a highly permeable, semi-confined aquifer that can yield several hundred to 1,000 gpm in municipal and industrial wells in the MCB, Camp Lejeune area. The water supply wells at the Base average 162 feet in depth; eight inches in diameter (casing); and yield an average of 174 gpm (Harned, et al., 1989). The water is typically a hard, calcium bicarbonate type. Information concerning the supply wells was gathered from the Wellhead Management Program Engineering Study 91-36 (Geophex, 1991), the Preliminary Draft Report Wellhead Monitoring Study 92-34 (Greenhome and O'Mara, Inc., 1992), and interviews with Base personnel.

3.1.7 Surface Water Hydrology

The dominant surface water body at MCB, Camp Lejeune is the New River which receives drainage from most of the Base. The river is short, with a course of approximately 50 miles on the central Coastal Plain of North Carolina. Over most of its course, the New River is confined to a narrow channel entrenched in Eocene and Oligocene limestones. South of Jacksonville, the river widens as it flows across less resistant sands, clays, and marls. At MCB, Camp Lejeune, the New River flows in a southerly direction into the Atlantic Ocean through the New River Inlet. Several small coastal creeks that are not associated with the New River or its tributaries drain into the area of MCB, Camp Lejeune. The New River, the Intracoastal Waterway, and the Atlantic Ocean converge at the New River Inlet (WAR, 1983).

Classifications for surface waters in North Carolina have been published under Title 15 of the North Carolina Administration Code. At MCB, Camp Lejeune, the New River falls into three classifications. The portion of the river that passes from the Seaboard Coast Line railroad trestle (located south/southwest of where U.S. Route 17/North Carolina Route 24 crosses the New River) to Montford Point is classified as SC NSW HQW. This classification is defined as salt waters protected for secondary recreation, fishing, aquatic life including propagation and survival (SC) that are nutrient sensitive (NSW) and of high quality (HQW). The portion of the river that resides between Montford Point to a line extending across the river from Grey Point to a point of land approximately 2,200 yards downstream of the mouth of Duck Creek is classified as Class SC NSW. As previously described, these waters are similar to the waters upstream of Montford Point, however they are not considered high quality waters. The remaining portion of the New River is classified as estuarine water suited for commercial shell fishing and all other tidal saltwater uses (SA).

3.1.8 Ecological Characteristics

The Natural Resources and Environmental Affairs (NREA) Division of MCB, Camp Lejeune, the U.S. Fish and Wildlife Service, and the North Carolina Wildlife Resource Commission have entered into an agreement for the protection of endangered and threatened species that might inhabit MCB, Camp Lejeune. Habitats are maintained at MCB, Camp Lejeune for the preservation and protection of rare and endangered species through the Base's forest and wildlife management programs. Full protection is provided to such species, and critical habitat is designated in management plans to prevent or mitigate adverse effects of Base activities. Special emphasis is placed on habitat and sightings of alligators, osprey, bald eagles, cougars, dusky seaside sparrows, and red-cockaded woodpeckers (WAR, 1983).

Camp Lejeune covers approximately 236 square miles, 84 percent of which is forested (USMC, 1987). Approximately 45 percent of this is pine forest, 22 percent is mixed pine/hardwood forest, and 17 percent is hardwood forest. Nine percent of the Base, a total of 3,587 acres, is wetland and includes pure pond pine stands, mixed pond pine/hardwood stands, marshes, pocosins, and wooded swamps. The Base also contains 80 miles of tidal streams, 21 miles of marine shoreline, and 12 freshwater ponds. Over half of the 153,000 acres located within the boundaries of MCB, Camp Lejeune are under forestry management. Timber producing areas are under even-aged management with the exception of those areas along streams and swamps. These areas are managed to provide both wildlife habitat and erosion control. Forest

management provides wood production, increased wildlife populations, enhancement of natural beauty, soil protection, prevention of stream pollution, and protection of endangered species (WAR, 1983).

Because of the natural resources on the Base, forested areas are actively managed for timber. Game species are also managed for hunting, and ponds are maintained for fishing. Game species managed include wild turkey, white-tailed deer, black bear, grey and fox squirrels, bobwhite quail, eastern cottontail and marsh rabbits, raccoons, and wood ducks.

Aquatic ecosystems on MCB, Camp Lejeune consist of small lakes, the New River estuary, numerous tributaries, creeks, and part of the Intracoastal Waterway. A wide variety of freshwater and saltwater fish species exist there. Freshwater ponds are under management to produce optimum yields and ensure continued harvest of desirable fish species (WAR, 1983). Freshwater fish in the streams and ponds include largemouth bass, redbreast sunfish, bluegill, chain pickerel, yellow perch, and catfish. Reptiles include alligators, turtles, and snakes (including venomous species). Both recreational and commercial fishing are practiced in the waterways of the New River and its tributaries (WAR, 1983).

Many natural communities are present in the coastal plain. Subcommunities and variations of these major community types are also present and alterations of natural communities have occurred in response to disturbance and intervention (i.e., forest cleared to become pasture). The natural communities found in the Camp Lejeune area are summarized as follows:

- Loblolly Pine Forest - a dominant forest type at Camp Lejeune. Pine forest often has a dense hardwood subcanopy and shrub understory because of clear-cutting and/or fire suppression. Dense shading results in a sparse ground layer of vegetation with little probability of rare species occurring (LeBlond et. al., 1994).
- Hardwood Forest - Found primarily in stream floodplains and on slopes and terraces next to stream valleys and estuarine features. Stream floodplain communities include cypress - gum swamp and coastal plain small stream swamp. Very few rare species are found in hardwood forests, but the communities themselves can be quite rare (LeBlond et. al., 1994).

- Loblolly Pine/Hardwoods Community - The predominant forest type at Camp Lejeune. Second growth forest that includes loblolly pine with a mix of hardwoods - oak, hickory, sweetgum, sour gum, red maple, and holly (oak is the predominant hardwood). These forests have a low probability for rare species because of the lack of herbaceous development and overall plant diversity (LeBlond et. al., 1994).
- Longleaf Pine Forest and Longleaf Pine/Hardwood Forests - Contain critical, fire maintained natural communities: Pine Savanna, Wet Pine Flatwoods, Mesic Pine Flatwoods, Pine/Scrub Oak Sanhill, and Zeric Sanhill Scrub. Some longleaf pine forests have developed in old fields and cut-over areas. The Federal endangered red-cockaded woodpecker (*Picoides borealis*) is essentially restricted to opened, burned longleaf pine forests. The pine savannas and wet pine flatwood communities are particularly important habitats for several rare species (LeBlond et. al., 1994).
- Maritime Forest - Develop on the lee side of stable sands and dunes protected from the ocean. Live oak is an indicator species with pine, cedar, yaupon, holly, and laurel oak. Deciduous hardwoods may be present where forest is mature (USMC, 1987).
- Pond Pine Forest - These forests are primarily found in pocosins and are classified by Schafale and Wealkey (1990) as the Pond Pine Woodland natural community. Red bay, sweet bay, and loblolly bay are important components of this community. These forests frequently produce areas of high plant diversity and support several rare species. The Federal endangered loosestrife (*Lysimachia asperulifolia*) is found in this community (LeBlond et. al., 1994).
- Freshwater Marsh - Occurs upstream from tidal marshes and downstream from non-tidal freshwater wetlands. Cattails, sedges, and rushes are present. On the coast of North Carolina, swamps are more common than marshes (USMC, 1987).
- Salt Marsh - These areas occur in saline tidal areas protected from tidal action by barrier beach features. The barrier islands fronting the Atlantic Ocean support Brackish Marsh, Upper Beach, Dune Grass, and Maritime Wet and Dry Grassland communities. Regularly flooded, tidally influenced areas dominated by salt-tolerant grasses. Saltwater cordgrass is a characteristic species. Tidal mud flats may be present during low tide. These dynamic communities are critical to such Federal endangered species as the piping plover

(*Charadrius melodus*) and the Federal threatened American loggerhead turtle (*Caretta caretta*) and the green turtle (*Chelonia mydas*) (LeBlond et. al., 1994).

- Salt Shrub Thicket - High areas of salt marshes and beach areas behind dunes. Subjected to salt spray and periodic saltwater flooding. Dominated by salt resistant shrubs.
- Dunes/Beaches - Zones from the ocean shore to the maritime forest. Subjected to sand, salt, wind, and water.
- Ponds and Lakes - Low depressional areas where water table reaches the surface or where ground is impermeable. In ponds rooted plants can grow across the bottom, Fish populations managed in these ponds include redear, bluegill, largemouth bass, and channel catfish (USMC, 1987).
- Open Water - Marine and estuarine water and all underlying bottoms below the intertidal zone.

3.1.9 Wetlands

The NC DENR's Division of Environmental Management (DEM) has developed guidance concerning activities that may impact wetlands (NC DENR, 1992). In addition, certain activities affecting wetlands also are regulated by the U.S. Army Corps of Engineers. The U.S. Fish and Wildlife Service has prepared National Wetland Inventory (NWI) maps for the Camp Lejeune, North Carolina area by stereoscopic analysis of high altitude aerial photographs (USDI, 1982). Figure 3-2 presents the NWI map for the Site 84 area.

Wetland ecosystems at MCB, Camp Lejeune can be categorized into five habitat types: (1) pond pine or pocosin; (2) sweet gum, water oak, cypress, and tupelo; (3) sweet bay, swamp black gum, and red maple; (4) tidal marshes; and, (5) coastal beaches. Pocosins provide excellent habitat for bear and deer because these areas are seldom disturbed by humans. The presence of pocosin-type habitat at MCB, Camp Lejeune is primarily responsible for the continued existence of black bear in the area. Many of the pocosins are overgrown with brush and pine species that would not be profitable to harvest (WAR, 1983).

Sweet gum, water oak, cypress, and tupelo habitat is found in the rich, moist bottomlands along streams and rivers. This habitat extends to the marine shorelines. Deer, bear, turkey, and waterfowl are commonly found in this type of habitat (WAR, 1983).

Sweet bay, swamp black gum, and red maple habitat exist in the floodplain areas of MCB, Camp Lejeune. Fauna including waterfowl, mink, otter, raccoon, deer, bear, and gray squirrel frequent this habitat (WAR, 1983).

The tidal marsh at the mouth of the New River is one of the few remaining North Carolina coastal areas relatively free from filling or other manmade changes. This habitat, which consists of marsh and aquatic plants such as algae, cattails, saltgrass, cordgrass, bulrush, and spikerush, provides wildlife with food and cover. Migratory waterfowl, alligators, raccoons, and river otter exist in this habitat (WAR, 1983).

Coastal beaches along the Intracoastal Waterway and along the outer banks of MCB, Camp Lejeune are used for recreation and to house a small military command unit. Basic assault training maneuvers are also conducted along these beaches. Training regulations presently restrict activities that would impact ecologically sensitive coastal barrier dunes. The coastal beaches provides habitat for many shorebirds (WAR, 1983).

3.1.10 Threatened and Endangered Species

Certain species have been granted protection by the U.S. Fish and Wildlife Services under the Federal Endangered Species Act (16 United States Code (U.S.C.) 1531-1543), and/or by the North Carolina Wildlife Resources Commission, under the North Carolina Endangered Species Act (G.S. 113-331 to 113-337). The protected species fall into one of the following status classifications: Federal or state endangered, threatened, or candidate species; state special concern; state significantly rare; or state watch list. While only the Federal or state threatened or endangered and state special concern species are protected from certain actions, the other classified species have the potential for protection in the future.

Surveys have been conducted to identify threatened or endangered species at Camp Lejeune and several programs are underway to manage and protect them. Table 3-4 lists protected species present at the Base and their protected classifications. Of these species, the red-cockaded woodpecker, American alligator, and sea turtle are covered by specific protection programs.

The red-cockaded woodpecker is classified as state endangered. This species requires a specific habitat in mature, living longleaf or loblolly pine trees. The birds exist in family groups and young are raised cooperatively. At Camp Lejeune, 2,512 acres of habitat have been identified and marked for protection. Research on the bird at Camp Lejeune began in 1985 and information has been collected to determine home ranges, population size and composition, reproductive success, and habitat use. An annual roost survey is conducted and 36 colonies of birds have been located.

The American alligator is considered threatened in the northernmost part of its range, which includes North Carolina. The alligator is found in freshwater, estuarine, and saltwater wetlands in Camp Lejeune. Base wetlands are maintained and protected for the alligator. Signs have been erected where alligators are known to live. Annual surveys of Wallace, Southwest, French, Duck, Mill, and Stone Creeks have been conducted since 1977 to identify alligators and their habitats on Base.

Two protected sea turtles, the Atlantic loggerhead and Atlantic green turtle, nest on Onslow Beach at Camp Lejeune and are both classified as threatened species. The green turtle was found nesting in 1980; the sighting was the first time the species was observed nesting north of Georgia. The turtle returned to nest in 1985. Turtle nests on the beach are surveyed and protected, turtles are tagged, and annual turtle status reports are issued.

Four bird species (black skimmer, piping plover, Bachman's sparrow, and peregrine falcon) have also been identified during surveys at Camp Lejeune. The piping plover and peregrine falcon are classified as threatened species. The black skimmer and Bachman's sparrow are classified as special concern (state). The black skimmer and piping plover are sea and shore birds respectively. Skimmers nest on low sandy islands and sand bars along the coast and piping plovers prefer beaches with broad open sandy flats above the high tide line. Skimmers feed above open water and piping plovers feed along the edge of incoming waves. Like the black skimmer and piping plover, Bachman's sparrows are very specific in their habitat requirements. They live in open stretches of pines with grasses and scattered shrubs for ground cover. Bachman's sparrows were observed at numerous locations throughout the southern portion of Camp Lejeune.

In addition to the protected species that breed or forage at Camp Lejeune, several protected whales migrate through the coastal waters off the base during the spring and fall. These include the Atlantic right whale, finback whale, sea whale, and sperm whale. Before artillery or bombing practice is conducted in the area, aerial surveys are made to assure that whales are not present in the impact areas.

A natural heritage resources survey was conducted at Camp Lejeune (LeBlond, 1991) to identify threatened or endangered plants and areas of significant natural interest. From this survey, the rough-leaf loosestrife was the only specie identified that is both Federal and state endangered. Also, several state endangered/threatened and Federal and state candidate species were found on the Base.

3.2 Characteristics of Site 84, Building 45 Area

This section describes the physical setting, topography, drainage characteristics, geology, hydrogeology, and ecological features of Site 84. Information provided in this section is based on previous investigations at Site 84 and on the RI field work.

3.2.1 Site Topography and Surface Features

Surface water drainage patterns at Site 84 were determined from a topographic survey completed during the 2001 field investigation. Drainage patterns are depicted on Figure 3-3. The site is relatively flat, with a gently downward slope from the area near Building 45 toward the field near the wooded area approaching Northeast Creek. Overland surface water drainage is to the northwest. Some overland flow will tend to pool in this field, while the remainder will continue to flow through the wetlands toward Northeast Creek.

3.2.2 Soil Associations

Site 84 has soils that are a member of the Muckalee-Dorovan soil association. Muckalee soils are poorly drained loam underlain by sandy loam and loam. The surface soils are strongly acidic and the subsoil can range from moderately acid to alkaline. Muckalee soils were formed from non-acidic parent material that was rich in calcium carbonate. Dorovan soils are muck that is very poorly drained and strongly acidic. Dorovan soils have a high content of organic materials. Dorovan soils have formed by the accumulation of organic debris.

As distance increases from Northeast Creek at Site 84, the soils transitions in to the Baymeade-Forest-Stallings soil association. Baymeade soils are well drained fine sands underlain by fine sandy loam subsoil that is gently sloping or nearly level. Baymeade soils are moderately to highly acidic. Foreston soils are found on slightly convex divides, are well drained, strongly

acidic, loamy fine sands with a fine sandy loam subsoil. Stallings soils are poorly drained, strongly to extremely acidic, loamy fine sands over fine sandy loam in interstream areas.

3.2.3 Site Geology

As the intent of the study (as defined in the RI/FS Project Plans) is to delineate impact to surficial soil and the shallow water table aquifer this section focuses on the shallow geology (to a depth of approximately 50' bgs.) Where available, geologic descriptions and boring logs from previous studies were used. Three cross sections were constructed to aid in the characterization of the geology and hydrogeology of Site 84. These cross-sections were constructed based on boring log records from well installation activities during the August/September 2001 field event, with supplemental information provided by previous investigations. These logs from the current investigation may be found in Appendix B. The locations of cross-sections are presented on Figure 3-4. The paragraphs that follow detail each cross-section constructed for the site.

Cross-section A-A' (Figure 3-5) trends northwest to southeast and passes through the Building 45 foundation. This section illustrates the fairly homogeneous lithologic sequence of Site 84. Fine sand, trace silt (of the undifferentiated formation) predominates in this section. Fill material (i.e., fine sand, coal and brick fragments) is present in the vicinity of the Building 45 foundation at a depth of approximately 2 feet. The fill material extends approximately 150 feet northwest of the foundation. The fill material was not observed at well 84-MW-18 (145 feet southeast of the foundation). The monitoring wells depicted on cross-section A-A' are screened in the surficial aquifer comprised of fine sands and a lesser amount of silt.

Cross-section B-B' (Figure 3-6) trends southwest to northeast and passes just northwest of the Building 45 foundation. Like Section A-A', fine sand (of the undifferentiated formation) predominates in Section B-B'. Fill material (i.e., fine sand, gravel and brick fragments) is present in the vicinity of Building 45 foundation at depth of approximately 2 feet. The fill material extends from the building foundation to well 84-MW-19 (95 feet southwest of the foundation). The fill material was not observed at well 84-MW-16 (110 feet northeast of the foundation). A sequence of fine sand with a lesser amount of clay was observed at well 84-MW-16 at depths of 14 to 14.6 and 16 to 18 feet. This fine sand/clay layer pinches out between 84-MW-16 and 84-MW-22.

Cross Section C-C' (Figure 3-7 trends northwest to southeast, parallel to section A-A'). Like the other sections, the section shows sand to predominate the subsurface under Site 84; however, the sand tends to be coarser under this portion of the site. Medium sand is present in the western edge of the section, with a narrow layer of coarse sand situated between wells MW-13 and MW-22. Fine sand and clay are present on the eastern edge of the section (e.g., boring DP-45 and well MW-09. A thick clay layer was observed at well MW-09, but pinches out to the west as it was not observed at wells MW-22 and MW-02.

The lithology observed along all three sections is indicative of the undifferentiated formation. The RI wells indicated fine sands to medium sands with lesser amounts of silt. This is consistent with observations made in the Cardinell study. The UST investigation cross sections and boring logs are not as detailed as logs from the RI, but generally support the findings of the RI.

It is not clear if the clay layer observed at well MW-09 is the Castle Hayne confining unit. The boring log from this well indicated that the top of the clay is at an elevation of approximately 7 feet above msl. From Cardinell, the elevation of the top of the Castle Hayne confining unit is estimated to range from 7 feet above msl to 4 feet below msl in this portion of Camp Lejeune. The site-specific data correlates to the base-wide data; however, the lithology sequence does not match. Cardinell indicates that the Castle Hayne confining unit is situated immediately above the Castle Hayne aquifer. Cardinell further indicates that the upper portion of the Castle Hayne aquifer is primarily composed of calcareous sand. Observations from other IR sites support this, but also note the presence of shell/fossil fragments in the upper portion of the Castle Hayne aquifer. Fine sand was observed immediately below the clay layer at well MW-09. Previous experience at the base indicated that the distinction between the terrigenous sands of the undifferentiated formation and the marine sediments of the River Bend formation (Castle Hayne aquifer) is clear. No such distinctions were observed during the RI and from the UST investigation data.

3.2.4 Site Hydrogeology

During advancement of the borings, groundwater was encountered from several inches to 15 feet bgs. Static water elevations were measured on August 7, 2001 for the 12 monitoring wells sampled as part of the RI field investigation (Table 3-5). These elevations were used to generate a potentiometric surface of the surficial aquifer, presented as Figure 3-8. As indicated on the figure, shallow groundwater flows to the northwest, towards Northeast Creek. It should be noted

that groundwater elevations from monitoring well MW-17 were not used to calculate groundwater contours. A perched groundwater zone was encountered at approximately three feet bgs at MW-17. Originally, during drilling operations water was encountered at 23 feet bgs in a fine sand, trace silt with the soil becoming drier with depth. Water was again encountered at 9.6 feet bgs and then remained wet to the bottom of the boring. It should be noted that when field operations began, a valve in Midway Park had inadvertently been turned on and was discharging potable water at Site 84. The water was discharging at approximately 10 gallons per minute and flowing overland in the area where MW-17 was ultimately installed. Baker immediately contacted Base facilities and worked with them to locate the source and have the valve shut off. It is unknown how long water was discharging at the site. This excessive infiltration of surface water runoff may have been responsible for an increase in static water level at MW-17, therefore data from this point was excluded from the figure.

In-situ hydraulic conductivity (slug) tests were conducted on select wells at Site 84 to provide an estimate of hydraulic conductivity of the surficial aquifer. A rising head slug test was conducted at six of the newly installed shallow monitoring wells (MW-16, MW-17, MW-18, MW-19, MW-20 and MW-23) and two existing shallow monitoring wells (MW-07 and MW-09). The Site 84 shallow wells had static water levels within the screened interval. Therefore, falling head tests were not conducted because these tests are not valid where the static water level is within the screened interval. A summary of the slug test results is presented on Table 3-6, and the slug test solutions are included as Appendix C.

The hydraulic conductivity values of the Site 84 upper superficial aquifer exhibited high variability between tested wells ranging from 0.48 feet/day at well MW-19 to 16 feet/day at well MW-09. The lower conductivities (0.48 to 1 feet/day) were observed at the wells near Building 45 foundation (MW-16, MW-18 and MW-19), in the eastern portion of the site. The higher conductivities (11.2 and 16 feet/day) were observed at the existing wells MW-07 and MW-09.

3.2.4.1 Groundwater Flow Velocities

Groundwater flow velocity can be estimated using a variation of Darcy's equation:

$$V = Ki/n_e$$

where:

- V = groundwater velocity (feet/day)
- K = hydraulic conductivity (feet/day)
- i = horizontal gradient (feet/feet)
- n_e = effective porosity (dimensionless)

Velocity calculations are presented in Appendix C. Hydraulic conductivity values were determined from slug tests conducted at selected wells at the site. The horizontal gradient was estimated from the potentiometric surface map contour spacing. An effective porosity of 20 percent was used (Table C.3.2 Wiedemeier, 1996).

Groundwater velocities in the vicinity of the Building 45 foundation (higher horizontal gradient) averaged 0.13 feet/day (approximately 47 feet/year) in the upper surficial aquifer. Groundwater velocities west of the building 45 foundation (lower horizontal gradient) averaged 0.2 feet/day (73 feet/year).

3.2.5 Potable Water Supply Well Inventory

A review of the WMPES Document indicates the existence of 15 potable water supply wells within a one-mile radius of the study area. Of these 15 potable water supply wells, six are currently in service as indicated on Figure 3-9. Table 3-7 provides detailed information concerning each of these wells.

3.2.6 Surface Water Hydrology

Site 84 is bordered to the northwest by Northeast Creek. The classification of Northeast Creek from North Carolina State Highway 24 downstream to the mouth of Scales Creek (the area adjacent to Site 84) is SC HQW NSW. This classification is defined as salt waters protected for secondary recreation, fishing, aquatic life including propagation and survival (SC) that are nutrient sensitive (NSW) and of high quality (HQW). From the downstream side of the mouth of Scales Creek to the New River, Northeast Creek is classified as SC NSW. These downstream waters are similar to the waters upstream of Scales Creek, however they are not considered high quality waters. These classifications are published under Title 15 of the North Carolina

Administration Code. The salinity of Northeast Creek, as measured on November 15, 2001, was 22.3 ppt. This salinity reading agrees with the classification of the creek as a saltwater body. The portion of Northeast Creek near the site is used for recreational purposes, including boating, swimming, fishing and crabbing.

3.2.7 Ecological Characteristics

The environmental setting of Site 84 was evaluated through examination of historical information and a site visit. Superfund Program Representative Sampling Guidance, Volume 3: Biological (USEPA, 1997b) was used as a guide to identify ecological components of the site. Four habitat units were identified at Site 84: a wooded habitat, an open field, a lagoon, and a creek. Although a formal wetland delineation has not been performed at the site, the National Wetlands Inventory (NWI) map indicates that wetlands exist within portions of the wooded habitat (Figure 3-3). Based on observations made during the site visit, it is likely that these wetlands extend in to the open field along the railroad tracks.

The wooded habitat is a member of the Loblolly Pine/Hardwoods Community - The predominant forest type at Camp Lejeune (see Section 3.1.8). The predominant size of trees present in the wooded portion of the site was 6 - 12 inches in diameter at breast height (dbh). Approximately five percent of the trees had dbhs greater than 12 inches.

An open field is present southeast of the woodland boundary and extends to the area surrounding former Building 45. The field in the area of the woodland and railroad tracks is not maintained and is in a depressed area in terms of surface water flow. There is no evidence that this area has ever been covered with gravel. Conversely, the field southwest and northeast of former Building 45 appears to consist of herbaceous vegetation that is growing over areas formerly covered with gravel. To the northeast of the building the field is a manicured lawn.

A lagoon, approximately 50 feet in diameter is located within the woodland southwest of the road leading to Northeast Creek. The banks of the lagoon are relatively steep, with water levels during a November 2001 site visit reaching approximately five feet below the highest point of the banks. The steep banks would make access to terrestrial mammals for drinking purposes difficult. A narrow area on the southeast edge of the lagoon has been cleared of vegetation as a result of trenching activities to locate a buried pipe (see Section 2.0).

Northeast Creek forms the northwest border of the site. The creek is a large tributary to the York River. As stated above, the creek is a saltwater body.

The following species were identified by track or sight during the site visit:

Trees:

- Loblolly pine (*Pinus taeda*)
- Sweet gum (*Liquidambar styraciflua*)
- Willow (*Salix* sp.) (likely *S. alba*)
- Spicebush (*Lindera benzoin*)
- Elm (*Ulmus americana*)
- Mulberry (*Morus* sp.)
- Turkey oak (*Quercus laevis*) (or hybrid; located north east of the foundation of former Building 45)

Saplings/ Shrubs:

- Sycamore (*Platanus occidentalis*)
- Sweet gum (*Liquidambar styraciflua*)
- Winged sumac (*Rhus copalina*)

Vines and herbaceous species:

- Poison ivy (*Toxicodendron radicans*)
- Grape vine (*Vitis* sp.)
- Virginia creeper (*Parthenocissus quinquefolia*)
- Black-eyed Susan (*Rudbeckia hirta*)
- Duckweed (in lagoon)

Terrestrial animals:

- Snake
- Deer
- Insects
- Hawk
- Shorebirds

Aquatic animals:

- Frog
- Turtles (observed during previous site investigations)
- Mussel shells (river bed)
- Fish (river)

3.2.8 Wetlands

Although wetlands have not been delineated at Site 84 by an actual wetland delineation survey, the area along Northeast Creek and west of the lagoon is classified as a PF0411C wetland based upon the National Wetlands Inventory maps for the MCB, Camp Lejeune area (Figure 3-2). This classification identifies the wetland as Palustrine in a forested area with broad-leaved deciduous trees. The water regime for the wetland is non-tidal and is only seasonally flooded.

3.2.9 Endangered Species

No protected species have been reported or observed at Site 84. The site is not located within any areas identified as ecologically protected or of significant natural value. Information used to evaluate rare species, natural communities, and critical areas at this site was obtained from the IAS (WAR, 1983) and a habitat inventory conducted for Camp Lejeune (LeBlond et al., 1994).

3.3 References

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TABLES

TABLE 3-1

CLIMATIC DATA SUMMARY
MARINE CORPS AIR STATION, NEW RIVER
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

	Precipitation (Inches)			Relative Humidity (Percent)	Temperature (Fahrenheit)			Mean Number of Days With			
	Maximum	Minimum	Average		Maximum	Minimum	Average	Precipitation >=0.01"	>=0.5"	>=90F	Temperature >=75F <=32F
January	7.5	1.4	4.0	79	54	34	44	11	2	0	1 16
February	9.1	.9	3.9	78	57	36	47	10	3	0	2 11
March	8	.8	3.9	80	64	43	54	10	3	*	5 5
April	8.8	.5	3.1	79	73	51	62	8	2	1	13 *
May	8.4	.6	4.0	83	80	60	70	10	3	2	25 0
June	11.8	2.2	5.2	84	86	67	77	10	4	7	29 0
July	14.3	4.0	7.7	86	89	72	80	14	5	13	31 0
August	12.6	1.7	6.2	89	88	71	80	12	4	11	31 0
September	12.8	.8	4.6	89	83	66	75	9	3	4	27 0
October	8.9	.6	2.9	86	75	54	65	7	2	*	17 *
November	6.7	.6	3.2	83	67	45	56	8	2	0	7 3
December	6.6	.4	3.7	81	58	37	48	9	2	0	2 12
Annual	65.9	38.2	52.4	83	73	53	63	118	35	39	189 48

Notes:

* = Mean no. of days less than 0.5 days

Source: Naval Oceanography Command Detachment, Asheville, North Carolina. Measurements obtained from January 1955 to December 1990.

TABLE 3-2

**GEOLOGIC AND HYDROGEOLOGIC UNITS IN THE
COASTAL PLAIN OF NORTH CAROLINA
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA**

GEOLOGIC UNITS			HYDROGEOLOGIC UNITS
System	Series	Formation	Aquifer and Confining Unit
Quaternary	Holocene/Pleistocene	Undifferentiated	Surficial Aquifer
Tertiary	Pliocene	Yorktown Formation ⁽¹⁾	Yorktown Confining Unit Yorktown Aquifer
	Miocene	Eastover Formation ⁽¹⁾	Pungo River Confining Unit Pungo River Aquifer
		Pungo River Formation ⁽¹⁾	
		Belgrade Formation ⁽²⁾	Castle Hayne Confining Unit
	Oligocene	River Bend Formation	Castle Hayne Aquifer
	Eocene	Castle Hayne Formation	Beaufort Confining Unit ⁽³⁾
	Palocene	Beaufort Formation	Beaufort Aquifer
			Peedee Confining Unit Peedee Aquifer
Cretaceous	Upper Cretaceous	Peedee Formation	Black Creek Confining Unit Black Creek Aquifer
		Black Creek and Middendorf Formations	Upper Cape Fear Confining Unit Upper Cape Fear Aquifer
			Lower Cape Fear Confining Unit Lower Cape Fear Aquifer
		Cape Fear Formation	Lower Cretaceous Confining Unit Lower Cretaceous Aquifer ⁽¹⁾
	Lower Cretaceous ⁽¹⁾		Unnamed Deposits ⁽¹⁾
	Pre-Cretaceous Basement Rocks		---

⁽¹⁾ Geologic and hydrologic units not present beneath Camp Lejeune.

⁽²⁾ Constitutes part of the surficial aquifer and Castle Hayne confining unit in the study area.

⁽³⁾ Estimated to be confined to deposits of Paleocene age in the study area.

Source: Cardinell, et al., 1993

TABLE 3-3

**HYDRAULIC PROPERTY ESTIMATES OF THE CASTLE HAYNE AQUIFER AND CONFINING UNIT
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA**

Hydraulic Properties	USGS Phase I Study ⁽¹⁾	USGS Aquifer Test ⁽²⁾	ESE, Inc. ⁽³⁾	NC DENR Aquifer Test ⁽⁴⁾	RASA Estimate ⁽⁵⁾
Aquifer transmissivity (cubic foot per day per square foot times foot of aquifer thickness)	4,300 to 24,500 average 9,500	1,140 to 1,325	820 to 1,740 average 1,280	900	10,140 to 26,000
Aquifer hydraulic conductivity (foot per day)	14 to 82 average 35	20 to 60	--	18 to 91 average 54	45 to 80 average 65
Aquifer storage coefficient (dimensionless)	--	2.0×10^{-4} to 2.2×10^{-4}	5.0×10^{-4} to 1.0×10^{-3} average 8.0×10^{-4}	1.9×10^{-3}	--
Confining-unit vertical hydraulic conductivity (foot per day)	--	3.0×10^{-2} to 4.1×10^{-1}	1.4×10^{-3} to 5.1×10^{-2} average 3.5×10^{-3}	--	--

Notes:

- (1) Analysis of specific capacity data from Harned and others (1989).
- (2) Aquifer test at well HP-708.
- (3) Aquifer test at Hadnot Point well HP-462 from Environmental Sciences and Engineering, Inc. (1988).
- (4) Unpublished aquifer test data at well X24s2x, from NC DENR well records (1985).
- (5) Transmissivities based on range of aquifer thickness and average hydraulic conductivity from Winner and Coble (1989).

Source: Cardinell, et al., 1993.

TABLE 3-4

**PROTECTED SPECIES
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA**

Species	Protected Classification
Animals:	
American alligator (<i>Alligator mississippiensis</i>)	SC
Bachmans sparrow (<i>Aimophila aestivalis</i>)	FCan, SC
Green (Atlantic) turtle (<i>Chelonia m. mydas</i>)	T(f), T(s)
Loggerhead turtle (<i>Caretta caretta</i>)	T(f), T(s)
Peregrine falcon (<i>Falco peregrinus</i>)	E(f), E(s)
Piping plover (<i>Charadrius melodus</i>)	T(f), T(s)
Red-cockaded woodpecker (<i>Picoides borealis</i>)	E(f), E(s)
Southern Hognose Snake (<i>Heterodon simus</i>)	FCan, SR
Diamondback Terrapin (<i>Malaclemys terrapin</i>)	FCan, SC
Carolina Gopher Frog (<i>Rana capito capito</i>)	FCan, SC
Cooper's Hawk (<i>Accipiter cooperii</i>)	SC
Eastern Diamondback Rattlesnake (<i>Crotalus adamanteus</i>)	SR
Eastern Coral Snake (<i>Micrurus fulvius</i>)	SR
Pigmy Rattlesnake (<i>Sistrurus miliarius</i>)	SR
Black Bear (<i>Ursus americanus</i>)	SR
Plants:	
Rough-leaf loosestrife (<i>Lysimachia asperulifolia</i>)	E(f), E(s)
Seabeach Amaranth (<i>Amaranthus pumilus</i>)	T(f), T(s)
Chapman's Sedge (<i>Carex chapmanii</i>)	FCan
Hirst's Witchgrass (<i>Dichanthelium</i> sp.)	FCan
Pondspice (<i>Litsea aestivalis</i>)	FCan
Boykin's Lobelia (<i>Lobelia boykinii</i>)	FCan
Loose Watermilfoil (<i>Myriophyllum laxum</i>)	FCan, T(s)
Awed Meadowbeauty (<i>Rhexia aristosa</i>)	FCan, T(s)
Carolina Goldenrod (<i>Solidago pulchra</i>)	FCan, E(s)
Carolina Asphodel (<i>Tofieldia glabra</i>)	FCan
Venus Flytrap (<i>Dionaea muscipula</i>)	FCan
Flaxleaf Gerardia (<i>Agalinis linifolia</i>)	SR
Pinebarrens Goober Grass (<i>Amphicarpum purshii</i>)	SR
Longleaf Three-awn (<i>Aristida palustris</i>)	SR
Pinebarrens Sandreed (<i>Calamovilfa brevipilis</i>)	E(s)
Warty Sedge (<i>Carex verrucosa</i>)	SR
Smooth Sawgrass (<i>Cladium mariscoides</i>)	SR
Leconte's Flatsedge (<i>Cyperus lecontei</i>)	SR
Erectleaf Witchgrass (<i>Dichanthelium erectifolium</i>)	SR
Horsetail Spikerush (<i>Eleocharis equisetoides</i>)	SR
Sand Spikerush (<i>Eleocharis montevidensis</i>)	SR
Flaxleaf Seedbox (<i>Ludwigia linifolia</i>)	SR

TABLE 3-4 (Continued)

**PROTECTED SPECIES
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA**

Species	Protected Classification
Plants (cont.):	
Torrey's Muhley (<i>Muhlenbergia torreyana</i>)	E(s)
Southeastern Panic Grass (<i>Panicum tenerum</i>)	SR
Spoonflower (<i>Peltandra sagittifolia</i>)	SR
Shadow-witch (<i>Ponthieva racemosa</i>)	SR
West Indies Meadowbeauty (<i>Rhexia cubensis</i>)	SR
Pale Beakrush (<i>Rhynchospora pallida</i>)	SR
Longbeak Baldsedge (<i>Rhynchospora scirpoides</i>)	SR
Tracy's Beakrush (<i>Rhynchospora tracyi</i>)	SR
Canby's Bulrush (<i>Scirpus etuberculatus</i>)	SR
Slender Nutrush (<i>Scleria minor</i>)	SR
Lejeune Goldenrod (<i>Solidago</i> sp.)	SR
Dwarf Bladderwort (<i>Utricularia olivacea</i>)	T(s)
Elliott's Yellow-eyed Grass (<i>Xyris elliotii</i>)	SR
Carolina Dropseed (<i>Sporobolus</i> sp.)	T(s)

Legend:

E(f) = Federal Endangered
 T(f) = Federal Threatened
 Fcan = Candidate for Federal Listing
 E(s) = State Endangered
 T(s) = State Threatened
 SC = State Special Concern
 SR = State Rare

Source: LeBlond, 1994

TABLE 3-5

**SLUG TEST HYDRAULIC CONDUCTIVITY SUMMARY
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA**

Well	Rising Head	
	(cm/sec)	(ft/day)
Upper Superficial Aquifer		
84-MW07	3.95E-03	11.2
84-MW09	5.63E-03	16.0
84-MW16	3.57E-04	1.0
84-MW17	3.41E-03	9.6
84-MW18	2.90E-04	0.8
84-MW19	1.68E-04	0.5
84-MW20	2.33E-03	6.6
84-MW23	7.89E-04	2.2
Total Average	2.12E-03	6.0

TABLE 3-6

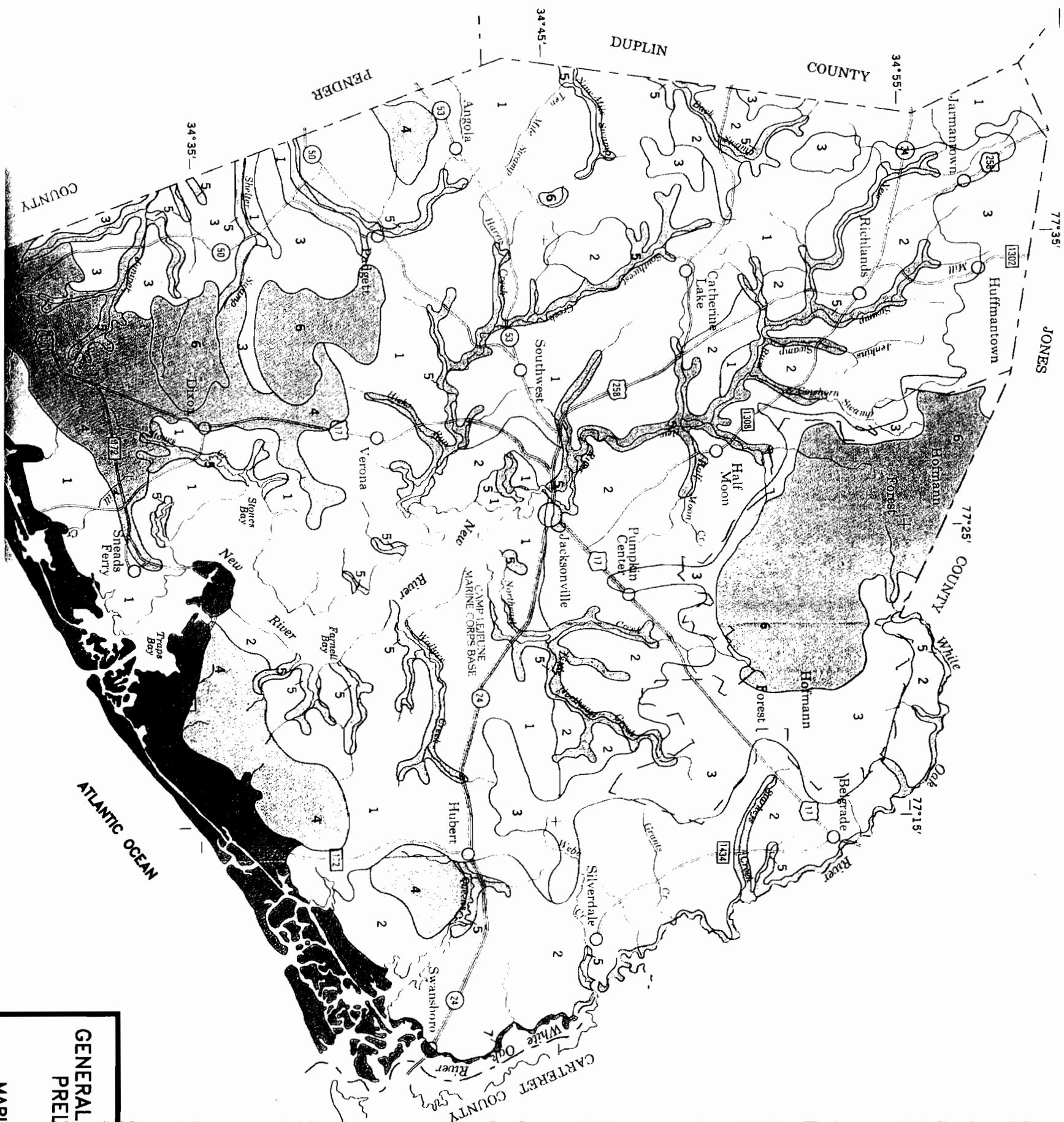
**SUMMARY OF POTABLE WATER SUPPLY WELLS
WITHIN A ONE-MILE RADIUS OF SITE 84
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA**

Supply Well Number	Well Depth (ft)	Screened Interval (ft)	Well Dia. (in)	Approx. Dist. (ft) and Dir.	Well Status
HP-704	124	84 - 114	10	927/SE	Active
LCH-4006	140	90 - 114 116 - 134	8	3598/SE	Inactive
HP-703	NA	NA	NA	2268/SE	Active
HP-616	170	95 - 115 130 - 140 160 - 170	8	3705/SE	Active
HP-645	245	90 - 100 138 - 148 230 - 240	10	3281/SE	Inactive
HP-644	255	85 - 100 235 - 250	10	3801/SW	Active
HP-643	250	90 - 100 138 - 148 230 - 240	10	4355/SW	Active
HP-698	124	84 - 124	10	5176/SW	Active
TT-54	104	NA	NA	4550/NW	Inactive
TT-31	94	NA	NA	5235/NW	Inactive
TT-67	98	NA	NA	5193/NW	Inactive
TT-23	263	NA	NA	4693/NW	Inactive
X-24	NA	NA	NA	5176/NW	Inactive
TT-26	100	NA	NA	5117/NW	Inactive
TT-25	200	70 - 95 155 - 170	8	4931/NW	Inactive

Notes:

NA - Information not available

FIGURES



- SOIL LEGEND**
- 1 BAYMEADE-FORESTON-STALLINGS
 - 2 NORFOLK-GOLDSBORO-ONSLOW
 - 3 RAINS-WOODINGTON-TORHUNTA
 - 4 LEON-MURVILLE-KUREB
 - 5 MUCKALEE-DOROVAN
 - 6 CROATAN
 - BOHICKET-NEWMAN
 - WANDO-PACTOLUS

Compiled 1990

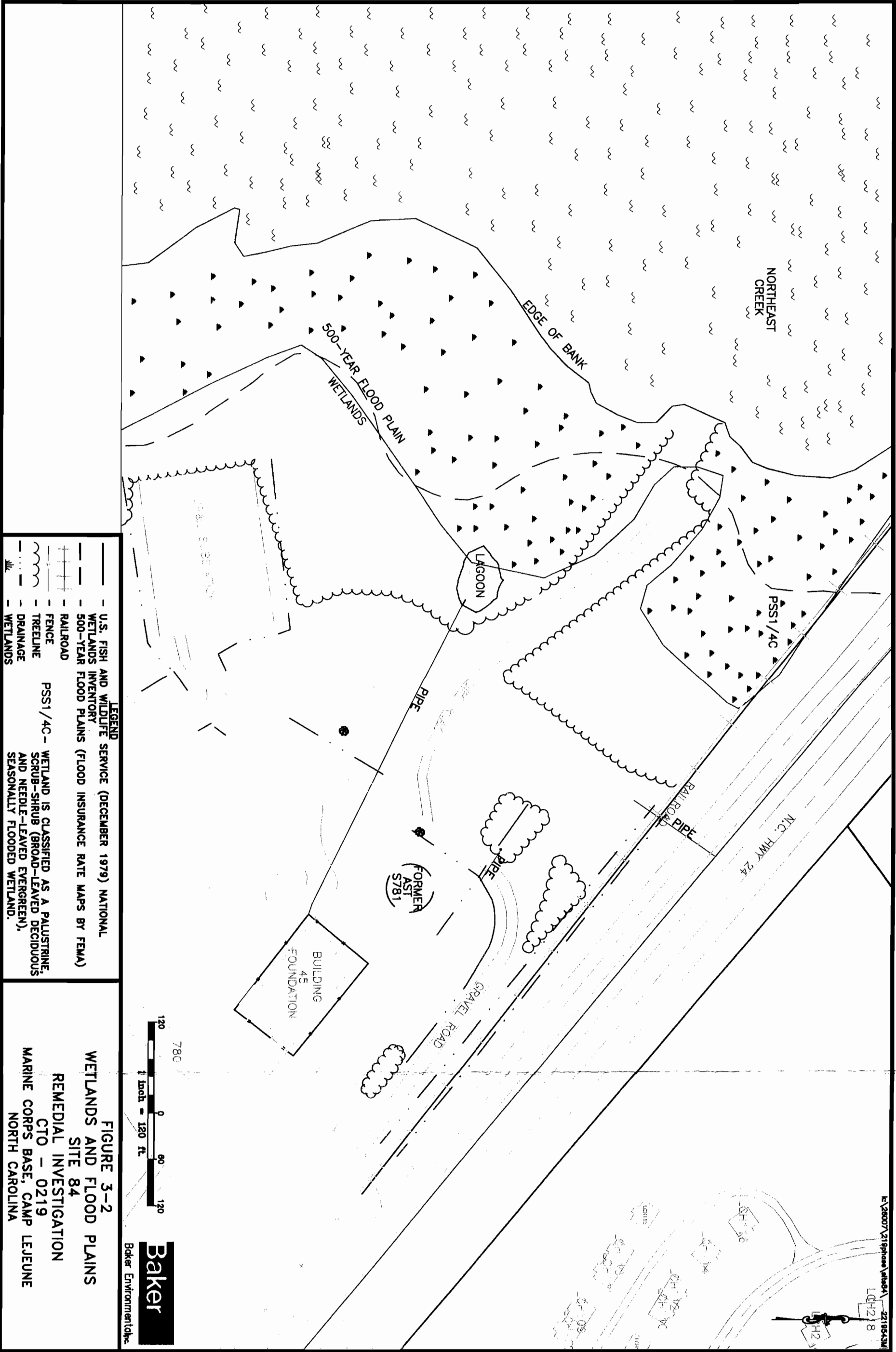
FIGURE 3-1
GENERAL SOIL MAP OF ONSLOW COUNTY
PRELIMINARY ASSESSMENT SITES
CTO - 0190

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

SOURCE: SOIL SURVEY OF ONSLOW CO., SCS, 1992.

Baker

Baker Environmental





ELEVATION IN FEET ABOVE MEAN SEA LEVEL.

→ SURFACE WATER FLOW DIRECTION

 - **WETLANDS**

- TOPOGRAPHIC CONTOURS ARE BASED ON SURVEY DATA
A FROM SAMPLE LOCATIONS (MILLER & STEVENSON, JULY 2001)

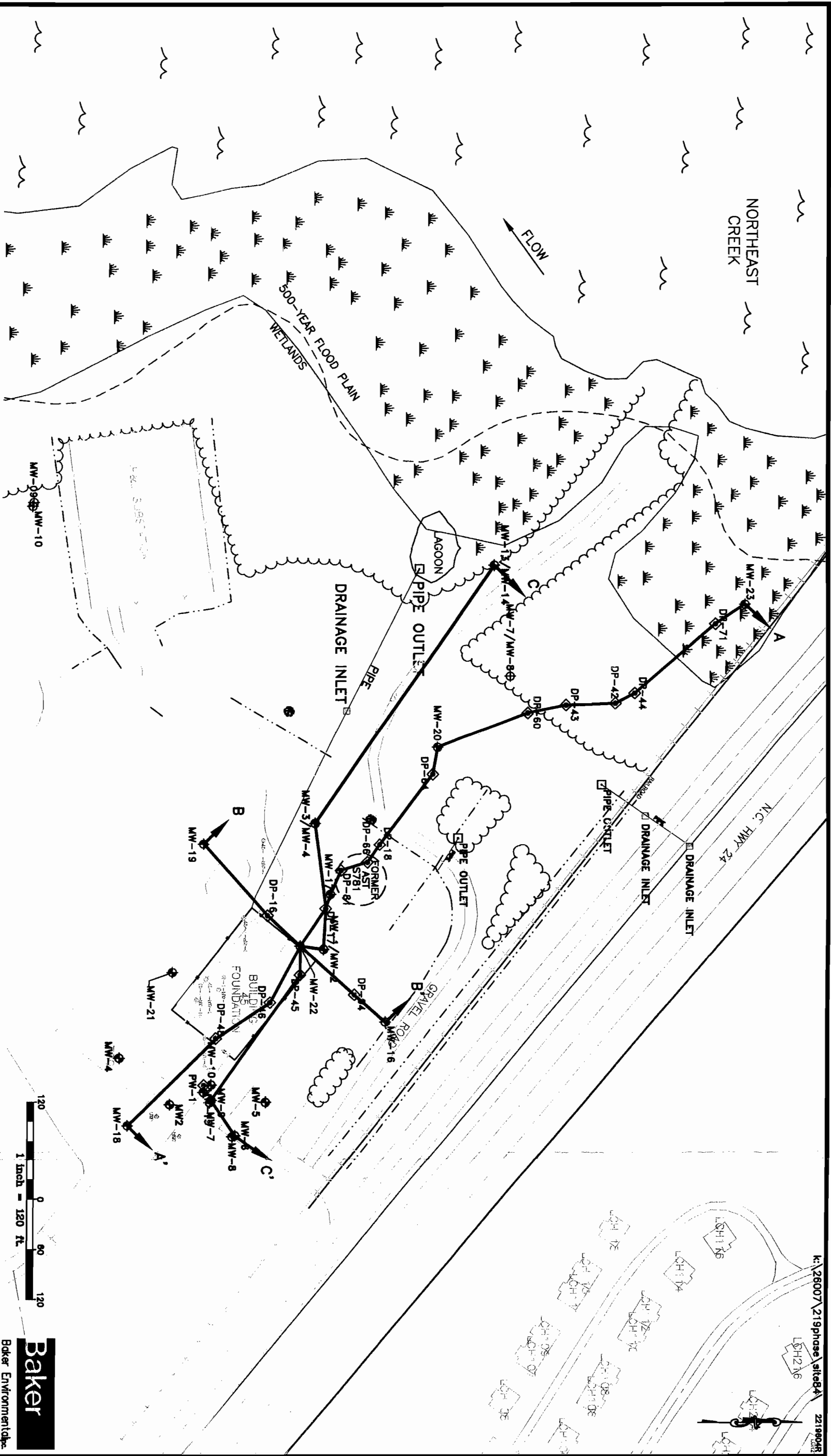
FIGURE 3-3
SURFACE WATER DRAINAGE PATTERN
SITE 84

REMEDIAL INVESTIGATION

CTO - 0219

MARINE CORPS BASE, CAMP LEJEUNE

NORTH CAROLINA



LEGEND

- NEW MONITORING WELL (2001)
- CROSS-SECTION TRAVERSE LOCATION
- DIRECT PUSH SOIL BORING (2001)

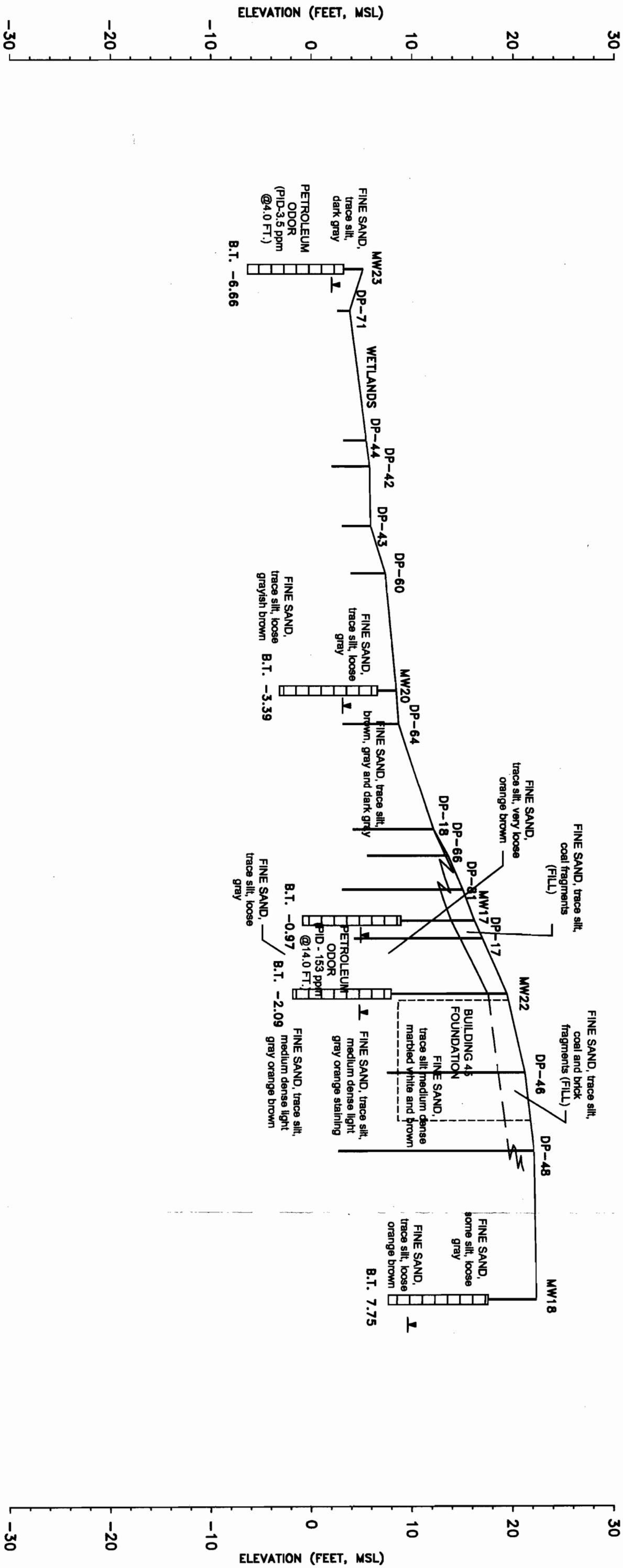
FIGURE 3-4
HYDROGEOLOGIC CROSS-SECTION LOCATIONS
SITE 84
REMEDIAL INVESTIGATION
CTO - 0219
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

Baker
Baker Environmental

NOTE
- DP-05, DP-15, DP-22, DP-68, DP-73, TP-01, TP-02 ARE
APPROXIMATE LOCATIONS NOT BASED ON SURVEY DATA
- MW-15 IS A SOIL BORING

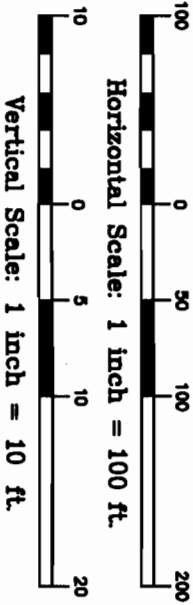
A
NORTHWEST

A'
SOUTHEAST



LEGEND

- MONITORING WELL SCREEN INTERVAL
- ESTIMATED CONTACT
- PROJECTED CONTACT
- WATER LEVEL
- B.T. -0.97 BORING TERMINATED, ELEVATION (FEET MSL)



THE SOIL BORING INFORMATION IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. SUBSURFACE CONDITIONS INTERPOLATED BETWEEN BORINGS ARE ESTIMATED BASED ON ACCEPTED SOIL ENGINEERING PRINCIPLES AND GEOLOGIC JUDGEMENT.

FIGURE 3-5
HYDROGEOLOGIC CROSS-SECTION A-A'
SITE 84
REMEDIAL INVESTIGATION
CTO - 0219

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

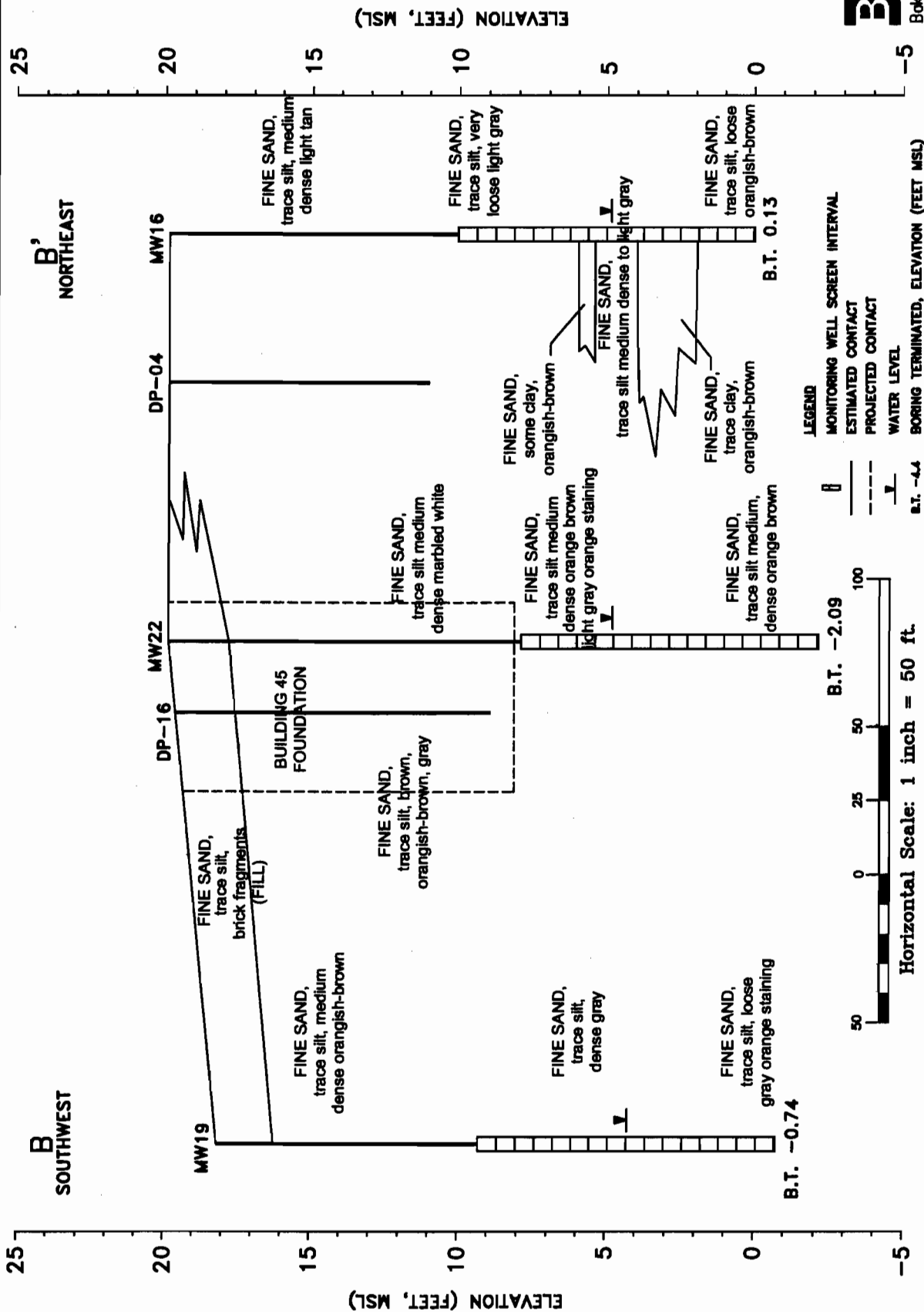
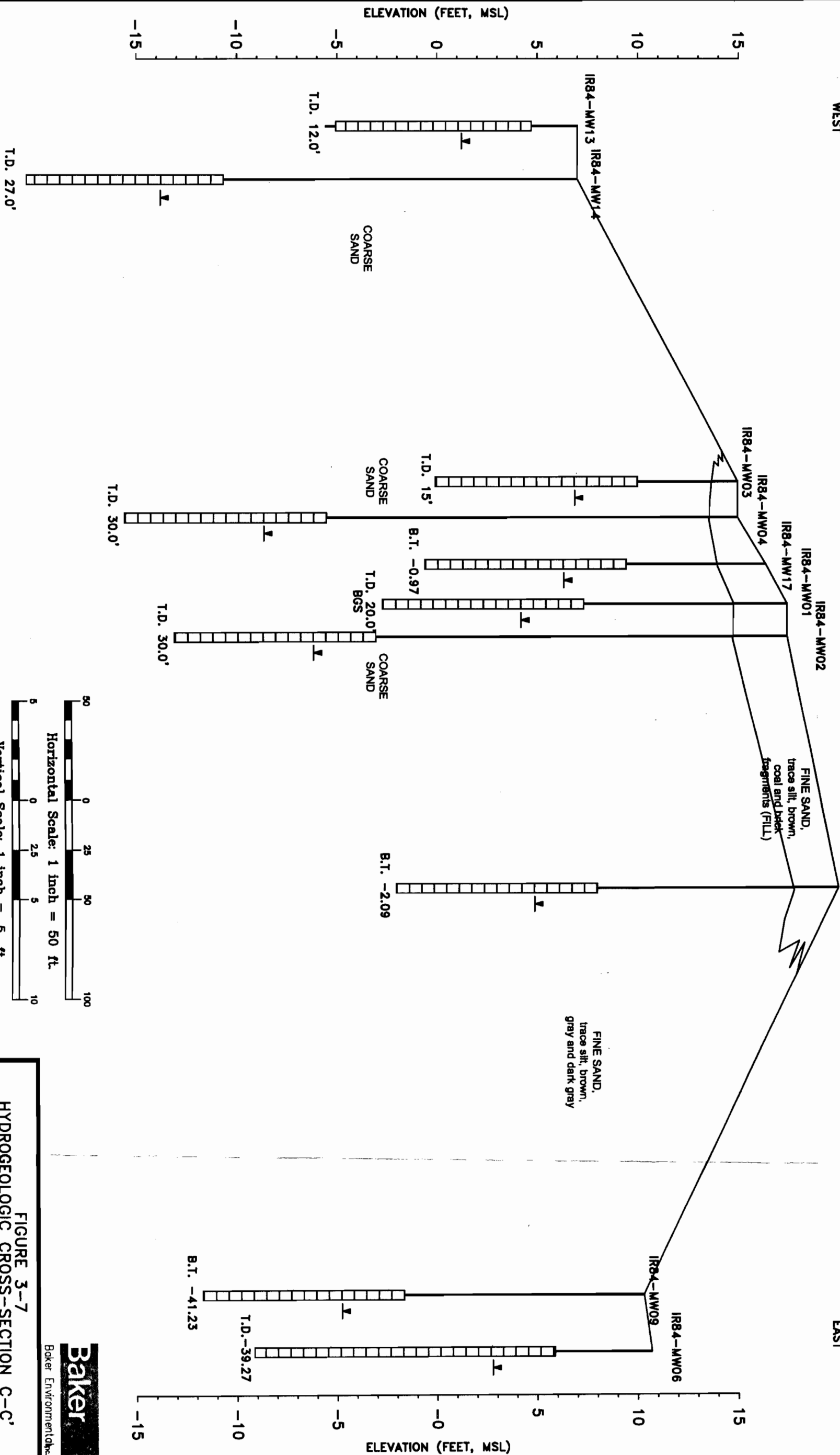


FIGURE 3-6
HYDROGEOLOGIC CROSS-SECTION B-B'
SITE 84
REMEDIAL INVESTIGATION
CTO - 0219
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

THE SOIL BORING INFORMATION IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. SUBSURFACE CONDITIONS INTERPOLATED BETWEEN BORINGS ARE ESTIMATED BASED ON ACCEPTED SOIL ENGINEERING PRINCIPLES AND GEOLOGIC JUDGEMENT.

**C
WEST**



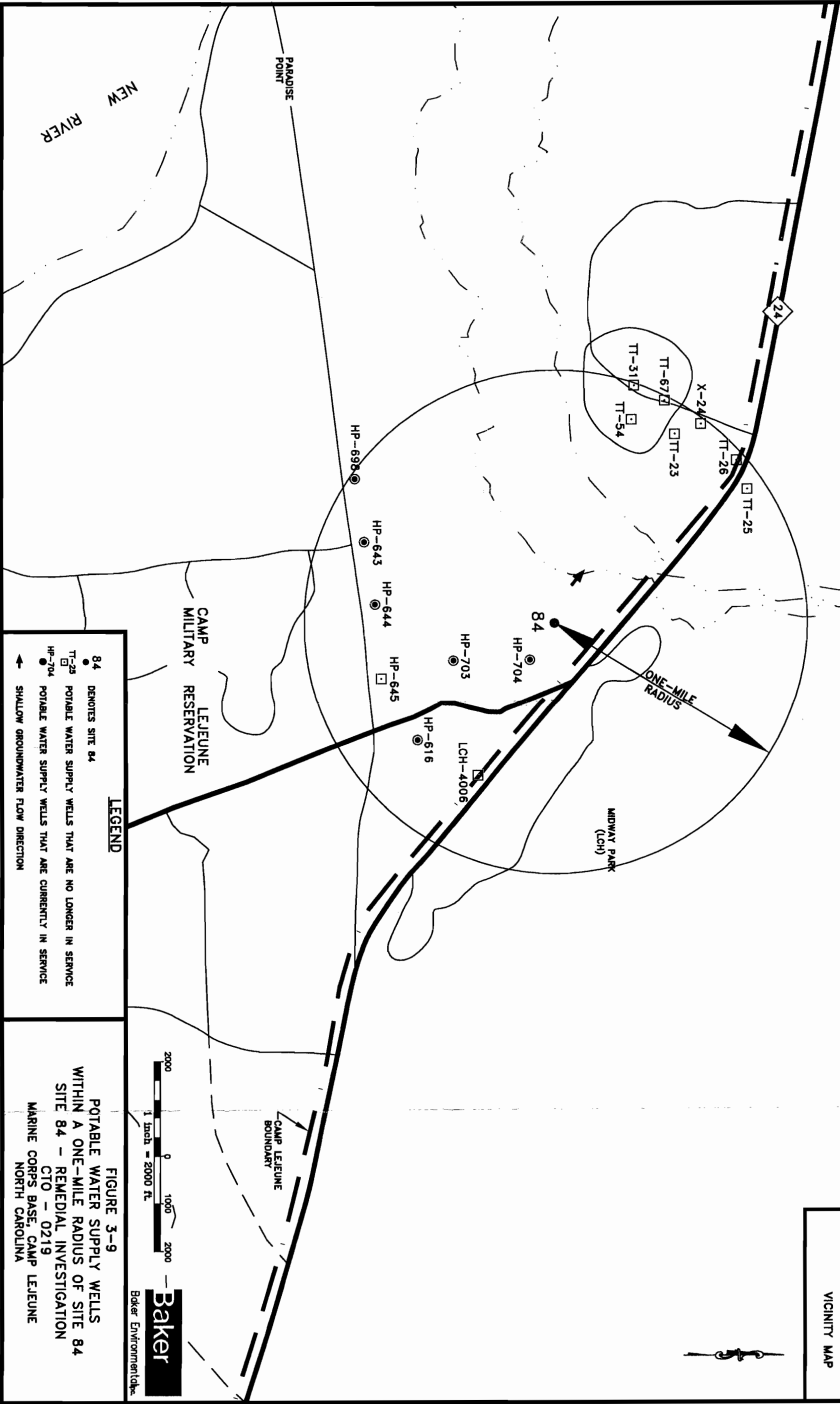
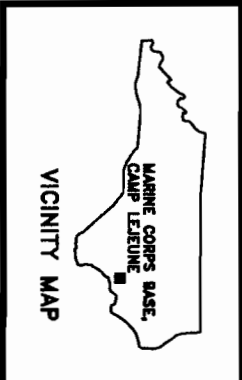
THE SOIL BORING INFORMATION IS CONSIDERED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THE RESPECTIVE BORING LOCATIONS. SUBSURFACE CONDITIONS INTERPOLATED BETWEEN BORINGS ARE ESTIMATED BASED ON ACCEPTED SOIL ENGINEERING PRINCIPLES AND GEOLOGIC JUDGEMENT.

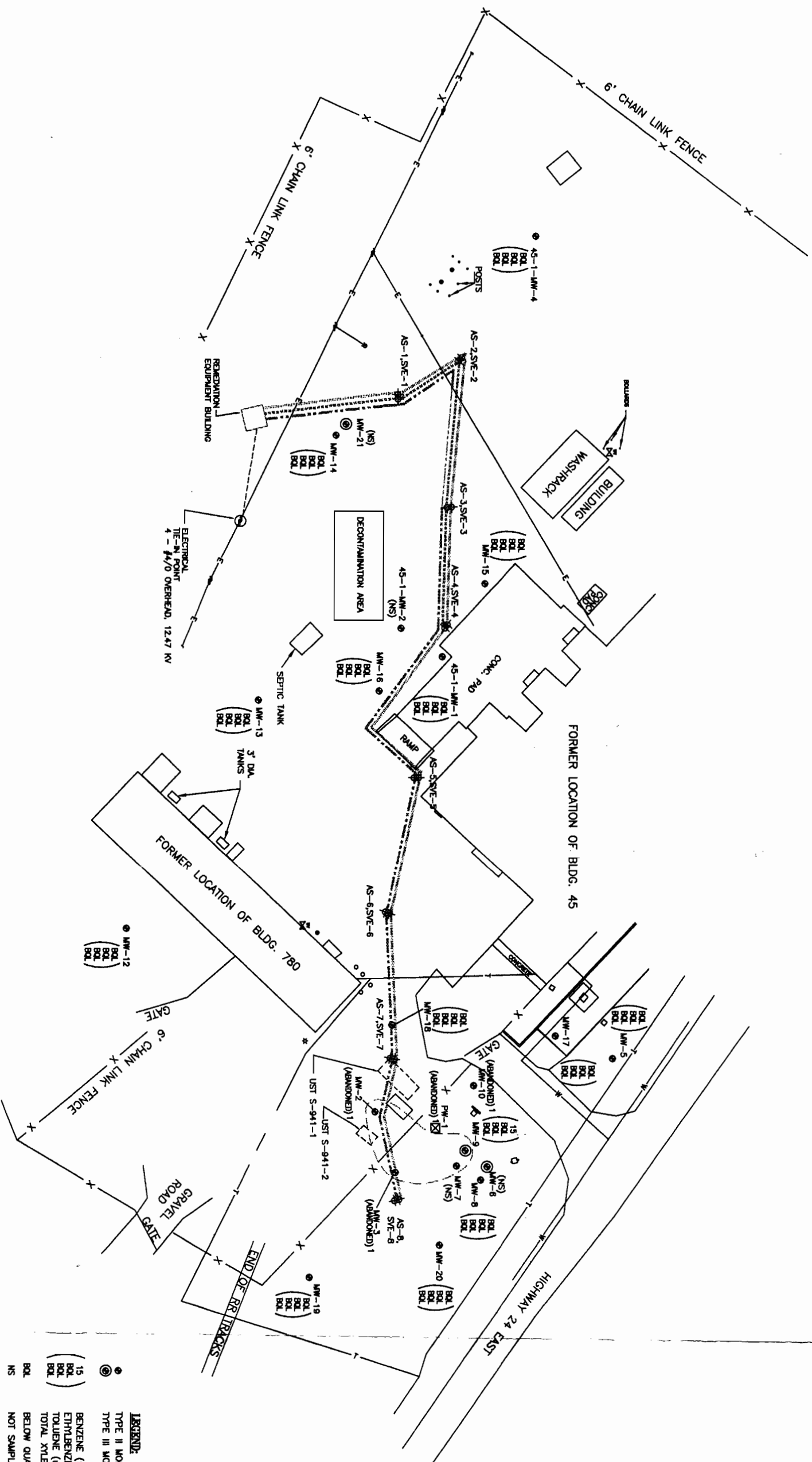
FIGURE 3-7
HYDROGEOLOGIC CROSS-SECTION C-C'

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Baker Environmental

**MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA**







DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP - JULY 17, 2002
VOLATILE AROMATIC HYDROCARBONS

SURVEY NOTES:

1. CURRENT SURVEY WORK WAS TIED INTO EXISTING WELLS WITH KNOWN COORDINATE INFORMATION. THESE WELL COORDINATES ARE BASED ON SURVEY WORK USING NCGS MONUMENT "PARK" (MAD 1983 COORDINATES N=361,284.78; E=2,496,141.90; ELEV=30.12)

2. UTILITIES ARE BASED ON MCB, CAMP LEJEUNE BASE MAPS AND UTILITIES LOCATED DURING ASSESSMENT ACTIVITIES. PER SPECIFICATIONS, CONTRACTOR SHALL PERFORM UTILITY CLEARANCE AT TIME OF CONSTRUCTION.

NOTE:

1. MONITORING WELLS PW-1, MW-2, MW-3 AND MW-10 WERE ABANDONED DURING SOIL EXCAVATION ACTIVITIES BY SHAW ENVIRONMENTAL AND INFRASTRUCTURE IN JUNE 2002

GRAPHICS SCALE
IF THIS DRAWING IS A REDUCTION, USE GRAPHIC SCALE



LEGEND:

TYPE II MONITORING WELL
TYPE III MONITORING WELL

BENZENE (ug/L)
 ETHYLBENZENE (ug/L)
 TOLUENE (ug/L)
 TOTAL XYLENES (ug/L)
 BELOW QUANTITATION LIMIT
 NOT SAMPLED

INTERPRETED AERIAL EXTENT OF BENZENE ABOVE THE NCAC 15A:21 STANDARD OF 1 ug/L

EXISTING PUMPING WELL

WELL CLUSTER

UTILITY POLE

WATER VALVE

MANHOLE

FIRE HYDRANT

LIGHT POLE

PERMITS IN

References

WATER UTILITY

TELEPHONE U

SOIL VAPOR

COIL WAPROB

AIR CONDIT

ALLIANCE

SHEET 17 OF 18 3-11	DATE: 17 JUL 2002	DEPARTMENT OF THE NAVY	NAVAL FACILITIES ENGINEERING COMMAND
	SCALE: 1"=50'	NAVAL STATION	ATLANTIC DIVISION NORFOLK, VIRGINIA
	SPCL. PROJ. NO.	ANNUAL MONITORING REPORT	
	CONSTR. CONTR. NO.	BUILDING 46, UST S-941-1 AND 2 MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA	
NAVFAC DRAWING NO.	DISSOLVED GROUNDWATER CONTAMINANT ISOPLETH MAP - JULY 17, 2002 VOLATILE AROMATIC HYDROCARBONS		



J.A. JONES
ENVIRONMENTAL
SERVICES
JACKSONVILLE, FLORIDA

A/E CONTRACT NO: N62470-93-D-3033

Author: M. J. Griffin

[illegible]

4.0 NATURE AND EXTENT OF CONTAMINATION

This section presents the results of the RI performed at Site 84. The objectives of the section are to characterize the nature and extent of contamination at Site 84. This characterization was accomplished by specific laboratory analysis and field screening of environmental samples including soil, groundwater, surface water, and sediments. The positive detection summary tables and detection figures referenced in the text are presented at the end of Section 4.0. A complete summary of the analytical data is included in Appendix F.

The initial scope of the investigation was to delineate the extent of PCBs contamination at Site 84. During the implementation of the field program the scope was significantly increased to include an investigation of VOCs, SVOCs, organic pesticides, herbicides, and inorganic compound distribution at Site 84. Additionally, two former UST basins were investigated by advancing four soil borings and one monitoring well installed at each basin (one located northwest of the Building 45 foundation, and the other to the south).

Presentation of the analytical data includes a comparison of site data to established standards and/or criteria. The standards and criteria chosen for evaluation are media specific and help to provide a reasonable assessment of site conditions. An explanation of each of the standards and criteria are presented in Section 4.4.

The analytical results for quality assurance/quality control (QA/QC) samples are presented in Section 4.3. The QA/QC results are in Appendix F.

4.1 Data Quality

Analytical data generated during the RI was submitted for third-party validation to Heartland Environmental Services, Inc. of St. Charles, Missouri. Procedures established by the National Functional Guidelines for Organic and Inorganic Analyses (USEPA, 1994) were adhered to during the validation process. Validation of the analytical data, through established procedures, serves to reduce the inherent uncertainties associated with its usability. Data qualified as "J" were retained as estimated values. Estimated analytical results within a data set are common and considered usable by the United States Environmental Protection Agency (USEPA). Data may be qualified as estimated for several reasons, including an exceedence of holding times, high or low surrogate recovery, or intra-sample variability. In addition, values may be assigned an estimated

"J" qualifier if the reported value is below the Contract Required Detection Limit (CRDL) or the Contract Required Quantitation Limit (CRQL).

Additional data qualifiers were employed during the validation of data. Compounds that were not detected were assigned the "U" qualifier and those non-detected compounds that had inaccurate or imprecise quantitation limits were assigned the "UJ" qualifier. Samples that were diluted due to matrix interference or blank contamination were assigned the "BG" qualifier. Samples with recovery outside control limits were assigned the "N" qualifier. Samples with detections less than the contract limit were assigned the "B" qualifier (inorganics only).

4.2 Data Management and Tracking

The management and tracking of environmental samples from the time of field collection to the receipt of the validated electronic analytical results is of primary importance and reflects the overall quality of the laboratory results. Field samples and their corresponding analytical tests were recorded on the chain-of-custody sheets, which are included in Appendix D. The chain-of-custody records were compared to the sampling plan to determine if all designated samples were collected for the appropriate parameters. Similarly, the validated information was compared to laboratory information as a final check. In summary, the tracking information was used to identify the following items:

- Identify sample discrepancies between the sampling plan and the field investigation;
- Verify that the laboratory received all samples, and analyzed for the correct parameters;
- Verify that the data validator received a complete data set; and
- Ensure that a complete data set was available for each media of concern prior to entering results into the database.

4.3 Non-Site Related Analytical Results

Many of organic and inorganic constituents detected in soil, groundwater, surface water, and sediments at Site 84 can be attributed to non-site related conditions or activities. Two primary sources of non-site related results include laboratory contaminants and naturally occurring inorganic elements. In addition, non-site related operational activities and conditions might contribute to "on-site" contamination. A discussion of naturally occurring inorganic elements and results of the QA/QC samples discussing possible laboratory contaminants is included below.

4.3.1 Laboratory and Non-Site Related Contaminants

The QA/QC samples collected from the investigation included trip blanks, rinsate blanks, and field blanks. Trip blanks accompanied environmental samples to the fixed based laboratory to ensure sample integrity during collection and shipment. Rinsate blanks were collected from the sampling equipment to ensure that decontamination procedures were effective in cleaning the field equipment. Field blanks were collected from the potable water source used during drilling and from the laboratory grade water used for decontamination purposes. Blanks samples provide an indication of non-site related contamination that could be introduced into a sample set during the collection, transportation, preparation, or analysis of samples. To remove non-site related constituents from further consideration, the concentrations of chemicals detected in blanks were compared with concentrations of the same chemicals detected in the environmental samples. Tables 4-1 through 4-3 provide positive detection summaries for the various QA/QC samples.

Common laboratory contaminants (e.g., acetone, 2-butanone, chloroform, methylene chloride, toluene, and phthalate esters) were retained for use in interpreting site conditions only when observed concentrations in any environmental sample exceeded ten times the maximum concentration detected in any blank. If the concentration of a common laboratory contaminant was less than ten times the maximum blank concentration, its presence among the samples was excluded from further evaluation (USEPA, 1989). The maximum concentrations of detected common laboratory contaminants in blanks were as follows:

• Acetone	3J µg/L
• 2-Butanone	4.6 J µg/L
• Chloroform	28 µg/L
• Methylene chloride	3.2 µg/L

- Toluene 1.3 µg/L
- Dimethyl phthalate 6.9 J µg/L

Organic constituents contained in blanks that are not considered common laboratory contaminants (i.e., all other TCL compounds) were considered for further evaluation only when observed concentrations in any environmental sample exceeded five times the maximum concentration detected in any blank (USEPA, 1989a). The maximum concentrations of all other detected compounds in blanks were as follows:

- 1,1-Dichloroethene 0.55J µg/L
- Benzene 0.35J µg/L
- Bromodichloromethane 3.4J µg/L
- Chloromethane 0.27J µg/L
- Methyl tert-butyl ether 2.1J µg/L
- Xylenes 0.51 J µg/L
- 4-Methylphenol 1.4J µg/L
- Benzothiazole 7.1NJ µg/L
- Phenol 0.029 µg/L
- Alpha-BHC 0.079 µg/L
- Gamma-BHC 0.029 µg/L
- Silvex 0.095

4.3.2 Naturally-Occurring Inorganic Elements

To differentiate inorganic contamination due to site operations from naturally occurring inorganic elements in site media, the results of the sample analyses were compared to information regarding background conditions at MCB, Camp Lejeune. The Final Base Background Study Report prepared for MCB Camp Lejeune, North Carolina was used for comparison of environmental samples collected for Site 84 to the background metals in this report (Baker, 2001).

A brief discussion of background sample set and comparison criteria are discussed in the paragraphs that follow. Please refer to the Final Base Background Study Report for complete details on the rationale of choosing background sample locations, method of collection and detailed discussions of analytical results (Baker 2001).

The base background soil analytical data was divided into five categories based on soil type and depth of sample interval. These categories include surface soil fine sands, surface soil loams, subsurface soil sand, subsurface soil silt, and subsurface soil clay. Different soil types can exhibit different concentrations of inorganic compounds. The purpose of these divisions was to compare data sets of similar soil types. Surface and subsurface soils of different soil types have properties that effect ion attraction and retention. Typically clays exhibit higher inorganic concentrations. An examination of the boring logs (Appendix B) indicates that all surface and subsurface soils collected were predominately fine sands. Thus, Site 84 soil samples were compared to the fine sand data set.

Tables 4-4 (surface soil) and 4-5 (subsurface soil) show ranges of detections, and statistical summaries including the arithmetic mean (including half non-detects), and the base background mean plus two standard deviations. Only the inorganics with concentrations exceeding the base background mean plus two standard deviations will be considered for further evaluation. Comparisons of the background values to the environmental samples for the surface and subsurface soil are discussed in Section 4.7.1 and 4.7.2.

4.4 State and Federal Criteria and Standards

Contaminant concentrations can be compared to contaminant-specific established State and Federal criteria and standards such as MCLs or Ambient Water Quality Criteria (AWQC).

The only enforceable federal regulatory standards for groundwater are the Federal MCLs. In addition to the federal standards, the State of North Carolina has developed the North Carolina Water Quality Standards (NCWQS) for groundwater and surface water. Regulatory guidelines were used for comparative purposes to infer the potential risks and environmental impacts when necessary. Relevant regulatory guidelines include AWQC and Health Advisories.

A brief explanation of the criteria and standards used for the comparison of site analytical results is presented below.

Region IX Preliminary Remediation Goals (PRG) - May, 2000 - Region IX Preliminary remediation goals (PRGs) are risk-based tools for evaluating and cleaning up contaminated sites. They are being used to streamline and standardize all stages of the risk decision-making process.

The Region IX PRG table combines current EPA toxicity values with "standard" exposure factors to estimate contaminant concentration in environmental media (soil, water, and air) that are considered protective of humans, including sensitive groups, over a lifetime. Chemical concentrations above these levels would not automatically trigger a response action; however, exceeding a PRG suggests that further evaluation of the potential risks that may be posed by site contamination is appropriate. The PRG concentrations can be used to screen pollutants in environmental media, trigger further investigation, and provide an initial cleanup goal if applicable. When considering PRGs as preliminary goals the residential concentrations should be used for maximum beneficial uses of a property.

North Carolina Soil-to-Groundwater Concentrations - 1996. Soil-to-Groundwater concentrations are determined by North Carolina and based on the current Groundwater Protection Standard (15A NCAC Subchapter 2L) or Interim Maximum Allowable Concentrations (IMAC). If there are no "2L" or IMAC, the Soil-to-Groundwater concentration is based on the recommended "2L", standard or if not available the Maximum Contaminant Level Goal (MCLG), which is based on a 10⁻⁶ carcinogenic risk.

North Carolina Water Quality Standards (Groundwater) NCWQS, 1994 - NCWQS (as amended) are the maximum allowable concentrations resulting from any discharge of contaminants to the land or waters of the state, which may be tolerated without creating a threat to human health or which otherwise render the groundwater unsuitable for its intended purpose.

Federal Maximum Contaminant Levels - February 1996 and 1999 - Federal MCLs are enforceable standards for public water supplies promulgated under the Safe Drinking Water Act (SDWA) and are designed for the protection of human health. MCLs are based on laboratory or epidemiological studies and apply to drinking water supplies consumed by a minimum of 25 persons. They are designed for prevention of human health effects associated with lifetime exposure (70-year lifetime) of an average adult (70-kg) consuming 2 liters of water per day. MCLs also consider the technical feasibility of removing the contaminant from the public water supply.

Federal Secondary Maximum Contaminant Levels - February 1996 and 1999 - Secondary MCLs are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems, but does not require systems to comply.

North Carolina Water Quality Standards (Surface Water) - human health standard - The NCWQS for surface water are the standard concentrations, that either alone or in combination with other wastes, in surface waters that will not render waters injurious to aquatic life or wildlife, recreational activities, public health, or impair waters for any designated use.

Ambient Water Quality Standards - Ambient Water Quality Standards (AWQS) are non-enforceable regulatory guidelines and are of primary utility in assessing acute and chronic toxic effects in aquatic systems. They may also be used for identifying the potential for human health risks. AWQC consider acute and chronic effects in both freshwater and saltwater aquatic life, and potential carcinogenic and noncarcinogenic health effects in humans from ingestion of both water (2 liters/day) and aquatic organisms (6.5 grams/day), or from ingestion of water alone (2 liters/day). The human health AWQC for potential carcinogenic substances are based on the USEPA-specified incremental cancer risk range of one additional case of cancer in an exposed population of 10,000,000 to 100,000 (i.e., the 10^{-7} to 10^{-5} range).

Region IV Sediment Screening Values - Federal sediment quality criteria for the protection of aquatic life are being developed. In the interim, the USEPA Region IV Waste Management Division recommends the use of sediment values compiled by the National Oceanic and Atmospheric Administration (NOAA) as screening values for evaluating the potential for chemical constituents in sediments to cause adverse biological effects. NOAA developed this screening method through evaluation of biological effects data for aquatic (marine and freshwater) organisms, obtained through equilibrium partitioning calculations, spiked-sediment bioassays, and concurrent biological and chemical field surveys. For each constituent having sufficient data available, the concentrations causing adverse biological effects were arrayed, and the lower 10 percentile (called an Effects Range-Low, or ER-L) and the median (called an Effects Range-Median, or ER-M) were determined.

If sediment contaminant concentrations are above the ER-M, adverse effects on the biota are considered probable. If contaminant concentrations are between the ER-L and the ER-M, adverse effects are considered possible, and USEPA recommends conducting sediment toxicity tests as a follow-up. If contaminant concentrations are below the ER-L, adverse effects are considered unlikely.

4.5 Nature and Extent of Contamination

This section presents the results of the soil, groundwater, surface water, and sediment investigations performed as part of the RI at Site 84. The data are presented for the site by media as listed below:

- Immunoassay Field Screening Data (PCBs)
 - Surface soil
 - Subsurface soil
- Analytical Results
 - Surface and subsurface
 - Test pits
 - Groundwater
 - Surface water
 - Sediment

The analytical results are presented in corresponding tables which show all of the positive detections. In addition, summary tables are included which provide a comparison to the appropriate screening criteria.

4.6 Immunoassay Field Screening (PCBs) Results

During the RI sampling event, 60 samples were tested in the field using EnSysTM immunoassay field test kits. The results of the field analysis are included on the soil sample matrix (Table 2-1).

The test kits provide results of PCB analysis in one of the four following concentration ranges:

- ≥ 50 ppm
- ≤ 50 ppm and ≥ 10 ppm
- ≤ 10 ppm and ≥ 1 ppm
- ≤ 1

Figures 4-1 and 4-2 depict areas of contamination for surface soil and subsurface soil using the above ranges.

4.6.1 Immunoassay Field Screening Results - Surface Soil

The majority of the immunoassay results were between 1 ppm and 10 ppm, representing a general area of low level contamination northwest of the Building 45 foundation. This area includes the former AST S-781, and extends toward, and includes a portion of the wetland area to the north of the site (in the vicinity of DP-71). A steep bank leading up to railroad tracks is located immediately north of DP-71 preventing migration of surface contaminants in this portion of the site. There were two surface soil samples located near the surface drainage feature with results greater than 50 ppm, IR84-DP32-00 and IR84-DP64-00, as shown on Figure 4-1 and indicated in red. There were several areas with sample concentrations between 10 ppm and 50 ppm that are represented in purple. One of these areas is located along the drainage pipe that runs from the building to the lagoon (IR84-DP12-00). Another area is located at the end of a surface drainage feature.

4.6.2 Immunoassay Field Screening Results - Subsurface Soil

Five subsurface soil samples were screened for PCBs using an immunoassay field test kit. One of the samples, IR84-DP18-02 (3-5 ft.) exhibited a concentration greater than or equal to 50 ppm (Figure 4-2). This sample point is located adjacent to the former AST S-781. There were three samples that exhibited PCB concentrations between 1 ppm and 10 ppm. The PCB concentration of the fifth sample (DP-28-01) was less than 1 ppm (the lowest detection limit of the field test kit).

4.7 Laboratory Analytical Results

This section discusses analytical results from the RI field program activities that consisted of surface and subsurface soils, test pit samples, groundwater, surface water, and sediment samples. Sample analytical results from the years 1995 and 1998 are included along with the recent field activities conducted in the summer of 2001 to fully assess contamination and potential risks at the site. Tables and figures referenced in Section 4.0 are provided at the end of the section.

4.7.1 Surface Soil

The RI soil investigation at Site 84 consisted of DP sampling, test pit samples, soil borings, and monitoring well borings. The PCB analytical results will be discussed first followed by organic pesticides, non-PCB organics, inorganics and TPH.

Surface soil analytical data is screened using Region IX PRGs and North Carolina soil-to-groundwater concentrations (Section 4.4) to assess which contaminants require further consideration. Inorganic compounds are further screened using base background data. Inorganic compound concentrations exceeding both the PRG and base background require further consideration.

4.7.1.1 PCBs

There were a total of 95 surface soil samples that were analyzed at a fixed based laboratory for PCBs (Table 4-6 and 4-7). Twenty of the samples were collected in October of 1995, 28 samples in March of 1998, and 47 samples (including 5 duplicates) between July and August 2001. (Note: Duplicate samples are shown on tables, but are not shown on figures). Figure 4-3 depicts all positive detections, including exceedences of the EPA Region IX PRG (Residential Soil screening criteria).

Aroclor-1260 was detected in 68 of 95 samples, at concentrations ranging from 18 J to 200,000 ug/kg. The PRG for Aroclor-1260 is 220 ug/kg, which was exceeded in 55 samples (Figure 4-3). The highest detection of Aroclor-1260 was in sample IR84-SB27-01 where the concentration was 200,000 ug/kg. Other significant detections were found in samples IR84-MW-20-00 at 11,000 J ug/kg, IR84-DP18-00 at 25,000 ug/kg, IR84-DP82-00 at 11,000 ug/kg, 84-SB01A at 12,000 ug/kg, 84SB02B at 12,000 ug/kg and 84-SB09A at 12,000 ug/kg.

Other PCB isomers were detected in surface soil samples, but in far fewer samples and generally at lower concentrations. Aroclor-1248 was detected in 4 of 95 samples, ranging from 56 µg/kg to 160,000 µg/kg and Aroclor-1254 was detected in only one sample at 51,000 µg/kg.

Figure 4-4 shows the distribution of PCBs in surface soil compared to various regulatory criteria. This figure was constructed from the laboratory analytical data, with support from the field screening effort. For example, PCBs were not detected in the field screening in samples located north-northeast of the building (e.g., DP-01, DP-02, and DP-30). Laboratory results support the

field screening (e.g., PCBs were not detected in DP-19 and only at trace levels in DP-20). The boundary representing the Region IX PRG has been extrapolated (i.e., dashed line) southwest of Building 45, near MW-19 as limited data exists in this portion of the site.

4.7.1.2 Volatile Organic Compounds

Twenty-six samples were analyzed for VOCs in the surface soil samples, as shown in Table 4-6 and 4-7. Only 2-butanone, acetone, ethylbenzene, and xylenes were positively detected in the samples. No detected VOCs exceeded the PRG. Only ethylbenzene exceeded the North Carolina soil-to-groundwater concentration with a value of 330 J ug/kg at IR84-DP82-00.

4.7.1.3 Semivolatile Organic Compounds

Twenty-six samples were also analyzed for SVOCs (Table 4-6 and 4-7). There were a total of 21 SVOCs detected in the surface soil samples as shown on Table 4-6. Eight of 21 SVOCs exceeded the PRGs (Figure 4-5). The PRG was exceeded for a class of SVOCs also known as polynuclear aromatic hydrocarbons (PAHs), and include:

- Benzo(a)anthracene (1,800 J ug/kg to 190,000 ug/kg)
- Benzo(a)pyrene (470 ug/kg to 150,000 ug/kg)
- Benzo(b)fluoranthene (2,200 ug/kg to 170,000 ug/kg)
- Benzo(k)fluoranthene (120,000 ug/kg)
- Carbazole (38,000 J ug/kg)
- Chrysene (180,000 ug/kg)
- Dibenz(a,h)anthracene (70J ug/kg to 17,000J ug/kg)
- Indeno(1,2,3-cd)pyrene (1,200 ug/kg to 59,000 ug/kg)

In addition, the following SVOCs exceeded the North Carolina soil-to-groundwater concentration. These exceedances also are noted on Figure 4-5.

- Fluoranthene (300,000 ug/kg)
- Naphthalene (640J ug/kg to 7,500J ug/kg)
- Phenanthrene (180,000 ug/kg)
- Pyrene (250,000 ug/kg to ug/kg)

4.7.1.4 Organic Pesticides

There were twenty-four samples that were collected at Site 84 and analyzed for organic pesticides (Table 4-6 and 4-7). Five of 14 organic pesticides analyzed were detected above the PRG as shown on Figure 4-6, including:

- Dieldrin (320 ug/kg)
- Heptachlor (4,400 ug/kg to 22,000 ug/kg)
- Heptachlor epoxide (1,500J ug/kg to 4,500 ug/kg)
- alpha-Chlordane (17,000J ug/kg to 48,000J ug/kg)
- gamma-Chlordane (20,000 ug/kg to 58,000 ug/kg)

In addition, the following organic pesticides exceeded the North Carolina soil-to-groundwater concentration. These exceedances also are noted on Figure 4-6.

- 4,4'-DDD (3,000J ug/kg)
- Dieldrin (4J ug/kg to 320 ug/kg)
- Heptachlor (4 ug/kg to 22,000 ug/kg)
- Heptachlor epoxide (1,500J ug/kg to 4,500 ug/kg)

4.7.1.5 Inorganic Compounds

There were 26 samples analyzed for inorganics with 22 constituents detected in surface soil samples (Table 4-6 and 4-7). However, only arsenic exceeded the PRG (in 22 of 26 samples), with results ranging from 0.42 J mg/kg to 9.1 mg/kg. As shown in Table 4-7, arsenic exceeded the background values (mean + 2 standard deviations) in 21 of the samples. Many other inorganic constituents exceeded background screening ranges also shown in Table 4-7. In addition, arsenic exceeded the North Carolina soil-to-groundwater concentration in 19 samples. These exceedances also are noted on Figure 4-7.

4.7.1.6 Total Petroleum Hydrocarbons (TPH)

TPH was analyzed in 11 surface soil samples collected during the RI. TPH-DRO was detected in all 11 samples of concentrations ranging from 71 mg/kg to 470 mg/kg, as shown on Figure 4-8. TPH-GRO was detected in one sample at 0.8 mg/kg (Note that the laboratory reported the units as ug/kg for TPH-GRO, and for comparison purposes the figures and text show them as mg/kg).

The highest detection of TPH was located along Building 45 (sample IR84-DP46-00), where TPH-DRO was detected at 470 mg/kg. Other surface soil detections of TPH-DRO ranged from 130 mg/kg to 340 mg/kg. TPH-GRO was not detected in high concentrations in the surface soil at Site 84.

4.7.2 Subsurface Soil

4.7.2.1 PCB Analytical Data

A total of 39 subsurface soil samples were analyzed for PCBs by a fixed based laboratory. Multiple Aroclor isomers were detected in 13 of 39 samples as shown on Tables 4-8 and 4-9. Aroclor-1248 was detected at 47,000 ug/kg in sample IR84-DP47-01, which exceeds the PRG. Aroclor-1245 was detected in sample IR84-DP46-02 at 5,000 ug/kg that also exceeded the PRG. Aroclor-1260 was detected in the other 11 samples, ranging in concentration from 131 ug/kg to 45,000 ug/kg. Five of these values exceeded the Region IX PRG Residential Soil screening level (ranging from 1,100 ug/kg to 45,000 ug/kg) with the highest detected concentration in sample IR84-DP18-02, as shown on Figure 4-9. Only detected concentrations including exceedances of screening criteria are depicted on Figure 4-9.

4.7.2.2 Volatile Organic Compounds

Twenty-four subsurface soil samples were analyzed for VOCs. There were ten VOCs detected in the subsurface soil samples, as shown in Table 4-8 and 4-9. No detected VOC exceeded the PRG. Soil borings IR84-MW-21 and MW-22 and IR84SB01 through SB08 were installed at the request of MCB Camp Lejeune to further characterize two former tank pits. The VOC analysis included volatile petroleum hydrocarbons (VPH) and extractable petroleum hydrocarbons (EPH). Benzene, chloroform, and ethylbenzene exceeded the soil-to-groundwater concentration values. As shown on Figure 4-10, exceedances were noted in the area local to former Building 45 and near the former AST.

4.7.2.3 Semivolatile Organic Compounds

Thirty-three samples were collected and analyzed for SVOCs (Table 4-8 and 4-9). A total of twenty-two SVOCs were detected, as shown in Table 4-8 and 4-9. Five of the 21 SVOCs detected exceeded the PRG in 3 samples as shown on Figure 4-10. The PRG was exceeded for a class of SVOCs known as PAHs, and include:

- Benzo(a)anthracene (640 µg/kg to 3,000 µg/kg)
- Benzo(a)pyrene (590 µg/kg to 2,600 µg/kg)
- Benzo(b)fluoranthene (720 µg/kg to 2,800 µg/kg)
- Dibenz(a,h)anthracene (98J µg/kg to 430J µg/kg)
- Indeno(1,2,3-cd)pyrene (1,200 µg/kg)

In addition, the following SVOCs exceeded the North Carolina soil-to-groundwater concentration. These exceedances also are noted on Figure 4-10

- Benzo(a)anthracene (640 µg/kg to 3,000 µg/kg)
- Benzo(a)pyrene (590 µg/kg to 2,600 µg/kg)
- Naphthalene (2,000 ug/kg to 8,500 ug/kg)

4.7.2.4 Organic Pesticides

Eleven organic pesticides were detected in subsurface soil samples (Table 4-8 and 4-9). Four of 14 organic pesticides analyzed for were detected above the PRG in three samples as shown on Figure 4-11, including:

- Heptachlor (200J ug/kg to 6,900 ug/kg)
- Heptachlor epoxide (63J ug/kg and 200J ug/kg)
- alpha-Chlordane (14,000J ug/kg)
- gamma-Chlordane (18,000 ug/kg)

In addition, the following organic pesticides exceeded the North Carolina soil-to-groundwater concentration. These exceedances also are noted on Figure 4-11.

- Dieldrin (2 ug/kg)
- Heptachlor (3 ug/kg to 6,900 ug/kg)
- Heptachlor epoxide (63J ug/kg to 200J ug/kg)

4.7.2.5 Inorganic Compounds

Thirty-three samples were analyzed for inorganics. There were a total of twenty-two metals detected as shown on Table 4-8 and 4-9. Most of the detections were below screening criteria. Only arsenic was detected at concentrations that exceeded the PRG in 25 samples, at concentrations ranging from 0.4 J mg/kg to 2.0 mg/kg, as shown on Figure 4-12.

As shown in Table 4-8 and 4-9, inorganics were compared to the base background (the mean plus two times standard deviations). Metals that exceeded the base background screening values are shown in Table 4-9.

4.7.2.6 Total Petroleum Hydrocarbons (TPH)

Eight samples that were analyzed for TPH-DRO and TPH-GRO in the subsurface soil samples Table 4-8 and 4-9). TPH DRO was detected in all eight samples, at concentrations ranging from 15 mg/kg to 5,550 mg/kg (Figure 4-8). TPH-GRO was detected in two samples at 580,000 mg/kg in sample IR84-DP15-03 and at 220 mg/kg in sample IR84-DP46-02.

4.7.3 **Test Pit Sampling**

There were two soil samples collected from each of the three test pits (as discussed in Section 2.1.2). These samples were analyzed for PCBs and percent solids as shown on Table 4-10. Aroclor-1260 was the only detected PCB isomer and was detected in all six samples, at concentrations ranging from 56 ug/kg to 990 ug/kg. Three of the six samples exhibited Aroclor-1260 above the PRG, namely IR84-TP01A, IR84-TP03A and IR84-TP03P.

The purpose of this sampling effort was to determine if the drainage pipe leadings from Building 45 to the lagoon has leaked. Based on the detection of Aroclor-1260 in all six samples, there is evidence that the pipe has potentially leaked.

4.7.4 Groundwater

4.7.4.1 Organics

As part of the initial investigation at the site in October 1995, two permanent monitoring wells and one temporary monitoring well were sampled for PCBs (Table 4-11). PCBs were not detected in any of these groundwater samples.

Groundwater sampling was also conducted in March 1998. Samples were collected from selected wells and analyzed for VOCs only (Table 4-11). A total of six monitoring wells were sampled which included a shallow and intermediate well cluster at three separate locations. The monitoring wells were selected based upon probable groundwater flow direction at the site and the proximity to former above ground storage tank AST-781. The locations of the monitoring wells and the analytical results are shown on Figure 4-13. As shown on the figure, there were low detections of benzene and ethylbenzene at monitoring well cluster MW-03 and MW-04. The detections of benzene slightly exceeded the NC WQS of 1.0 µg/L, but are below the federal MCL, as shown in Table 4-12. Ethylbenzene also was detected in each of these monitoring wells; however, the levels were below both state and federal standards. Chloroform was detected at 16 µg/L in monitoring well cluster MW-11 and MW-12. This concentration exceeds the NC WQS of, but is less than the Federal MCL.

For the RI, 14 groundwater samples were collected and analyzed for VOCs, SVOCs, PCBs, herbicides and metals. There were no exceedences of screening criteria for any of the VOCs or SVOCs. Although there were seven organic pesticides detected during the RI, only two exceeded the MCL and/or NC WQS. Gamma-chlordane exceeded the NC WQS at well 84-MW-18. Also, heptachlor epoxide exceeded the NC WQS at well 84-MW-20.

4.7.4.2 Inorganics

There were a total of 19 metals detected in groundwater samples collected in August of 2001. All detections of aluminum exceeded the MCL (in seven samples as shown on Figure 4-14). Antimony was detected above the MCL in one sample. All detections of iron exceeded the MCL and NC WQS. Detections of manganese exceeded the MCL and NC WQS in six samples.

4.7.5 Surface Water

Surface water samples were not collected as part of the 2001 field investigation. However, seven surface water samples were collected during the October 1995 sampling event at Site 84 and analyzed for PCBs. Three of the surface water samples were collected from Northeast Creek and four of the surface water samples were collected from the lagoon. As shown on Tables 4-13 and 4-14, PCBs were not detected in any of the surface water samples collected.

In March 1998, an additional seven surface water samples were collected from the lagoon. Each of the samples was analyzed for PCBs with one sample analyzed for VOCs and SVOCs. Again, PCBs were not detected in any of the surface water samples. There were several VOCs detected in the one surface water sample, including acetone at 5.6 J $\mu\text{g/L}$, benzene at 1.2 J $\mu\text{g/L}$, toluene at 2.7 J $\mu\text{g/L}$, and xylenes at 3.5 J $\mu\text{g/L}$. There were no SVOCs detected in the surface water sample.

4.7.6 Sediment

In October 1995, seven sediment samples were collected at Site 84 and analyzed for PCBs. Three of the samples were collected from Northeast Creek (Table 4-15 and 4-16) and four of the samples were collected from the lagoon. The sediment samples collected from Northeast Creek did not detect the presence of any PCB compounds; however, each of the four samples collected from the lagoon exhibited PCBs. Sediment sample 84-SD05 detected the PCB compounds Aroclor-1248 at 2,800 $\mu\text{g/kg}$ and Aroclor-1260 at a concentration of 20,000 $\mu\text{g/kg}$. Aroclor-1260 was also detected in samples 84-SD06, 84-SD07, and 84-SD08 at concentrations of 8,100 $\mu\text{g/kg}$, 17,000 $\mu\text{g/kg}$, and 3,700 $\mu\text{g/kg}$, respectively.

During the March 1998 sampling event, three additional sediment samples were collected from the lagoon. Each of the samples detected Aroclor-1260 at concentrations of 40,000 $\mu\text{g/kg}$, 5,900 $\mu\text{g/kg}$, and 4,300 $\mu\text{g/kg}$. These concentrations are all above the Region IV screening standard of 22.7 $\mu\text{g/kg}$.

4.8 Summary of Findings of Remedial Investigation Study

As shown on Figure 4-4, PCB-contaminated surface soil is present around Building 45 and extends approximately 600 feet northwest of the building. The area exceeding the Region IX PRG is estimated at 190,000 square feet. There are three hot spots evident within this larger area. One "hot spot" is located along the north side of the Building 45 foundation. A review of historical drawings indicates a room designated as "station transformers" on the north side of former Building 45. A floor drain is also indicated on the drawings (Appendix A). This pipe drains to the north, into a collector drain that runs parallel to the north side of the building. The PCB distribution pattern in the soil around Building 45 suggests that drain pipes leading from the transformer room could be a source of PCB contamination. The second "hot spot" is located immediately north of the pipe that runs between the building and the lagoon, and is approximately 200 feet from the building ("midfield area"). The third "hot spot" is located on the northeast side of the lagoon. PCBs were detected in subsurface soil samples, but generally at lower concentrations.

PCBs are not very soluble in water and are not very mobile in the environment (Fetter, 1988). Thus, it is expected that shallow soils would exhibit the highest concentration. The relatively widespread distribution of PCBs in the surface soil could be related to the mobilization of contaminated soil particles through the result of several factors including wind, vehicle traffic, and soil erosion. For example, mowing operations at the site creates a lot of dust, vehicle traffic is not restricted to the roads shown on the map (i.e., a large portion of the site is accessible to vehicles) and soil particles may be transported as overland flow during heavy precipitation events.

Surface and subsurface soils surrounding the building appear impacted by past operations as a heavy equipment maintenance facility. Several lines of evidence support this:

1. The VOCs detected are primarily fuel-related, including benzene and ethylbenzene. The SVOCs detected are PAHs, which may also be fuel-related. TPH as diesel and gasoline range organics have also been detected.

2. The detections of VOCs, SVOCs and TPH have generally occurred in soil samples surrounding Building 45 and the former AST. This distribution of contaminants in the surface soil and subsurface soil is suggestive of a pattern of leaks and spills associated with day-to-day operations of a maintenance facility.
3. Because metals are naturally occurring, they were detected in every sample analyzed for TAL inorganics. However, only arsenic exceeded the PRG. When the arsenic exceedences were further compared to base background (the mean plus two standard deviations), most were above background. That is an indication that arsenic is an inorganic contaminant of concern (COC). Arsenic was detected in samples scattered throughout Site 84, but was highest near the former AST and the Building 45 foundation. Arsenic was used in organic pesticides, but there does not appear to be a good correlation between arsenic and pesticide concentrations. An important factor in the natural circulation of arsenic is its volatility (Hem, 1992). This refers to its tendency to be more mobile or available for uptake than organic pesticides. This may help explain why there is not a good correlation between the distribution of arsenic and organic organic pesticides.
4. The presence of organic organic pesticides at significant concentrations was also observed in surface soils surrounding Building 45. Organic organic pesticides are not very mobile and continuous application around the building could cause a concentration buildup over time.

There is no evidence to suggest that Northeast Creek has been impacted by past site operations. PCBs have not been detected in surface water or sediment samples collected from the creek.

The lagoon is impacted as suggested by the data. Sediment samples collected from the lagoon contain PCBs and fuel-related VOCs; however, samples of the lagoon surface water exhibited only low concentrations of benzene, toluene, and xylenes and no PCBs. Further, it should be noted that the depth of the water in the lagoon is significantly less than when the building was in operation. Day-to-day work at Building 45 resulted in a steady influx of what may be described as "waste" water. During that time, the depth of the water in the lagoon was as much as six feet. Recent observations of the lagoon estimate water depth at three feet or less. The existing surface water in the lagoon is most likely due to a combination of precipitation and possibly groundwater infiltration. As noted on the figures, the lagoon is in the wetland, in an area of the site where

water is observed to be at or near ground surface. The depth of the lagoon is approximately six to seven feet below ground surface; as such groundwater could infiltrate.

With the exception of the UST release, groundwater contamination at Site 84 is limited. Individual contaminant distribution is scattered, with no apparent plume. Low levels of fuel-related compounds (e.g., benzene and ethylbenzene) are present in groundwater samples at low levels. Benzene was present in samples from two wells in the vicinity of the former AST exceeded screening criteria. Low levels of organic pesticides were also present in groundwater samples; however, two organic pesticides were detected above screening criteria in two different wells.

Two former petroleum USTs were located approximately 110-feet southeast of the Building 45 foundation. LNAPL is present in two wells associated with the USTs (Figure I-10). A dissolved-phase groundwater plume has formed and extends downgradient of the USTs just beyond well 84-MW-21, south of the Building 45 foundation. The UST program at MCB Camp Lejeune is currently engaged in a remedial action to address the LNAPL and the dissolved-phase plume. The monitoring wells installed as part of the RI do not appear to be impacted.

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TABLES

TABLE 4-1
POSITIVE DETECTIONS IN TRIP BLANK SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID SAMPLE DATE	IR84-TB02 07-16-2001	IR84-TB03 07-23-2001	IR84-TB04 08-01-2001	IR84-TB05 08-02-2001	IR84-TB07 08-06-2001	IR84-TB08 08-07-2001	IR84-TB06 08-03-2001	TBIR84-TB03 07-31-2001	TRIP BLANKS 07-21-2001
VOLATILES (ug/L)									
1,1-Dichloroethene	0.24 U	0.24 U	0.24 U	0.55 J	0.24 U	0.34 J	0.24 U	0.24 U	0.24 U
2-Butanone	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.62 J	0.41 U	0.41 U
Acetone	2.4 J	2.6 J	3 J	0.51 U	2.3 J	1.4 JB	2.7 J	0.51 U	0.51 U
Bromodichloromethane	0.17 U	0.17 U	0.17 U	0.17 U	0.26 J	0.17 U	0.17 U	0.17 U	0.17 U
Chloroform	0.14 U	0.14 U	0.14 U	0.14 U	28	0.14 U	0.14 U	0.22 J	0.14 U
Chloromethane	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.27 J	0.13 U
Methylene chloride	0.45 J	0.53 J	0.48 J	0.34 U	4.1 U	0.34 U	0.44 J	0.34 U	0.34 U
Toluene	0.18 U	0.18 U	0.18 U	0.23 J	0.26 J	0.18 U	0.18 U	0.26 J	0.18 U
Xylenes (total)	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.44 J	0.33 U

NOTES:

J = Value is estimated

U = Not detected at detection limit

ug/L = microgram per liter

BG = sample was diluted due to matrix interference and blank contamination

N = sample recovery not within control limits

TABLE 4-2
POSITIVE DETECTIONS IN EQUIPMENT RINSATE SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/ BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	1R84-ER01	1R84-ER02	1R84-ER03	1R84-ER04	1R84-ER05	1R84-ER07	EQJR84-ER08	1R84-ER09
SAMPLE DATE	07-17-2001	07-18-2001	07-19-2001	07-20-2001	07-21-2001	07-23-2001	07-31-2001	08-01-2001
VOLATILES (ug/L)								
Acetone	NA	NA	NA	NA	10 U	NA	0.51 U	1.8 J
Bromodichloromethane	NA	NA	NA	NA	0.17 U	NA	0.17 U	0.17 U
Chloroform	NA	NA	NA	NA	6.9	NA	0.18 J	0.25 J
Chloromethane	NA	NA	NA	NA	0.13 U	NA	0.13 U	0.44 J
Methylene chloride	NA	NA	NA	NA	2.5	NA	0.34 U	0.34 U
Toluene	NA	NA	NA	NA	0.25 J	NA	0.23 J	0.25 J
SEMIVOLATILES (ug/L)								
PESTICIDES/PCBs (ug/L)	No Detections							
HERBICIDES (ug/L)	No Detections							
METALS (mg/L)								
Aluminum	NA	NA	NA	NA	0.047 J	NA	0.044 J	0.045 J
Antimony	NA	NA	NA	NA	0.0022 U	NA	0.0022 U	0.0023 J
Barium	NA	NA	NA	NA	0.003 U	NA	0.0035 J	0.0034 J
Beryllium	NA	NA	NA	NA	0.00054 U	NA	0.00054 U	0.00054 U
Calcium	NA	NA	NA	NA	0.41 J	NA	0.25 U	0.25 U
Iron	NA	NA	NA	NA	2.9	NA	0.088 U	0.088 U
Manganese	NA	NA	NA	NA	0.046	NA	0.0009 U	0.0011 U
Nickel	NA	NA	NA	NA	0.0032 J	NA	0.0022 U	0.0022 U
Vanadium	NA	NA	NA	NA	0.00082 U	NA	0.00082 U	0.00082 U

NOTES:

J = Value is estimated

U = Not detected at detection limit

ug/L = microgram per liter

mg/L = milligram per liter

BG = sample was diluted due to matrix interference and blank contamination

N = sample recovery not within control limits

NA = Not Analyzed

TABLE 4-2 (continued)
POSITIVE DETECTIONS IN EQUIPMENT RINSATE SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/ BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-ER10	IR84-ER11	IR84-ER12	IR84-ER13
SAMPLE DATE	08-02-2001	08-03-2001	08-06-2001	08-07-2001
VOLATILES (ug/L)				
Acetone	1.3 J	0.91 J	2.6 J	1.5 JB
Bromodichloromethane	0.17 U	0.17 U	0.28 J	0.18 J
Chloroform	0.21 J	0.14 U	28	21
Chloromethane	0.13 U	0.13 U	0.13 U	0.13 U
Methylene chloride	0.34 U	0.34 U	4.7 U	2.8
Toluene	0.35 J	0.18 U	0.31 J	0.35 J
SEMIVOLATILES (ug/L)				
PESTICIDES/PCBs (ug/L)				
HERBICIDES (ug/L)				
METALS (mg/L)				
Aluminum	0.028 U	0.028 U	0.094 U	0.028 U
Antimony	0.0022 U	0.0022 U	0.0022 U	0.0022 U
Barium	0.0036 J	0.0039 J	0.003 U	0.003 U
Beryllium	0.00054 U	0.00054 U	0.00061 J	0.00054 U
Calcium	0.25 U	0.25 U	0.25 U	0.25 U
Iron	0.088 U	0.088 U	0.088 U	0.088 U
Manganese	0.00094 B	0.0009 U	0.0009 U	0.0009 U
Nickel	0.0022 U	0.0022 U	0.0022 U	0.0022 U
Vanadium	0.00098 J	0.00082 U	0.00082 U	0.00082 U

NOTES:

J = Value is estimated
U = Not detected at detection limit
ug/L = microgram per liter
mg/L = milligram per liter
BG = sample was diluted due to matrix interference and blank contamination
N = sample recovery not within control
NA = Not Analyzed

TABLE 4-3
POSITIVE DETECTIONS IN FIELD BLANKS
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-FB01	IR84-FB02	IR84-FB03	IR84-FB04	IR84-FB05	IR84-FB06
SAMPLE DATE	07-17-2001	07-17-2001	07-21-2001	07-21-2001	08-01-2001	08-03-2001
VOLATILES (ug/L)						
1,1,1-Trichloroethane	NA	NA	0.15 U	0.15 U	0.15 U	0.15 U
1,1,2,2-Tetrachloroethane	NA	NA	0.25 U	0.25 U	0.25 U	0.25 U
1,1,2-Trichloroethane	NA	NA	0.3 U	0.3 U	0.3 U	0.3 U
1,1-Dichloroethane	NA	NA	0.24 U	0.24 U	0.24 U	0.44 J
2-Butanone	NA	NA	0.41 U	0.41 U	0.41 U	4.6 J
Acetone	NA	NA	10 U	0.51 U	1.1 J	30 J
Benzene	NA	NA	0.16 U	0.16 U	0.16 U	0.35 J
Bromodichloromethane	NA	NA	0.17 U	0.17 U	3.4	0.17 U
Chloroform	NA	NA	8.6	0.14 U	16	0.14 U
Dibromochloromethane	NA	NA	0.26 U	0.26 U	0.62 J	0.26 U
Methyl tert-butyl ether	NA	NA	0.13 U	0.13 U	0.13 U	2.1 J
Methylene chloride	NA	NA	3.2	0.34 U	0.34 U	0.34 U
Toluene	NA	NA	0.54 J	0.2 J	0.18 U	1.3
Xylenes (total)	NA	NA	0.33 U	0.33 U	0.33 U	0.51 J
SEMIVOLATILES (ug/L)						
4-Methylphenol	NA	NA	1.3 U	1.3 U	1.3 U	1.4 J
Benzothiazole	NA	NA	NA	NA	NA	7.1 NJ
Dimethyl phthalate	NA	NA	0.76 U	0.76 U	0.76 U	6.9 J
Phenol	NA	NA	2.6 U	2.6 U	2.6 U	28
PESTICIDES/PCBs (ug/L)						
alpha-BHC	NA	NA	0.079	0.0059 U	0.0059 U	0.0059 U
gamma-BHC (Lindane)	NA	NA	0.029 J	0.0062 U	0.0062 U	0.0062 U
HERBICIDES (ug/L)						
Silvex	NA	NA	0.036 U	0.036 U	0.036 U	0.095 J
METALS (mg/L)						
Aluminum	NA	NA	0.05 J	0.055 J	0.085 J	0.028 U
Barium	NA	NA	0.0044 J	0.066 J	0.021 J	0.003 U
Calcium	NA	NA	0.25 U	50 J	14.8	0.25 U
Copper	NA	NA	0.0042 U	0.0042 U	0.031	0.0042 U
Iron	NA	NA	0.088 U	1.4	0.088 U	0.088 U
Magnesium	NA	NA	0.03 U	2.6 J	3.4 J	0.03 U
Manganese	NA	NA	0.0009 U	0.054	0.055	0.0009 U
Potassium	NA	NA	0.18 U	1.7 J	1.8 J	0.16 U
Sodium	NA	NA	0.63 U	7.9	14.2	0.63 U
Zinc	NA	NA	0.012 U	0.024	0.061	0.012 U

NOTES:

J = Value is estimated

U = Not detected at detection limit

ug/L = micrograms per liter

mg/L = milligrams per liter

BG = sample was diluted due to matrix interference and blank contamination

N = sample recovery not within control limits

NA = Not Analyzed

TABLE 4-4
BACKGROUND SURFACE SOIL STATISTICS FOR INORGANICS
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

Parameter	Frequency of Detection	Range	Arithmetic Mean + 2 Standard Deviations
METALS (mg/kg)			
Aluminum	39/39	29.4 - 8530	6,070
Antimony	14/39	ND - 0.9J	0.556
Arsenic	12/39	ND - 0.85J	0.671
Barium	35/39	ND - 24	16.8
Beryllium	24/39	ND - 0.11J	0.0974
Cadmium	4/39	ND - 0.11J	0.0549
Calcium	32/39	ND - 105000	37,271
Chromium	33/39	ND - 9.7	7.02
Cobalt	18/39	ND - 0.4J	0.317
Copper	29/39	ND - 38.5	15.8
Iron	39/39	26.3 - 5000	3,162
Lead	39/39	0.45 - 38.5J	20.2
Magnesium	32/39	ND - 1610	622
Manganese	34/39	ND - 25.9	17.4
Mercury	19/39	ND - 0.12J	0.0844
Nickel	27/39	ND - 1.8	1.54
Potassium	30/39	ND - 263J	157
Selenium	9/39	ND - 0.63	0.463
Sodium	1/39	ND - 307	132
Thallium	0/39	ND	0.203
Vanadium	37/39	0.14J - 13.4	9.17
Zinc	24/39	ND - 73.9	30.0

NOTES:

ND = Not detected
mg/kg - milligram per kilogram
J = Value is estimated
Background = 2 + standard deviations



TABLE 4-5
BASE BACKGROUND SUB-SURFACE SOIL STATISTICS FOR INORGANICS
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

Parameter	Frequency of Detection	Range	Arithmetic Mean + 2 Standard Deviations
METALS (mg/kg)			
Aluminum	29/29	260J - 9900	14,538
Antimony	11/29	ND - 0.41J	0.597
Arsenic	6/29	ND - 1.4	1.62
Barium	29/29	0.67J - 18.2	23.9
Beryllium	16/29	ND - 0.097J	0.140
Cadmium	0/29	ND	0.0136
Calcium	19/29	ND - 499	426
Chromium	29/29	0.83 - 13.2	17.1
Cobalt	18/29	ND - 1.4	1.26
Copper	15/29	ND - 3.3	4.31
Iron	29/29	81.5 - 4600	5,881
Lead	29/29	1.1J - 6	8.16
Magnesium	29/29	13.5J - 216	361
Manganese	29/29	0.75J - 7.1	8.90
Mercury	19/29	ND - 0.061J	0.0937
Nickel	23/29	ND - 3.6	4.29
Potassium	29/29	16J - 292	373
Selenium	11/29	ND - 0.47J	0.687
Sodium	0/29	ND	83.3
Thallium	0/29	ND	0.225
Vanadium	29/29	0.6J - 13.7	19.7
Zinc	12/29	ND - 7.9	8.83

NOTES:

ND = Not detected
mg/kg- milligram per kilogram
J = Value is estimated
Background = Mean + 2 standard deviations

TABLE 4-6
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-MW15-00	84-MW16-00	84-MW17-00	IR84-MW18-00	IR84-MW19-00	IR84-MW20-00	IR84-MW20-00D
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-31-2001	07-31-2001	07-31-2001	08-01-2001	08-01-2001	08-01-2001	08-01-2001
VOLATILES (ug/kg)							
2-Butanone	3.1 U	NA	2.9 U	NA	NA	9 J	4.8 J
Acetone	40 J	NA	2.2 U	NA	NA	46 UJ	23 U
Ethylbenzene	0.67 U	NA	0.62 U	NA	NA	0.69 UJ	0.67 U
Xylenes (total)	2.2 U	NA	2 U	NA	NA	2.2 UJ	2.2 U
SEMIVOLATILES (ug/kg)							
2-Methylnaphthalene	54 U	NA	350 J	NA	NA	63 U	55 U
Acenaphthene	58 U	NA	2300	NA	NA	67 U	58 U
Anthracene	56 U	NA	3500	NA	NA	64 U	56 U
Benzo(a)anthracene	62 U	NA	5900	NA	NA	72 U	63 U
Benzo(a)pyrene	68 U	NA	5800	NA	NA	78 U	68 U
Benzo(b)fluoranthene	66 U	NA	7100	NA	NA	76 U	66 U
Benzo(ghi)perylene	62 U	NA	3200	NA	NA	72 U	63 U
Benzo(k)fluoranthene	60 U	NA	3800	NA	NA	69 U	60 U
Carbazole	59 U	NA	2100	NA	NA	68 U	59 U
Chrysene	52 U	NA	6700	NA	NA	60 U	52 U
Dibenz(a,h)anthracene	58 U	NA	1200 J	NA	NA	67 U	58 U
Dibenzofuran	57 U	NA	1800 J	NA	NA	65 U	57 U
Dibenzothiophene	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	63 U	NA	16000	NA	NA	73 U	64 U
Fluorene	54 U	NA	2600	NA	NA	63 U	55 U
Hexachlorocyclopentadiene	68 U	NA	340 U	NA	NA	78 U	68 U
Indeno(1,2,3-cd)pyrene	79 U	NA	3200	NA	NA	91 U	80 U
Naphthalene	56 U	NA	640 J	NA	NA	64 U	56 U
Phenanthrene	59 U	NA	15000	NA	NA	68 U	59 U
Pyrene	58 U	NA	10000	NA	NA	67 U	58 U
bis(2-Ethylhexyl) phthalate	61 U	NA	310 U	NA	NA	140 J	620

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-MW15-00	84-MW16-00	84-MW17-00	IR84-MW18-00	IR84-MW19-00	IR84-MW20-00	IR84-MW20-00D
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-31-2001	07-31-2001	07-31-2001	08-01-2001	08-01-2001	08-01-2001	08-01-2001
HERBICIDES (ug/kg)							
No exceedances							
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	0.9 U	NA	9.4 J	NA	NA	8.1 J	0.9 UJ
4,4'-DDE	0.65 U	NA	3.2 U	NA	NA	5.6 J	0.65 UJ
4,4'-DDT	1.5 U	NA	7.4 U	NA	NA	3.4 U	1.5 U
Dieldrin	1.7 U	NA	14 J	NA	NA	50 J	1.7 UJ
Endosulfan sulfate	0.32 U	NA	28 J	NA	NA	54 J	2.1 J
Endrin	0.69 U	NA	3.5 U	NA	NA	6.9 J	0.69 UJ
Endrin aldehyde	1.7 U	NA	46 J	NA	NA	74 J	22 J
Endrin ketone	0.29 U	NA	8.3 J	NA	NA	0.68 U	0.3 U
Heptachlor	0.69 U	NA	3.5 U	NA	NA	1.6 U	0.69 U
Heptachlor epoxide	0.75 U	NA	3.7 U	NA	NA	1.7 U	0.75 U
Methoxychlor	0.93 U	NA	4.7 U	NA	NA	98 J	0.93 UJ
PCB-1248	5.2 U	5.1 U	52 U	5.5 U	48 U	300 U	10 U
PCB-1254	23 U	22 U	230 U	24 U	210 U	1300 U	45 U
PCB-1260	8.4 U	30 J	3500	41	3600	11000 J	410 J
alpha-BHC	0.52 U	NA	2.6 U	NA	NA	1.2 U	0.52 U
alpha-Chlordane	0.67 U	NA	40 J	NA	NA	4.5 J	0.67 UJ
gamma-Chlordane	0.65 U	NA	43	NA	NA	6.7 J	0.65 UJ
METALS (mg/kg)							
Aluminum	2990	NA	2750	NA	NA	8940	2880
Antimony	0.56 UJ	NA	1.1 J	NA	NA	0.64 UJ	0.56 UJ
Arsenic	0.64 J	NA	6.7	NA	NA	1.5	1.1
Barium	5.3 J	NA	8.9 J	NA	NA	13.4 J	10.4 J
Beryllium	0.052 U	NA	0.052 U	NA	NA	0.06 U	0.052 U
Cadmium	0.049 U	NA	0.14 J	NA	NA	0.071 J	0.16 J
Calcium	636	NA	7200	NA	NA	1350	10500
Chromium	3.2	NA	4.4	NA	NA	6.4	4.5
Cobalt	0.17 U	NA	0.3 J	NA	NA	0.42 J	0.34 J
Copper	1.1 J	NA	5.8	NA	NA	1.7 J	4
Iron	1550	NA	2060	NA	NA	5000	1960
Lead	2.8	NA	31.5	NA	NA	5.7	22.4

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-MW15-00	84-MW16-00	84-MW17-00	IR84-MW18-00	IR84-MW19-00	IR84-MW20-00	IR84-MW20-00D
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-31-2001	07-31-2001	07-31-2001	08-01-2001	08-01-2001	08-01-2001	08-01-2001
METALS (mg/kg) (Cont.)							
Magnesium	91 J	NA	239 J	NA	NA	188 J	234 J
Manganese	5.5	NA	13.4	NA	NA	11.5	9.1
Mercury	0.02 J	NA	0.0095 U	NA	NA	0.028 J	0.0095 U
Nickel	0.91 J	NA	1.1 J	NA	NA	1.9 J	1.3 J
Potassium	70.2 J	NA	106 J	NA	NA	107 J	71.3 J
Selenium	0.35 U	NA	0.35 U	NA	NA	0.4 U	0.53 J
Sodium	56.7 U	NA	56.8 U	NA	NA	65.2 U	56.8 U
Thallium	0.57 U	NA	0.57 U	NA	NA	0.65 U	0.57 U
Vanadium	4.1 J	NA	4.9 J	NA	NA	11.2	4.6 J
Zinc	3.2	NA	22.5	NA	NA	4.7	13.8
TOTAL PETROLEUM HYDROCARBONS							
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	NA
CONVENTIONAL							
Percent Solids (%)	88.3	90	88	83.5	95.1	76.7	88
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	NA	NA

NOTES:

J = Value is estimated
U = Not detected at detection limit
ug/kg = microgram per kilogram
mg/kg = milligram per kilogram
BG = sample was diluted due to matrix interference and blank contamination
N = sample recovery not within control limits

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP06-00	IR84-DP18-00	IR84-DP20-00	IR84-DP22-00	IR84-DP22-00D	IR84-DP27-00	IR84-DP29-00
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-17-2001	07-19-2001	07-19-2001	07-19-2001	07-19-2001	07-19-2001	07-19-2001
VOLATILES (ug/kg)							
2-Butanone	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA
SEMIVOLATILES (ug/kg)							
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA
Dibenzothiophene	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP06-00	IR84-DP18-00	IR84-DP20-00	IR84-DP22-00	IR84-DP22-00D	IR84-DP27-00	IR84-DP29-00
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-17-2001	07-19-2001	07-19-2001	07-19-2001	07-19-2001	07-19-2001	07-19-2001
HERBICIDES (ug/kg)							
No exceedances							
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA
PCB-1248	4.8 U	260 U	56	5.3 U	5.3 U	5.8 U	57 U
PCB-1254	21 U	1100 U	21 U	23 U	23 U	25 U	250 U
PCB-1260	56	25000	18 J	340	420	270	3800
alpha-BHC	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA
METALS (mg/kg)							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP06-00	IR84-DP18-00	IR84-DP20-00	IR84-DP22-00	IR84-DP22-00D	IR84-DP27-00	IR84-DP29-00
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-17-2001	07-19-2001	07-19-2001	07-19-2001	07-19-2001	07-19-2001	07-19-2001
METALS (mg/kg) (Cont.)							
Magnesium	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA
TOTAL PETROLEUM HYDROCARBONS							
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	NA
CONVENTIONAL							
Percent Solids (%)	95	88.1	94.8	86.3	86.3	79.2	81.4
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	13 BG	NA

NOTES:

J = Value is estimated
U = Not detected at detection limit
ug/kg = microgram per kilogram
mg/kg = milligram per kilogram
BG = sample was diluted due to matrix interference and l
N = sample recovery not within control limits

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP33-00	IR84-DP36-00	IR84-DP37-00	IR84-DP41-00	IR84-DP42-00	IR84-DP42-00D	IR84-DP45-00
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-20-2001	07-20-2001	07-20-2001	07-20-2001	07-20-2001	07-20-2001	07-21-2001
VOLATILES (ug/kg)							
2-Butanone	NA	NA	NA	NA	NA	NA	2.8 U
Acetone	NA	NA	NA	NA	NA	NA	2.2 U
Ethylbenzene	NA	NA	NA	NA	NA	NA	0.62 U
Xylenes (total)	NA	NA	NA	NA	NA	NA	2 U
SEMIVOLATILES (ug/kg)							
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	200 U
Acenaphthene	NA	NA	NA	NA	NA	NA	460 J
Anthracene	NA	NA	NA	NA	NA	NA	910 J
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	3800
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	3300
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	4300
Benzo(ghi)perylene	NA	NA	NA	NA	NA	NA	1600
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	1800
Carbazole	NA	NA	NA	NA	NA	NA	570 J
Chrysene	NA	NA	NA	NA	NA	NA	3900
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	530 J
Dibenzofuran	NA	NA	NA	NA	NA	NA	250 J
Dibenzothiophene	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	5900
Fluorene	NA	NA	NA	NA	NA	NA	410 J
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	250 U
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	1500
Naphthalene	NA	NA	NA	NA	NA	NA	200 U
Phenanthrene	NA	NA	NA	NA	NA	NA	3500
Pyrene	NA	NA	NA	NA	NA	NA	5400
bis(2-Ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	230 U

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP33-00	IR84-DP36-00	IR84-DP37-00	IR84-DP41-00	IR84-DP42-00	IR84-DP42-00D	IR84-DP45-00
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-20-2001	07-20-2001	07-20-2001	07-20-2001	07-20-2001	07-20-2001	07-21-2001
HERBICIDES (ug/kg)							
No exceedances							
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	NA	NA	NA	NA	NA	NA	820 U
4,4'-DDE	NA	NA	NA	NA	NA	NA	600 U
4,4'-DDT	NA	NA	NA	NA	NA	NA	1400 U
Dieldrin	NA	NA	NA	NA	NA	NA	1600 U
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	290 U
Endrin	NA	NA	NA	NA	NA	NA	640 U
Endrin aldehyde	NA	NA	NA	NA	NA	NA	1600 U
Endrin ketone	NA	NA	NA	NA	NA	NA	270 U
Heptachlor	NA	NA	NA	NA	NA	NA	10000
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	2000 J
Methoxychlor	NA	NA	NA	NA	NA	NA	860 U
PCB-1248	54 U	48 U	4.9 U	77 U	5.9 U	6 U	480 U
PCB-1254	240 U	210 U	21 U	340 U	26 U	26 U	2100 U
PCB-1260	1400	940	84	1600	660	860	770 U
alpha-BHC	NA	NA	NA	NA	NA	NA	480 U
alpha-Chlordane	NA	NA	NA	NA	NA	NA	19000 J
gamma-Chlordane	NA	NA	NA	NA	NA	NA	23000
METALS (mg/kg)							
Aluminum	NA	NA	NA	NA	NA	NA	2810
Antimony	NA	NA	NA	NA	NA	NA	1.1 J
Arsenic	NA	NA	NA	NA	NA	NA	1.3
Barium	NA	NA	NA	NA	NA	NA	16.9 J
Beryllium	NA	NA	NA	NA	NA	NA	0.06 J
Cadmium	NA	NA	NA	NA	NA	NA	0.33 J
Calcium	NA	NA	NA	NA	NA	NA	14200 J
Chromium	NA	NA	NA	NA	NA	NA	6.1
Cobalt	NA	NA	NA	NA	NA	NA	0.33 J
Copper	NA	NA	NA	NA	NA	NA	19.3
Iron	NA	NA	NA	NA	NA	NA	2440
Lead	NA	NA	NA	NA	NA	NA	20.6

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP33-00	IR84-DP36-00	IR84-DP37-00	IR84-DP41-00	IR84-DP42-00	IR84-DP42-00D	IR84-DP45-00
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-20-2001	07-20-2001	07-20-2001	07-20-2001	07-20-2001	07-20-2001	07-21-2001
METALS (mg/kg) (Cont.)							
Magnesium	NA	NA	NA	NA	NA	NA	329 J
Manganese	NA	NA	NA	NA	NA	NA	17.4
Mercury	NA	NA	NA	NA	NA	NA	0.052 J
Nickel	NA	NA	NA	NA	NA	NA	1.6 J
Potassium	NA	NA	NA	NA	NA	NA	114 J
Selenium	NA	NA	NA	NA	NA	NA	0.56 U
Sodium	NA	NA	NA	NA	NA	NA	52.2 U
Thallium	NA	NA	NA	NA	NA	NA	0.6 J
Vanadium	NA	NA	NA	NA	NA	NA	4.9 J
Zinc	NA	NA	NA	NA	NA	NA	64.9 J
TOTAL PETROLEUM HYDROCARBONS							
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	340
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	18 U
CONVENTIONAL							
Percent Solids (%)	84.5	96	93.9	59.6	77.4	76.5	95.8
Total Organic Carbon (mg/kg)	NA	3 BG	NA	NA	NA	NA	NA

NOTES:

J = Value is estimated
U = Not detected at detection limit
ug/kg = microgram per kilogram
mg/kg = milligram per kilogram
BG = sample was diluted due to matrix interference and I
N = sample recovery not within control limits

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP46-00	IR84-DP47-00	IR84-DP48-00	IR84-DP49-00	IR84-DP50-00	IR84-DP51-00	IR84-DP52-00
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-21-2001	07-21-2001	07-21-2001	07-21-2001	07-21-2001	07-21-2001	07-21-2001
VOLATILES (ug/kg)							
2-Butanone	2.8 U	2.8 U	2.9 U	2.9 U	2.8 U	2.9 U	2.9 U
Acetone	2.2 U	2.2 U	2.3 U	2.3 U	2.2 U	2.3 U	2.3 U
Ethylbenzene	0.62 U	0.62 U	0.64 U	0.63 U	0.62 U	0.64 U	0.63 U
Xylenes (total)	2 U	2 U	2.1 U	2 U	2 U	2.1 U	2 U
SEMIVOLATILES (ug/kg)							
2-Methylnaphthalene	6700 U	120 J	52 U	130 U	50 U	52 U	52 U
Acenaphthene	20000 J	910	140 J	890	53 U	56 U	55 U
Anthracene	56000	1100	210 J	1100	51 U	54 U	53 U
Benzo(a)anthracene	190000	2500	520	3100	58 U	60 U	59 U
Benzo(a)pyrene	150000	2300	470	3000	63 U	66 U	64 U
Benzo(b)fluoranthene	170000	2200	540	3600	61 U	63 U	62 U
Benzo(ghi)perylene	55000	1200	260 J	1500	58 U	74 J	59 U
Benzo(k)fluoranthene	120000	2000	340 J	2100	56 U	58 U	57 U
Carbazole	38000 J	700 J	130 J	650 J	55 U	57 U	56 U
Chrysene	180000	2700	560	3300	48 U	50 U	49 U
Dibenz(a,h)anthracene	17000 J	400 J	70 J	460 J	53 U	56 U	55 U
Dibenzofuran	8900 J	560 J	84 J	400 J	52 U	55 U	54 U
Dibenzothiophene	NA	NA	89 NJ	760 NJ	NA	NA	NA
Fluoranthene	300000	5600	1200	7200	59 U	61 U	60 U
Fluorene	19000 J	880	130 J	680 J	50 U	52 U	52 U
Hexachlorocyclopentadiene	8400 U	410 J	65 U	160 U	63 U	66 U	64 U
Indeno(1,2,3-cd)pyrene	59000	1200	250 J	1500	73 U	76 U	75 U
Naphthalene	7500 J	240 J	53 U	140 J	51 U	54 U	53 U
Phenanthrene	180000	5300	950	6000	55 U	57 U	56 U
Pyrene	250000	3200	760	6100	53 U	56 U	55 U
bis(2-Ethylhexyl) phthalate	7600 U	140 U	59 U	150 U	57 U	59 U	58 U

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP46-00	IR84-DP47-00	IR84-DP48-00	IR84-DP49-00	IR84-DP50-00	IR84-DP51-00	IR84-DP52-00
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-21-2001	07-21-2001	07-21-2001	07-21-2001	07-21-2001	07-21-2001	07-21-2001
HERBICIDES (ug/kg)							
No exceedances							
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	830 U	3000 J	6.2 J	8.5 U	1.7 U	3.2 J	4.2 U
4,4'-DDE	600 U	590 U	1.2 U	58	6.6	17	9.7
4,4'-DDT	1400 U	1400 U	2.8 U	190	25 J	43	54 J
Dieldrin	1600 U	1600 U	9.2 J	320	21	3.3 U	8.1 U
Endosulfan sulfate	290 U	290 U	0.61 U	3 U	0.59 U	0.61 U	1.5 U
Endrin	640 U	640 U	1.3 U	6.6 U	1.3 U	1.3 U	3.3 U
Endrin aldehyde	1600 U	1600 U	3.3 U	16 U	5.6 J	3.3 U	8.3 J
Endrin ketone	270 U	270 U	4.4 J	2.8 U	0.55 U	0.57 U	1.4 U
Heptachlor	7400	22000	9.5 J	6.6 U	4.2	1.3 U	3.3 U
Heptachlor epoxide	1600 J	4500 J	4.2 J	7.1 U	1.4 U	1.4 U	3.5 U
Methoxychlor	860 U	860 U	1.8 U	8.8 U	8.1 J	1.8 U	16 J
PCB-1248	19000	160000	500 U	25 U	4.8 U	5 U	49 U
PCB-1254	4200 U	10000 U	2200 U	110 U	21 U	22 U	210 U
PCB-1260	1600 U	3900 U	810 U	820 J	470	50	980
alpha-BHC	480 U	480 U	1 U	4.9 U	0.96 U	1 U	2.5 U
alpha-Chlordane	17000 J	48000 J	65 J	6.3 U	5.8 J	1.3 U	3.2 U
gamma-Chlordane	20000	58000	75 J	6.1 U	9.8	1.2 U	3.1 U
METALS (mg/kg)							
Aluminum	3090	2760	2970	2070	2310	1420	1270
Antimony	0.74 J	1 J	1.3 J	3.3 J	0.76 J	0.54 U	0.53 U
Arsenic	1.3	1.4	1.1	9.1	8.2	0.42 J	0.33 J
Barium	24.7	23.1	13.5 J	65.7	18.5 J	7.6 J	8.4 J
Beryllium	0.075 J	0.072 J	0.05 U	0.073 J	0.065 J	0.05 U	0.049 U
Cadmium	0.13 J	0.38 J	0.067 J	0.53 J	0.37 J	0.08 J	0.078 J
Calcium	12000	56300 J	3580 J	98000 J	100000 J	17200 J	15200 J
Chromium	5.6	6.9	3.8	20.2	11.8	2.2	2.1
Cobalt	0.45 J	0.39 J	0.25 J	0.76 J	0.3 J	0.22 J	0.22 J
Copper	6	8.1	8.6	146	11.3	1.4 J	2.2 J
Iron	2460	2700	2290	2660	2510	684	992
Lead	27.1	28.9	20.2	97.3	27.9	9.1	11.9

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP46-00	IR84-DP47-00	IR84-DP48-00	IR84-DP49-00	IR84-DP50-00	IR84-DP51-00	IR84-DP52-00
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-21-2001	07-21-2001	07-21-2001	07-21-2001	07-21-2001	07-21-2001	07-21-2001
METALS (mg/kg) (Cont.)							
Magnesium	371 J	1070	178 J	1480	1460	282 J	236 J
Manganese	22.4	25.6	10.9	32.8	27.4	17.4	15.8
Mercury	0.068 J	0.053 J	0.015 J	0.045 J	0.015 J	0.022 J	0.016 J
Nickel	1.8 J	1.5 J	1.4 J	2.9 J	2.1 J	0.98 J	1.2 J
Potassium	181 J	226 J	99.1 J	179 J	185 J	72.4 J	76.5 J
Selenium	0.33 U	0.32 U	0.34 U	0.33 U	0.32 U	0.34 U	0.33 U
Sodium	52.5 U	165 J	54.5 U	187 J	235 J	54.6 U	53.7 U
Thallium	0.53 U	0.52 U	0.55 U	0.54 U	0.52 U	0.55 U	0.54 U
Vanadium	5.4	5.7	5.8	5.7	5.7	2.3 J	2.4 J
Zinc	60.3 J	46.3 J	17.3 J	154 J	27.3 J	9.8 J	13.5 J
TOTAL PETROLEUM HYDROCARBONS							
TPH (as Diesel) (mg/kg)	470	370	130	270	170	34	49
TPH (as Gasoline) (ug/kg)	880	18 U	19 U	18 U	18 U	19 U	18 U
CONVENTIONAL							
Percent Solids (%)	95.2	95.8	91.7	93	95.4	91.5	93.1
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	NA	NA

NOTES:

J = Value is estimated
U = Not detected at detection limit
ug/kg = microgram per kilogram
mg/kg = milligram per kilogram
BG = sample was diluted due to matrix interference and I
N = sample recovery not within control limits

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP53-00	IR84-DP54-00	IR84-DP55-00	IR84-DP63-00	IR84-DP65-00	IR84-DP69-00
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-21-2001	07-21-2001	07-21-2001	07-22-2001	07-22-2001	07-22-2001
VOLATILES (ug/kg)						
2-Butanone	3 U	2.9 U	2.8 U	NA	NA	NA
Acetone	2.4 U	2.3 U	2.2 U	NA	NA	NA
Ethylbenzene	0.67 U	0.64 U	0.62 U	NA	NA	NA
Xylenes (total)	2.1 U	2.1 U	2 U	NA	NA	NA
SEMIVOLATILES (ug/kg)						
2-Methylnaphthalene	220 U	52 U	50 U	NA	NA	NA
Acenaphthene	1100 J	55 U	53 U	NA	NA	NA
Anthracene	1500	53 U	51 U	NA	NA	NA
Benzo(a)anthracene	3600	60 U	57 U	NA	NA	NA
Benzo(a)pyrene	3300	65 U	63 U	NA	NA	NA
Benzo(b)fluoranthene	4400	63 U	61 U	NA	NA	NA
Benzo(ghi)perylene	1600	60 U	57 U	NA	NA	NA
Benzo(k)fluoranthene	2000	58 U	55 U	NA	NA	NA
Carbazole	930 J	56 U	54 U	NA	NA	NA
Chrysene	3900	50 U	48 U	NA	NA	NA
Dibenz(a,h)anthracene	570 J	55 U	53 U	NA	NA	NA
Dibenzofuran	710 J	54 U	52 U	NA	NA	NA
Dibenzothiophene	NA	NA	NA	NA	NA	NA
Fluoranthene	8400	61 U	59 U	NA	NA	NA
Fluorene	960 J	52 U	50 U	NA	NA	NA
Hexachlorocyclopentadiene	270 U	65 U	63 U	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1600	76 U	73 U	NA	NA	NA
Naphthalene	300 J	53 U	51 U	NA	NA	NA
Phenanthrene	7100	56 U	54 U	NA	NA	NA
Pyrene	8100 J	55 U	53 U	NA	NA	NA
bis(2-Ethylhexyl) phthalate	240 U	59 U	56 U	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP53-00	IR84-DP54-00	IR84-DP55-00	IR84-DP63-00	IR84-DP65-00	IR84-DP69-00	IR84-DP69-00D
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-21-2001	07-21-2001	07-21-2001	07-22-2001	07-22-2001	07-22-2001	07-22-2001
HERBICIDES (ug/kg)							
No exceedances							
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	890 U	0.86 U	0.83 U	NA	NA	NA	NA
4,4'-DDE	640 U	5.8	3.1	NA	NA	NA	NA
4,4'-DDT	1500 U	7.8	1.9	NA	NA	NA	NA
Dieldrin	1700 U	3.5 J	4.2	NA	NA	NA	NA
Endosulfan sulfate	320 U	0.3 U	0.29 U	NA	NA	NA	NA
Endrin	690 U	0.66 U	0.64 U	NA	NA	NA	NA
Endrin aldehyde	1700 U	1.6 U	1.6 U	NA	NA	NA	NA
Endrin ketone	290 U	0.28 U	0.27 U	NA	NA	NA	NA
Heptachlor	4400	1.7 J	1.5 J	NA	NA	NA	NA
Heptachlor epoxide	1500 J	0.72 U	0.69 U	NA	NA	NA	NA
Methoxychlor	920 U	1.9 J	0.86 U	NA	NA	NA	NA
PCB-1248	2600 U	5 U	480 U	540 U	520 U	15 U	15 U
PCB-1254	51000	22 U	2100 U	2300 U	2200 U	66 U	65 U
PCB-1260	4200 U	20 J	770 U	18000	13000	99 J	190
alpha-BHC	520 U	0.5 U	0.48 U	NA	NA	NA	NA
alpha-Chlordane	18000 J	6.9 J	0.62 U	NA	NA	NA	NA
gamma-Chlordane	22000	7.6	0.6 U	NA	NA	NA	NA
METALS (mg/kg)							
Aluminum	1770	4340	3340	NA	NA	NA	NA
Antimony	1.7 J	0.53 U	0.76 J	NA	NA	NA	NA
Arsenic	0.97 J	0.47 J	0.89 J	NA	NA	NA	NA
Barium	15.2 J	6.5 J	11.4 J	NA	NA	NA	NA
Beryllium	0.052 U	0.05 U	0.048 U	NA	NA	NA	NA
Cadmium	0.57	0.047 U	0.045 U	NA	NA	NA	NA
Calcium	6080 J	291 J	1040 J	NA	NA	NA	NA
Chromium	5.2	4.4	4	NA	NA	NA	NA
Cobalt	0.38 J	0.2 J	0.26 J	NA	NA	NA	NA
Copper	13.5	1.1 J	3	NA	NA	NA	NA
Iron	1740	1630	2000	NA	NA	NA	NA
Lead	29.5	4.7	11.8	NA	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP53-00	IR84-DP54-00	IR84-DP55-00	IR84-DP63-00	IR84-DP65-00	IR84-DP69-00	IR84-DP69-00D
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-21-2001	07-21-2001	07-21-2001	07-22-2001	07-22-2001	07-22-2001	07-22-2001
METALS (mg/kg) (Cont.)							
Magnesium	211 J	116 J	100 J	NA	NA	NA	NA
Manganese	13.8	4.2	11.3	NA	NA	NA	NA
Mercury	0.039 J	0.01 J	0.013 J	NA	NA	NA	NA
Nickel	1.4 J	1 J	1.1 J	NA	NA	NA	NA
Potassium	73.9 U	97.6 U	89 U	NA	NA	NA	NA
Selenium	0.35 U	0.34 U	0.32 U	NA	NA	NA	NA
Sodium	56.4 U	54.3 U	52.3 U	NA	NA	NA	NA
Thallium	0.56 U	0.54 U	0.52 U	NA	NA	NA	NA
Vanadium	3.4 J	5.5	5.2	NA	NA	NA	NA
Zinc	72 J	3.4 J	8.5 J	NA	NA	NA	NA
TOTAL PETROLEUM HYDROCARBONS							
TPH (as Diesel) (mg/kg)	220	7 J	12	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	19 U	18 U	18 U	NA	NA	NA	NA
CONVENTIONAL							
Percent Solids (%)	88.7	92.1	95.7	85.8	89.3	30.3	30.9
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	NA	NA

NOTES:

J = Value is estimated
U = Not detected at detection limit
ug/kg = microgram per kilogram
mg/kg = milligram per kilogram
BG = sample was diluted due to matrix interference and l
N = sample recovery not within control limits

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP71-00	IR84-DP74-00	IR84-DP75-00	IR84-DP76-00	IR84-DP77-00	IR84-DP78-00	IR84-DP79-00
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-22-2001	08-02-2001	08-02-2001	08-02-2001	08-05-2001	08-05-2001	08-05-2001
VOLATILES (ug/kg)							
2-Butanone	NA	3 U	2.9 U	3 U	3 U	2.7 U	3.1 U
Acetone	NA	2.4 U	2.2 U	2.3 U	2.4 U	2.1 U	2.4 U
Ethylbenzene	NA	0.66 U	0.63 U	0.65 U	0.66 U	0.58 U	0.67 U
Xylenes (total)	NA	2.1 U	2 U	2.1 U	2.1 U	1.9 U	2.2 U
SEMIVOLATILES (ug/kg)							
2-Methylnaphthalene	NA	53 U	54 U	54 U	52 U	51 U	51 U
Acenaphthene	NA	56 U	57 U	58 U	55 U	55 U	54 U
Anthracene	NA	54 U	55 U	55 U	53 U	52 U	52 U
Benzo(a)anthracene	NA	61 U	61 U	62 U	59 U	59 U	58 U
Benzo(a)pyrene	NA	66 U	67 U	68 U	65 U	64 U	64 U
Benzo(b)fluoranthene	NA	64 U	65 U	66 U	63 U	62 U	62 U
Benzo(ghi)perylene	NA	61 U	61 U	62 U	59 U	59 U	58 U
Benzo(k)fluoranthene	NA	58 U	59 U	60 U	57 U	57 U	56 U
Carbazole	NA	57 U	58 U	59 U	56 U	56 U	55 U
Chrysene	NA	51 U	51 U	52 U	50 U	49 U	49 U
Dibenz(a,h)anthracene	NA	56 U	57 U	58 U	55 U	55 U	54 U
Dibenzofuran	NA	55 U	56 U	57 U	54 U	53 U	53 U
Dibenzothiophene	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	62 U	62 U	63 U	60 U	60 U	59 U
Fluorene	NA	53 U	54 U	54 U	52 U	51 U	51 U
Hexachlorocyclopentadiene	NA	66 U	67 U	68 U	65 U	64 U	64 U
Indeno(1,2,3-cd)pyrene	NA	77 U	78 U	79 U	76 U	75 U	74 U
Naphthalene	NA	54 U	55 U	55 U	53 U	52 U	52 U
Phenanthrene	NA	57 U	58 U	59 U	56 U	56 U	55 U
Pyrene	NA	56 U	57 U	58 U	55 U	55 U	54 U
bis(2-Ethylhexyl) phthalate	NA	59 U	60 U	61 U	58 U	58 U	57 U

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP71-00	IR84-DP74-00	IR84-DP75-00	IR84-DP76-00	IR84-DP77-00	IR84-DP78-00	IR84-DP79-00
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-22-2001	08-02-2001	08-02-2001	08-02-2001	08-05-2001	08-05-2001	08-05-2001
HERBICIDES (ug/kg)							
No exceedances							
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	NA	0.87 U	0.88 U	0.89 U		0.84 U	0.84 U
4,4'-DDE	NA	0.63 U	0.64 U	0.64 U		0.61 U	0.61 U
4,4'-DDT	NA	1.4 U	1.4 U	1.5 U		1.4 U	1.4 U
Dieldrin	NA	1.7 U	1.7 U	1.7 U		1.6 U	1.6 U
Endosulfan sulfate	NA	0.31 U	0.31 U	0.32 U	8.4 J	0.3 U	0.3 U
Endrin	NA	0.67 U	0.68 U	0.69 U		0.65 U	0.65 U
Endrin aldehyde	NA	1.7 U	1.7 U	1.7 U	14 J	1.6 U	1.6 U
Endrin ketone	NA	0.29 U	0.29 U	0.29 U	17 J	0.28 U	1.7 J
Heptachlor	NA	0.67 U	0.68 U	0.69 U		0.65 U	0.65 U
Heptachlor epoxide	NA	0.73 U	4.3	0.75 U		0.71 U	0.7 U
Methoxychlor	NA	0.9 U	0.91 U	0.93 U	22 J	0.88 U	0.87 U
PCB-1248	180 U	5.1 U	130	5.2 U	25 U	4.9 U	4.9 U
PCB-1254	770 U	22 U	22 U	23 U	110 U	21 U	21 U
PCB-1260	7800	8.1 U	8.3 U	8.4 U	1700	7.9 U	42
alpha-BHC	NA	0.51 U	0.51 U	0.52 U		0.49 U	0.49 U
alpha-Chlordane	NA	0.65 U	2 J	0.67 U		0.63 U	0.63 U
gamma-Chlordane	NA	0.63 U	3.9	0.64 U		0.61 U	0.61 U
METALS (mg/kg)							
Aluminum	NA	3540	1700	4820	2150	1650	1780
Antimony	NA	0.66 J	0.55 UJ	0.55 UJ	0.53 UJ	0.52 UJ	0.52 UJ
Arsenic	NA	1.5	0.79 J	2.5	3.1	0.32 U	0.32 U
Barium	NA	9.8 U	3.7 U	6.3 U	5.7 J	5.5 J	6.7 J
Beryllium	NA	0.051 U	0.051 U	0.052 U	0.081 U	0.078 U	0.094 U
Cadmium	NA	0.047 U	0.048 U	0.049 U	0.046 U	0.046 U	0.046 U
Calcium	NA	3160 J	358 J	628 J	3920	634	204 J
Chromium	NA	4.8	2.6	7.5	2.8	1.7	1.8
Cobalt	NA	0.41 J	0.17 U	0.33 J	0.2 J	0.18 J	0.16 U
Copper	NA	6.8	1 J	0.65 J	1.6 J	0.35 J	0.41 J
Iron	NA	2170	1270	2620	1710	950	1160
Lead	NA	13.7 J	5 J	4.3 J	7	1.8	2

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP71-00	IR84-DP74-00	IR84-DP75-00	IR84-DP76-00	IR84-DP77-00	IR84-DP78-00	IR84-DP79-00
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1
SAMPLE DATE	07-22-2001	08-02-2001	08-02-2001	08-02-2001	08-05-2001	08-05-2001	08-05-2001
METALS (mg/kg) (Cont.)							
Magnesium	NA	232 J	56.6 J	174 J	114 J	52.9 J	47.3 J
Manganese	NA	10.4	3.3	3.8	8	7.7	6.6
Mercury	NA	0.2	0.0094 U	0.015 J	0.019 J	0.009 U	0.0089 U
Nickel	NA	2.4 J	0.63 J	0.72 J	0.76 J	0.54 J	0.46 J
Potassium	NA	72.5 J	76.8 J	258 J	62 U	38.5 U	34.8 U
Selenium	NA	0.61	0.35 U	0.35 U	0.33 U	0.33 U	0.33 U
Sodium	NA	55 U	55.8 U	56.5 U	54 U	53.5 U	53.1 U
Thallium	NA	0.55 U	0.56 U	0.57 U	0.54 U	0.53 U	0.53 U
Vanadium	NA	5.1 J	4.2 J	10.4	4.6 J	2.5 J	2.8 J
Zinc	NA	9	2.5	1.9 J	6.2 J	1.5 J	1.8 J
TOTAL PETROLEUM HYDROCARBONS							
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	NA
CONVENTIONAL							
Percent Solids (%)	51.7	90.9	89.7	88.5	92.6	93.5	94.2
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	NA	NA

NOTES:

J = Value is estimated
 U = Not detected at detection limit
 ug/kg = microgram per kilogram
 mg/kg = milligram per kilogram
 BG = sample was diluted due to matrix interference and l
 N = sample recovery not within control limits

TABLE 4-6 (continued)
 POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP80-00	IR84-DP81-00	IR84-DP82-00	IR84-DP83-00	IR84-DP84-00	84-SB01A	84-SB02A
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 0.5	0 - 0.5
SAMPLE DATE	08-05-2001	08-05-2001	08-05-2001	08-05-2001	08-03-2001	10-26-1995	10-26-1995
VOLATILES (ug/kg)							
2-Butanone	2.9 U	3.1 U	110 U	2.8 U	50 U	NA	NA
Acetone	2.3 U	2.4 U	1400 U	2.2 U	87 U	NA	NA
Ethylbenzene	0.64 U	0.68 U	330 J	0.61 U	1.5 U	NA	NA
Xylenes (total)	2.1 U	2.2 U	120 J	2 U	8.7 J	NA	NA
SEMIVOLATILES (ug/kg)							
2-Methylnaphthalene	51 U	53 U	550 U	52 U	92000	NA	NA
Acenaphthene	54 U	56 U	590 U	56 U	2800 J	NA	NA
Anthracene	52 U	54 U	560 U	53 U	4100 J	NA	NA
Benzo(a)anthracene	58 U	61 U	630 U	60 U	1800 J	NA	NA
Benzo(a)pyrene	64 U	66 U	690 U	65 U	1700 U	NA	NA
Benzo(b)fluoranthene	61 U	64 U	670 U	63 U	1600 U	NA	NA
Benzo(ghi)perylene	58 U	61 U	630 U	60 U	1500 J	NA	NA
Benzo(k)fluoranthene	56 U	59 U	610 U	58 U	1500 U	NA	NA
Carbazole	55 U	57 U	600 U	57 U	1400 U	NA	NA
Chrysene	49 U	51 U	530 U	50 U	2800 J	NA	NA
Dibenz(a,h)anthracene	54 U	56 U	590 U	56 U	1400 U	NA	NA
Dibenzofuran	53 U	55 U	570 U	54 U	1400 U	NA	NA
Dibenzothiophene	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	59 U	62 U	640 U	61 U	1700 J	NA	NA
Fluorene	51 U	53 U	580 J	52 U	9000 J	NA	NA
Hexachlorocyclopentadiene	64 U	66 U	690 U	65 U	1700 U	NA	NA
Indeno(1,2,3-cd)pyrene	74 U	77 U	800 U	76 U	1900 U	NA	NA
Naphthalene	52 U	54 U	560 U	53 U	1400 U	NA	NA
Phenanthrene	55 U	57 U	910 J	57 U	24000	NA	NA
Pyrene	54 U	56 U	590 U	56 U	16000	NA	NA
bis(2-Ethylhexyl) phthalate	57 U	60 U	620 U	59 U	1500 U	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP80-00	IR84-DP81-00	IR84-DP82-00	IR84-DP83-00	IR84-DP84-00	84-SB01A	84-SB02A
DEPTH	0 - 1	0 - 1	0 - 1	0 - 1	0 - 1	0 - 0.5	0 - 0.5
SAMPLE DATE	08-05-2001	08-05-2001	08-05-2001	08-05-2001	08-03-2001	10-26-1995	10-26-1995
HERBICIDES (ug/kg)							
No exceedances							
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	0.84 U	3.6 J	32 J	1.7 U		NA	NA
4,4'-DDE	0.6 U	0.63 U	6.5 U	1.2 U		NA	NA
4,4'-DDT	1.4 U	1.4 U	15 U	8.2 J		NA	NA
Dieldrin	1.6 U	1.7 U	52	3.3 U		NA	NA
Endosulfan sulfate	0.3 U	3.2	40 J	0.61 U		NA	NA
Endrin	0.65 U	0.67 U	7 U	1.3 U		NA	NA
Endrin aldehyde	1.6 U	4.5 J	61 J	3.3 U		NA	NA
Endrin ketone	0.28 U	26 J	3 U	0.57 U		NA	NA
Heptachlor	0.65 U	0.67 U	7 U	1.3 U		NA	NA
Heptachlor epoxide	0.7 U	0.73 U	7.6 U	1.4 U		NA	NA
Methoxychlor	0.87 U	8.7 J	79 J	1.8 U		NA	NA
PCB-1248	4.9 U	5.1 U	260 U	5 U	6.4 U	1900 U	380 U
PCB-1254	21 U	22 U	1100 U	22 U	28 U	1900 U	380 U
PCB-1260	7.8 U	530	11000	58	10 U	12000	4400
alpha-BHC	0.49 U	0.51 U	21	1 U		NA	NA
alpha-Chlordane	0.63 U	0.65 U	6.8 U	1.3 U		NA	NA
gamma-Chlordane	0.6 U	0.63 U	6.5 U	1.2 U		NA	NA
METALS (mg/kg)							
Aluminum	1390	2440	2380	2080	2140	NA	NA
Antimony	0.52 UJ	1.6 J	1.2 J	0.53 UJ	2 J	NA	NA
Arsenic	0.79 J	2.6	0.98 J	0.68 J	0.78 J	NA	NA
Barium	3 J	9.7 J	16.4 J	6.5 J	24.6 J	NA	NA
Beryllium	0.073 U	0.11 U	0.11 U	0.11 U	0.064 U	NA	NA
Cadmium	0.046 U	0.048 U	0.23 J	0.047 U	0.16 J	NA	NA
Calcium	109 J	461 J	17900	14500	1510	NA	NA
Chromium	2.5	3.2	4.6	3.2	2.6	NA	NA
Cobalt	0.24 J	0.22 J	0.36 J	0.22 J	0.28 J	NA	NA
Copper	0.35 J	1.9 J	8.4	1.3 J	28.4	NA	NA
Iron	1490	1910	2270	1620	1990	NA	NA
Lead	2.1	61.4	65.4	5.7	54.7	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-DP80-00	IR84-DP81-00	IR84-DP82-00	IR84-DP83-00	IR84-DP84-00	84-SB01A	84-SB02A
DEPTH	0-1	0-1	0-1	0-1	0-1	0-0.5	0-0.5
SAMPLE DATE	08-05-2001	08-05-2001	08-05-2001	08-05-2001	08-03-2001	10-26-1995	10-26-1995
METALS (mg/kg) (Cont.)							
Magnesium	53.5 J	71.7 J	347 J	283 J	156 J	NA	NA
Manganese	2.7	13.2	11.1	15.9	6.6	NA	NA
Mercury	0.0089 U	0.0093 U	0.17	0.0091 U	0.041 J	NA	NA
Nickel	0.52 J	0.73 J	1.7 J	0.94 J	2.6 J	NA	NA
Potassium	51.1 U	53.3 U	86 J	86.8 J	75.9 U	NA	NA
Selenium	0.33 U	0.34 U	0.36 U	0.34 U	0.43 U	NA	NA
Sodium	53 U	55.2 U	57.5 U	54.4 U	69.6 U	NA	NA
Thallium	0.53 U	0.55 U	0.57 U	0.54 U	0.7 U	NA	NA
Vanadium	4 J	4.4 J	5.2 J	3.8 J	4.2 J	NA	NA
Zinc	1.3 J	19.4 J	40.7 J	7.7 J	38.2	NA	NA
TOTAL PETROLEUM HYDROCARBONS							
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	NA
CONVENTIONAL							
Percent Solids (%)	94.3	90.5	87	91.9	71.8	NA	NA
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	NA	NA

NOTES:

J = Value is estimated
U = Not detected at detection limit
ug/kg = microgram per kilogram
mg/kg = milligram per kilogram
BG = sample was diluted due to matrix interference and I
N = sample recovery not within control limits

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-SB03A	84-SB04A	84-SB05A	84-SB06A	84-SB07A	84-SB08A	84-SB09A	84-SB10A
DEPTH	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995
VOLATILES (ug/kg)								
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA	NA
SEMIVOLATILES (ug/kg)								
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzothiophene	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
 POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-SB03A	84-SB04A	84-SB05A	84-SB06A	84-SB07A	84-SB08A	84-SB09A	84-SB10A
DEPTH	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995
HERBICIDES (ug/kg)								
No exceedances								
PESTICIDES/PCBs (ug/kg)								
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1248	730 U	1800 U	400 U	170 U	150 U	390 U	1900 U	140 U
PCB-1254	730 U	1800 U	400 U	170 U	150 U	390 U	1900 U	140 U
PCB-1260	5300	6200	5000	1300 J	360	2500	12000	1100
alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA
METALS (mg/kg)								
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-SB03A	84-SB04A	84-SB05A	84-SB06A	84-SB07A	84-SB08A	84-SB09A	84-SB10A
DEPTH	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995
METALS (mg/kg) (Cont.)								
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL PETROLEUM HYDROCARBONS								
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
CONVENTIONAL								
Percent Solids (%)	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

J = Value is estimated
U = Not detected at detection limit
ug/kg = microgram per kilogram
mg/kg = milligram per kilogram
BG = sample was diluted due to matrix interference and l
N = sample recovery not within control limits

TABLE 4-6 (continued)
 POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-SB02-00	IR84-SB04-00	IR84-SB08-00	IR84-SB10-00	IR84-SB15-00	IR84-SB21-00	IR84-SB23-00
DEPTH	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	04-16-1998	04-16-1998	04-16-1998	04-16-1998	04-16-1998	04-16-1998	04-16-1998
VOLATILES (ug/kg)							
2-Butanone	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA
SEMIVOLATILES (ug/kg)							
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA
Dibenzothiophene	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-SB02-00	IR84-SB04-00	IR84-SB08-00	IR84-SB10-00	IR84-SB15-00	IR84-SB21-00	IR84-SB23-00
DEPTH	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	04-16-1998	04-16-1998	04-16-1998	04-16-1998	04-16-1998	04-16-1998	04-16-1998
HERBICIDES (ug/kg)							
No exceedances							
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA
PCB-1248	74 U	390 U	350 U	710 U	390 U	36 U	42 U
PCB-1254	74 U	390 U	350 U	710 U	390 U	36 U	42 U
PCB-1260	1000	3900	4300	8100	6800	36 U	42 U
alpha-BHC	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA
METALS (mg/kg)							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
 POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-SB02-00	IR84-SB04-00	IR84-SB08-00	IR84-SB10-00	IR84-SB15-00	IR84-SB21-00	IR84-SB23-00
DEPTH	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	04-16-1998	04-16-1998	04-16-1998	04-16-1998	04-16-1998	04-16-1998	04-16-1998
METALS (mg/kg) (Cont.)							
Magnesium	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA
TOTAL PETROLEUM HYDROCARBONS							
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	NA
CONVENTIONAL							
Percent Solids (%)	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	NA	NA

NOTES:

J = Value is estimated
 U = Not detected at detection limit
 ug/kg = microgram per kilogram
 mg/kg = milligram per kilogram
 BG = sample was diluted due to matrix interference and I
 N = sample recovery not within control limits

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-SB25-00	IR84-SB26-00	IR84-SB27-00	IR84-SB28-00	IR84-SB29-00	IR84-SB30-00	IR84-SB31-00
DEPTH	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	04-16-1998	04-23-1998	04-23-1998	04-23-1998	04-23-1998	04-23-1998	04-23-1998
VOLATILES (ug/kg)							
2-Butanone	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA
SEMIVOLATILES (ug/kg)							
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA
Dibenzothiophene	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-SB25-00	IR84-SB26-00	IR84-SB27-00	IR84-SB28-00	IR84-SB29-00	IR84-SB30-00	IR84-SB31-00
DEPTH	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	04-16-1998	04-23-1998	04-23-1998	04-23-1998	04-23-1998	04-23-1998	04-23-1998
HERBICIDES (ug/kg)							
No exceedances							
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA
PCB-1248	44 U	130 U	1800 U	35 U	460 U	55 U	37 U
PCB-1254	44 U	130 U	1800 U	35 U	460 U	55 U	37 U
PCB-1260	110 J	1500 J	26000	35 U	5800	55 U	37 U
alpha-BHC	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA
METALS (mg/kg)							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-SB25-00	IR84-SB26-00	IR84-SB27-00	IR84-SB28-00	IR84-SB29-00	IR84-SB30-00	IR84-SB31-00
DEPTH	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
SAMPLE DATE	04-16-1998	04-23-1998	04-23-1998	04-23-1998	04-23-1998	04-23-1998	04-23-1998
METALS (mg/kg) (Cont.)							
Magnesium	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA
TOTAL PETROLEUM HYDROCARBONS							
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	NA
CONVENTIONAL							
Percent Solids (%)	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	NA	NA

NOTES:

J = Value is estimated
U = Not detected at detection limit
ug/kg = microgram per kilogram
mg/kg = milligram per kilogram
BG = sample was diluted due to matrix interference and I
N = sample recovery not within control limits

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-SB01B	84-SB02B	84-SB03B	84-SB04B	84-SB05B	84-SB06B	84-SB07B	84-SB08B
DEPTH	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0
SAMPLE DATE	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995
VOLATILES (ug/kg)								
2-Butanone	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA	NA
SEMIVOLATILES (ug/kg)								
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzothiophene	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-SB01B	84-SB02B	84-SB03B	84-SB04B	84-SB05B	84-SB06B	84-SB07B	84-SB08B
DEPTH	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0
SAMPLE DATE	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995
HERBICIDES (ug/kg)								
No exceedances								
PESTICIDES/PCBs (ug/kg)								
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA	NA
PCB-1248	370 U	1900 U	720 U	180 U	370 U	810 U	190 U	1800 U
PCB-1254	370 U	1900 U	720 U	180 U	370 U	810 U	190 U	1800 U
PCB-1260	1700	12000	5700	2300	4300 J	2800	880	6100
alpha-BHC	NA	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA	NA
METALS (mg/kg)								
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-SB01B	84-SB02B	84-SB03B	84-SB04B	84-SB05B	84-SB06B	84-SB07B	84-SB08B
DEPTH	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0
SAMPLE DATE	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995	10-26-1995
METALS (mg/kg) (Cont.)								
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL PETROLEUM HYDROCARBONS								
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
CONVENTIONAL								
Percent Solids (%)	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

J = Value is estimated
U = Not detected at detection limit
ug/kg = microgram per kilogram
mg/kg = milligram per kilogram
BG = sample was diluted due to matrix interference and l
N = sample recovery not within control limits

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-SB09B	84-SB10B	IR84-SB02-01	IR84-SB04-01	IR84-SB08-01	IR84-SB10-01	IR84-SB15-01
DEPTH	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0
SAMPLE DATE	10-26-1995	10-26-1995	04-16-1998	04-16-1998	04-16-1998	04-16-1998	04-16-1998
VOLATILES (ug/kg)							
2-Butanone	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA
SEMIVOLATILES (ug/kg)							
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA
Dibenzothiophene	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-SB09B	84-SB10B	IR84-SB02-01	IR84-SB04-01	IR84-SB08-01	IR84-SB10-01	IR84-SB15-01
DEPTH	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0
SAMPLE DATE	10-26-1995	10-26-1995	04-16-1998	04-16-1998	04-16-1998	04-16-1998	04-16-1998
HERBICIDES (ug/kg)							
No exceedances							
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA
PCB-1248	1800 U	730 U	41 U	39 U	36 U	360 U	39 U
PCB-1254	1800 U	730 U	41 U	39 U	36 U	360 U	39 U
PCB-1260	10000	7500	110 U	140 U	120 U	2900	530 J
alpha-BHC	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA
METALS (mg/kg)							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-SB09B	84-SB10B	IR84-SB02-01	IR84-SB04-01	IR84-SB08-01	IR84-SB10-01	IR84-SB15-01
DEPTH	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0
SAMPLE DATE	10-26-1995	10-26-1995	04-16-1998	04-16-1998	04-16-1998	04-16-1998	04-16-1998
METALS (mg/kg) (Cont.)							
Magnesium	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA
TOTAL PETROLEUM HYDROCARBONS							
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	NA
CONVENTIONAL							
Percent Solids (%)	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	NA	NA

NOTES:

J = Value is estimated
U = Not detected at detection limit
ug/kg = microgram per kilogram
mg/kg = milligram per kilogram
BG = sample was diluted due to matrix interference and l
N = sample recovery not within control limits

TABLE 4-6 (continued)
 POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-SB21-01	IR84-SB23-01	IR84-SB25-01	IR84-SB26-01	IR84-SB27-01	IR84-SB28-01	IR84-SB29-01
DEPTH	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0
SAMPLE DATE	04-16-1998	04-16-1998	04-16-1998	04-23-1998	04-23-1998	04-23-1998	04-23-1998
VOLATILES (ug/kg)							
2-Butanone	NA	NA	NA	NA	NA	NA	NA
Acetone	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA
SEMIVOLATILES (ug/kg)							
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA
Benzo(ghi)perylene	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	NA	NA	NA	NA	NA	NA	NA
Dibenzothiophene	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA
Hexachlorocyclopentadiene	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA
bis(2-Ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-SB21-01	IR84-SB23-01	IR84-SB25-01	IR84-SB26-01	IR84-SB27-01	IR84-SB28-01	IR84-SB29-01
DEPTH	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0
SAMPLE DATE	04-16-1998	04-16-1998	04-16-1998	04-23-1998	04-23-1998	04-23-1998	04-23-1998
HERBICIDES (ug/kg)							
No exceedances							
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA	NA
Dieldrin	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	NA
Heptachlor	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	NA	NA	NA	NA	NA	NA	NA
PCB-1248	36	36	40	40	18000	35	40
PCB-1254	36	36	40	40	18000	35	40
PCB-1260	62	36	40	40	200000	35	520
alpha-BHC	NA	NA	NA	NA	NA	NA	NA
alpha-Chlordane	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA	NA
METALS (mg/kg)							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-SB21-01	IR84-SB23-01	IR84-SB25-01	IR84-SB26-01	IR84-SB27-01	IR84-SB28-01	IR84-SB29-01
DEPTH	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0	0.5 - 1.0
SAMPLE DATE	04-16-1998	04-16-1998	04-16-1998	04-23-1998	04-23-1998	04-23-1998	04-23-1998
METALS (mg/kg) (Cont.)							
Magnesium	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA
TOTAL PETROLEUM HYDROCARBONS							
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	NA
CONVENTIONAL							
Percent Solids (%)	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	NA	NA	NA	NA	NA	NA	NA

NOTES:

J = Value is estimated

U = Not detected at detection limit

ug/kg = microgram per kilogram

mg/kg = milligram per kilogram

BG = sample was diluted due to matrix interference and I

N = sample recovery not within control limits

TABLE 4-6 (continued)
 POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-SB30-01	IR84-SB31-01
DEPTH	0.5 - 1.0	0.5 - 1.0
SAMPLE DATE	04-23-1998	04-23-1998
VOLATILES (ug/kg)		
2-Butanone	NA	NA
Acetone	NA	NA
Ethylbenzene	NA	NA
Xylenes (total)	NA	NA
SEMIVOLATILES (ug/kg)		
2-Methylnaphthalene	NA	NA
Acenaphthene	NA	NA
Anthracene	NA	NA
Benzo(a)anthracene	NA	NA
Benzo(a)pyrene	NA	NA
Benzo(b)fluoranthene	NA	NA
Benzo(ghi)perylene	NA	NA
Benzo(k)fluoranthene	NA	NA
Carbazole	NA	NA
Chrysene	NA	NA
Dibenz(a,h)anthracene	NA	NA
Dibenzofuran	NA	NA
Dibenzothiophene	NA	NA
Fluoranthene	NA	NA
Fluorene	NA	NA
Hexachlorocyclopentadiene	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA
Naphthalene	NA	NA
Phenanthrene	NA	NA
Pyrene	NA	NA
bis(2-Ethylhexyl) phthalate	NA	NA

TABLE 4-6 (continued)
 POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-SB30-01	IR84-SB31-01
DEPTH	0.5 - 1.0	0.5 - 1.0
SAMPLE DATE	04-23-1998	04-23-1998
HERBICIDES (ug/kg)		
No exceedances		
PESTICIDES/PCBs (ug/kg)		
4,4'-DDD	NA	NA
4,4'-DDE	NA	NA
4,4'-DDT	NA	NA
Dieldrin	NA	NA
Endosulfan sulfate	NA	NA
Endrin	NA	NA
Endrin aldehyde	NA	NA
Endrin ketone	NA	NA
Heptachlor	NA	NA
Heptachlor epoxide	NA	NA
Methoxychlor	NA	NA
PCB-1248	44	36 U
PCB-1254	44	36 U
PCB-1260	44	36 U
alpha-BHC	NA	NA
alpha-Chlordane	NA	NA
gamma-Chlordane	NA	NA
METALS (mg/kg)		
Aluminum	NA	NA
Antimony	NA	NA
Arsenic	NA	NA
Barium	NA	NA
Beryllium	NA	NA
Cadmium	NA	NA
Calcium	NA	NA
Chromium	NA	NA
Cobalt	NA	NA
Copper	NA	NA
Iron	NA	NA
Lead	NA	NA

TABLE 4-6 (continued)
POSITIVE DETECTIONS IN SURFACE SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-SB30-01	IR84-SB31-01
DEPTH	0.5 - 1.0	0.5 - 1.0
SAMPLE DATE	04-23-1998	04-23-1998

METALS (mg/kg) (Cont.)

Magnesium	NA	NA
Manganese	NA	NA
Mercury	NA	NA
Nickel	NA	NA
Potassium	NA	NA
Selenium	NA	NA
Sodium	NA	NA
Thallium	NA	NA
Vanadium	NA	NA
Zinc	NA	NA

TOTAL PETROLEUM HYDROCARBONS

TPH (as Diesel) (mg/kg)

TPH (as Gasoline) (ug/kg)

CONVENTIONAL

Percent Solids (%)

Total Organic Carbon (mg/kg)

TPH (as Diesel) (mg/kg)	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA
Percent Solids (%)	NA	NA
Total Organic Carbon (mg/kg)	NA	NA

NOTES:

J = Value is estimated

U = Not detected at detection limit

ug/kg = microgram per kilogram

mg/kg = milligram per kilogram

BG = sample was diluted due to matrix interference and I

N = sample recovery not within control limits

TABLE 4-7
SURFACE SOIL DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB, CAMP LEJEUNE, NORTH CAROLINA

	Region IX PRG	North Carolina Soil-to-Groundwater Concentration (units as indicated)	SS Background Mean + 2 Standard Deviations (mg/kg)	Minimum Detected	Maximum Detected	Frequency of Detection
VOLATILES (ug/kg)	(ug/kg)	(ug/kg)				
2-Butanone	7,300,000	692	NE	4.8 J	9 J	2/26
Acetone	1,600,000	2810	NE	40 J	40 J	1/26
Ethylbenzene	230,000	241	NE	330 J	330 J	1/26
Xylenes (total)	210,000	4960	NE	8.7 J	120 J	2/26
SEMIVOLATILES (ug/kg)	(ug/kg)	(ug/kg)				
2-Methylnaphthalene	1,600,000 (1)	NE	NE	120 J	92000	3/26
Acenaphthene	3,700,000	8160	NE	140 J	20000 J	8/26
Anthracene	22,000,000	995000	NE	210 J	56000	8/26
Benzo(a)anthracene	620	358	NE	520	190000	8/26
Benzo(a)pyrene	62	91.1	NE	470	150000	7/26
Benzo(b)fluoranthene	620	NE	NE	540	170000	7/26
Benzo(ghi)perylene	NE	6720000	NE	74 J	55000	9/26
Benzo(k)fluoranthene	6,200	NE	NE	340 J	120000	7/26
Carbazole	24,000	NE	NE	130 J	38000 J	7/26
Chrysene	62,000	39800	NE	560	180000	8/26
Dibenz(a,h)anthracene	62	168	NE	70 J	17000 J	7/26
Dibenzofuran	290,000	NE	NE	84 J	8900 J	7/26
Dibenzothiophene	NE	NE	NE	89 NU	760 NU	2/2
Fluoranthene	2,300,000	276000	NE	1200	300000	8/26
Fluorene	2,600,000	44300	NE	130 J	19000 J	9/26
Hexachlorocyclopentadiene	420,000	200000	NE	410 J	410 J	1/26
Indeno(1,2,3-cd)pyrene	620	3260	NE	250 J	59000	7/26
Naphthalene	56,000	585	NE	140 J	7500 J	5/26
Phenanthrene	NE	59600	NE	910 J	180000	9/26
Pyrene	2,300,000	28600	NE	760	250000	8/26
bis(2-Ethylhexyl) phthalate	35,000	6670	NE	140 J	620	2/26

TABLE 4-7 (continued)
SURFACE SOIL DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB, CAMP LEJEUNE, NORTH CAROLINA

	Region IX PRG	North Carolina Soil-to-Groundwater Concentration (units as indicated)	SS Background Mean + 2 Standard Deviations (mg/kg)	Minimum Detected	Maximum Detected	Frequency of Detection
PESTICIDES/PCBs (ug/kg)	(ug/kg)	(ug/kg)				
4,4'-DDD	2,400	129	NE	3.2 J	3000 J	7/24
4,4'-DDE	1,700	NE	NE	3.1	58	7/24
4,4'-DDT	1,700	1360	NE	1.9	190	7/24
Dieldrin	30	1.13	NE	3.5 J	320	8/24
Endosulfan sulfate	NE	NE	NE	2.1 J	54 J	6/25
Endrin	18,000 (2)	440	NE	6.9 J	6.9 J	1/24
Endrin aldehyde	18,000 (2)	NE	NE	4.5 J	74 J	8/25
Endrin ketone	18,000 (2)	NE	NE	1.7 J	26 J	5/25
Heptachlor	110	2.4	NE	1.5 J	22000	8/24
Heptachlor epoxide	53	6.67	NE	4.2 J	4500 J	6/24
Methoxychlor	310,000	56100	NE	1.9 J	98 J	7/25
PCB-1248	220	NE	NE	56	160000	4/95
PCB-1254	220	NE	NE	51000	51000	1/95
PCB-1260	220	NE	NE	18 J	200000	68/95
alpha-BHC	90	NE	NE	21	21	1/24
alpha-Chlordane	1,600 (3)	NE	NE	2 J	48000 J	10/24
gamma-Chlordane	1,600 (3)	NE	NE	3.9	58000	10/24
ME-TALS (mg/kg)	(mg/kg)	(mg/kg)				
Aluminum	76,000	NE	6,070	1270	8940	26/26
Antimony	31	5420	0.556	0.66 J	3.3 J	13/26
Arsenic	0.39	26200	0.671	0.33 J	9.1	24/26
Barium	5,400	848000	16.8	3 J	65.7	23/26
Beryllium	150	3380	0.0974	0.06 J	0.075 J	5/26
Cadmium	37	2720	0.0549	0.067 J	0.57	14/26
Calcium	NE	NE	37,271	109 J	100000 J	26/26
Chromium	30 (assumes Cr +6)	27200	7.02	1.7	20.2	26/26
Cobalt	4,700	NE	0.317	0.18 J	0.76 J	23/26
Copper	2,900	704000	15.8	0.35 J	146	26/26
Iron	23,000	151000	3,162	684	5000	26/26
Lead	420	270000	20.2	1.8	97.3	26/26
Magnesium	NE	NE	622	47.3 J	1480	26/26

TABLE 4-7 (continued)
SURFACE SOIL DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB, CAMP LEJEUNE, NORTH CAROLINA

	Region IX PRG	North Carolina Soil-to-Groundwater Concentration (units as indicated)	SS Background Mean + 2 Standard Deviations (mg/kg)	Minimum Detected	Maximum Detected	Frequency of Detection
METALS (mg/kg) (Cont.)	Residential soil (units as indicated)					
Manganese	(mg/kg)	(mg/kg)	(mg/kg)			
Mercury	1,800	65200	17.4	2.7	32.8	26/26
Nickel	23	15.4	0.0844	0.01 J	0.2	18/26
Potassium	1,600	56400	1.54	0.46 J	2.9 J	26/26
Selenium	NE	NE	157	70.2 J	258 J	17/26
Sodium	390	12200	0.463	0.53 J	0.61	2/26
Thallium	NE	NE	132	165 J	235 J	3/26
Vanadium	5.2	512	0.203	0.6 J	0.6 J	1/26
Zinc	550	NE	9.17	2.3 J	11.2	26/26
	23,000	1100000	30.0	1.3 J	154 J	26/26
TOTAL PETROLEUM HYDROCARBONS						
TPH (as Diesel) (mg/kg)	NE	NE	NE	7 J	470	11/11
TPH (as Gasoline) (ug/kg)	NE	NE	NE	880	880	1/11
CONVENTIONAL						
Percent Solids (%)	NE	NE	NE	30.3	96	47/47
Total Organic Carbon (mg/kg)	NE	NE	NE	3 BG	13 BG	2/2

NOTES:

- (1) No Region IX PRG is available, value is Region 3 Residential Risk Based Concentration (RBC) based on ingestion.
 - (2) Total endrin consisting of endrin, endrin aldehyde, and endrin ketone.
 - (3) Value for chlordane
- Region IX PRG = Region IX Preliminary Remediation Goal (www.epa.gov/region09/waste/sfund/prg updated 11/01/00)
SS Background - Surface Soil background concentrations (Background Study Report, Baker 2001)

TABLE 4-7 (continued)
SURFACE SOIL DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB, CAMP LEJEUNE, NORTH CAROLINA

	Location of Maximum Detect	Region IX PRG Residential soil Exceedance Count	North Carolina Soil-to-Groundwater Concentration Exceedance Count	SS Background Mean + 2 Standard Deviations Exceedance Count
VOLATILES (ug/kg)				
2-Butanone	IR84-MW20-00	0	0	NA
Acetone	84-MW15-00	0	0	NA
Ethylbenzene	IR84-DP82-00	0	1	NA
Xylenes (total)	IR84-DP82-00	0	0	NA
SEMIVOLATILES (ug/kg)				
2-Methylnaphthalene	IR84-DP84-00	0	0	NA
Acenaphthene	IR84-DP46-00	0	1	NA
Anthracene	IR84-DP46-00	0	0	NA
Benzo(a)anthracene	IR84-DP46-00	7	8	NA
Benzo(a)pyrene	IR84-DP46-00	7	7	NA
Benzo(b)fluoranthene	IR84-DP46-00	6	0	NA
Benzo(ghi)perylene	IR84-DP46-00	NA	0	NA
Benzo(k)fluoranthene	IR84-DP46-00	1	0	NA
Carbazole	IR84-DP46-00	1	0	NA
Chrysene	IR84-DP46-00	1	1	NA
Dibenz(a,h)anthracene	IR84-DP46-00	7	6	NA
Dibenzofuran	IR84-DP46-00	0	0	NA
Dibenzothiophene	IR84-DP49-00	NA		NA
Fluoranthene	IR84-DP46-00	0	1	NA
Fluorene	IR84-DP46-00	0	0	NA
Hexachlorocyclopentadiene	IR84-DP47-00	0	0	NA
Indeno(1,2,3-cd)pyrene	IR84-DP46-00	6	1	NA
Naphthalene	IR84-DP46-00	0	2	NA
Phenanthrene	IR84-DP46-00	NA	1	NA
Pyrene	IR84-DP46-00	0	1	NA
bis(2-Ethylhexyl) phthalate	IR84-MW20-00D	0	0	NA

TABLE 4-7 (continued)
 SURFACE SOIL DATA COMPARED TO SCREENING CRITERIA
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB, CAMP LEJEUNE, NORTH CAROLINA

	Location of Maximum Detect	Region IX PRG	North Carolina Soil-to-Groundwater Concentration Exceedance Count	SS Background Mean + 2 Standard Deviations Exceedance Count
PESTICIDES/PCBs (ug/kg)				
4,4'-DDD	IR84-DP47-00	1	1	NA
4,4'-DDE	IR84-DP49-00	0	0	NA
4,4'-DDT	IR84-DP49-00	0	0	NA
Dieldrin	IR84-DP49-00	3	8	NA
Endosulfan sulfate	IR84-MW20-00	NA	0	NA
Endrin	IR84-MW20-00	0	0	NA
Endrin aldehyde	IR84-MW20-00	0	0	NA
Endrin ketone	IR84-DP81-00	0	0	NA
Heptachlor	IR84-DP47-00	6	6	NA
Heptachlor epoxide	IR84-DP47-00	4	4	NA
Methoxychlor	IR84-MW20-00	0	0	NA
PCB-1248	IR84-DP47-00	2	0	NA
PCB-1254	IR84-DP53-00	1	0	NA
PCB-1260	IR84-SB27-01	55	0	NA
alpha-BHC	IR84-DP82-00	0	0	NA
alpha-Chlordane	IR84-DP47-00	4	0	NA
gamma-Chlordane	IR84-DP47-00	4	0	NA
METALS (mg/kg)				
Aluminum	IR84-MW20-00	0	0	1
Antimony	IR84-DP49-00	0	0	13
Arsenic	IR84-DP49-00	21	0	21
Barium	IR84-DP49-00	0	0	23
Beryllium	IR84-DP46-00	0	0	0
Cadmium	IR84-DP53-00	0	0	14
Calcium	IR84-DP50-00	NA	0	11
Chromium	IR84-DP49-00	0	0	6
Cobalt	IR84-DP49-00	0	0	12
Copper	IR84-DP49-00	0	0	11
Iron	IR84-MW20-00	0	0	1
Lead	IR84-DP49-00	0	0	13
Magnesium	IR84-DP49-00	NA	0	9

TABLE 4-7 (continued)
SURFACE SOIL DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB, CAMP LEJEUNE, NORTH CAROLINA

	Location of Maximum Detect	Region IX PRG Residential soil Exceedance Count	North Carolina Soil-to-Groundwater Concentration Exceedance Count	SS Background Mean + 2 Standard Deviations Exceedance Count
METALS (mg/kg) (Cont.)				
Manganese	IR84-DP49-00	0	0	9
Mercury	IR84-DP74-00	0	0	18
Nickel	IR84-DP49-00	0	0	12
Potassium	IR84-DP76-00	NA	0	5
Selenium	IR84-DP74-00	0	0	1
Sodium	IR84-DP50-00	NA	0	3
Thallium	IR84-DP45-00	0	0	1
Vanadium	IR84-MW20-00	0	0	2
Zinc	IR84-DP49-00	0	0	13
TOTAL PETROLEUM HYDROCARBONS				
TPH (as Diesel) (mg/kg)	IR84-DP46-00	NA	NA	NA
TPH (as Gasoline) (ug/kg)	IR84-DP46-00	NA	NA	NA
CONVENTIONAL				
Percent Solids (%)	IR84-DP36-00	NA	NA	NA
Total Organic Carbon (mg/kg)	IR84-DP27-00	NA	NA	NA

NOTES:

- (1) No Region IX PRG is available, value is Region 3 ReNE = not established
 - (2) Total endrin consisting of endrin, endrin aldehyde, and NA = Not applicable
 - (3) Value for chlordane
- U = Not detected at method detection limit
- Region IX PRG = Region IX Preliminary Remediation Goal = Value is estimated
- SS Background - Surface Soil background concentrations BG = sample was diluted due to matrix interference and blank contamination.

TABLE 4-8
POSITIVE DETECTIONS IN SUBSURFACE SOILS
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID DEPTH SAMPLE DATE	84-MW15-04 7-9 07-31-2001	84-MW16-07 13-15 07-31-2001	84-MW17-07 13-15 07-31-2001	IR84-MW18-04 7-9 08-01-2001	IR84-MW19-06 11-13 08-01-2001	IR84-MW21-04 7-9 08-02-2001	IR84-MW22-02 3-5 08-03-2001
VOLATILES (ug/kg)							
1,2-Dichloroethene (total)	36 U		32 U	NA	NA	1.6 U	1.3 U
2-Butanone	100 U	NA	88 U	NA	NA	3.8 J	2.6 U
Acetone	93 U	NA	82 U	NA	NA	18 J	2 U
Benzene	160 J	NA	19 U	NA	NA	0.72 U	0.62 U
Chloroform	12 U	NA	11 U	NA	NA	0.91 U	0.98 J
Ethylbenzene	1000	NA	15 U	NA	NA	0.66 U	0.56 U
Methylene chloride	51 U	NA	270 U	NA	NA	1.4 U	1.2 U
Styrene	21 U	NA	19 U	NA	NA	0.56 U	0.47 U
Toluene	310 U	NA	11 U	NA	NA	0.59 U	0.5 U
Xylenes (total)	2800	NA	21 U	NA	NA	2.1 U	1.8 U
SEMIVOLATILES (ug/kg)							
2-Methylnaphthalene	27000	NA	57 U	NA	NA	58 U	57 U
Acenaphthene	640 U	NA	60 U	NA	NA	62 U	60 U
Anthracene	610 U	NA	58 U	NA	NA	59 U	58 U
Benzo(a)anthracene	690 U	NA	65 U	NA	NA	67 U	65 U
Benzo(a)pyrene	750 U	NA	71 U	NA	NA	73 U	71 U
Benzo(b)fluoranthene	720 U	NA	69 U	NA	NA	70 U	69 U
Benzo(ghi)perylene	690 U	NA	65 U	NA	NA	67 U	65 U
Benzo(k)fluoranthene	660 U	NA	63 U	NA	NA	64 U	63 U
Carbazole	650 U	NA	62 U	NA	NA	63 U	62 U
Chrysene	570 U	NA	54 U	NA	NA	56 U	54 U
Dibenz(a,h)anthracene	640 U	NA	60 U	NA	NA	62 U	60 U
Dibenzofuran	620 U	NA	59 U	NA	NA	61 U	59 U
Fluoranthene	700 U	NA	66 U	NA	NA	68 U	66 U
Fluorene	600 U	NA	57 U	NA	NA	58 U	57 U
Hexachlorocyclopentadiene	750 U	NA	71 U	NA	NA	73 U	71 U
Indeno(1,2,3-cd)pyrene	870 U	NA	83 U	NA	NA	85 U	83 U

TABLE 4-8 (continued)
 POSITIVE DETECTIONS IN SUBSURFACE SOILS
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA,
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID DEPTH SAMPLE DATE	84-MW15-04 7 - 9 07-31-2001	84-MW16-07 13 - 15 07-31-2001	84-MW17-07 13 - 15 07-31-2001	IR84-MW18-04 7 - 9 08-01-2001	IR84-MW19-06 11 - 13 08-01-2001	IR84-MW21-04 7 - 9 08-02-2001	IR84-MW22-02 3 - 5 08-03-2001
Naphthalene	8500	NA	58 U	NA	NA	59 U	58 U
Phenanthrene	3400 J	NA	62 U	NA	NA	63 U	62 U
Phthalic anhydride	NA	NA	NA	NA	NA	NA	NA
Pyrene	640 U	NA	60 U	NA	NA	62 U	60 U
bis(2-Chloroethoxy)methane	590 U	NA	56 U	NA	NA	57 U	56 U
bis(2-Ethylhexyl) phthalate	670 U	NA	91 J	NA	NA	150 J	1800
HERBICIDES (ug/kg)							
No exceedances							
PESTICIDES/PCBs (ug/kg)							
4,4'-DDD	2 U	NA	0.93 U	NA	NA	0.96 U	0.93 U
4,4'-DDE	1.4 U	NA	0.67 U	NA	NA	0.69 U	0.67 U
4,4'-DDT	3.2 U	NA	1.5 U	NA	NA	1.6 U	1.5 U
Dieldrin	3.7 U	NA	1.8 U	NA	NA	1.8 U	1.8 U
Endrin aldehyde	3.7 U	NA	1.8 U	NA	NA	1.8 U	1.8 U
Heptachlor	1.5 U	NA	0.72 U	NA	NA	0.74 U	0.72 U
Heptachlor epoxide	1.6 U	NA	0.78 U	NA	NA	0.8 U	0.78 U
Methoxychlor	2 U	NA	0.97 U	NA	NA	2.9 J	0.97 U
PCB-1248	5.7 U	5.7 U	5.4 U	5.6 U	5.7 U	5.6 U	5.4 U
PCB-1254	25 U	25 U	24 U	24 U	25 U	24 U	24 U
PCB-1260	54	9.2 U	8.8 U	8.9 U	9.2 U	9 U	8.8 U
alpha-Chlordane	1.5 U	NA	0.7 U	NA	NA	0.71 U	0.7 U
beta-BHC	1.1 U	NA	1.7 J	NA	NA	0.56 U	0.54 U
gamma-Chlordane	1.4 U	NA	0.67 U	NA	NA	0.69 U	0.67 U
METALS (mg/kg)							
Aluminum	2360	NA	630	NA	NA	4610	3470
Antimony	0.61 UJ	NA	0.58 UJ	NA	NA	0.59 UJ	0.58 U
Arsenic	0.62 J	NA	0.35 U	NA	NA	0.38 J	0.58 J
Barium	12.8 J	NA	0.92 J	NA	NA	8.8 U	6 J
Beryllium	0.057 U	NA	0.054 U	NA	NA	0.056 U	0.054 U
Cadmium	0.054 U	NA	0.051 U	NA	NA	0.052 U	0.051 U
Calcium	390 J	NA	71.4 J	NA	NA	971 J	385 J
Chromium	3.6	NA	1.2	NA	NA	4.1	5.7

TABLE 4-8 (continued)
POSITIVE DETECTIONS IN SUBSURFACE SOILS
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-MW15-04	84-MW16-07	84-MW17-07	IR84-MW18-04	IR84-MW19-06	IR84-MW21-04	IR84-MW22-02
DEPTH	7-9	13-15	13-15	7-9	11-13	7-9	3-5
SAMPLE DATE	07-31-2001	07-31-2001	07-31-2001	08-01-2001	08-01-2001	08-02-2001	08-03-2001
Cobalt	0.29 J	NA	0.18 U	NA	NA	0.18 U	0.29 J
Copper	0.63 J	NA	0.32 U	NA	NA	0.34 J	1.8 J
Iron	1140	NA	549	NA	NA	801	2670
Lead	3	NA	0.87	NA	NA	3.5 J	3.7
Magnesium	117 J	NA	16.4 J	NA	NA	117 J	111 J
Manganese	6.5	NA	1.5 J	NA	NA	5.2	6.2
Mercury	0.014 J	NA	0.0099 U	NA	NA	0.037 J	0.018 J
Nickel	0.51 J	NA	0.32 U	NA	NA	0.65 J	1.3 J
METALS (mg/kg) (cont.)							
Potassium	96.7 J	NA	21.3 J	NA	NA	81.6 J	92.5 J
Selenium	0.39 U	NA	0.37 U	NA	NA	0.38 U	0.37 U
Sodium	62.4 U	NA	59.2 U	NA	NA	60.6 U	59.2 U
Thallium	0.62 U	NA	0.59 U	NA	NA	0.61 U	0.59 U
Vanadium	4.2 J	NA	1.2 J	NA	NA	2.3 J	5.8 J
Zinc	2.1 J	NA	2.7	NA	NA	1.5 U	4
TOTAL PETROLEUM HYDROCARBONS							
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	NA
CONVENTIONAL							
Percent Solids (%)	80.1	80.5	84.5	82.9	80.4	82.5	84.5

NOTES:

NA = Not analyzed

U = Not detected at method detection limit

J = Value is estimated

B (inorganics) = value is less than contract required detection limit but greater than instrument detection limit

N = sample recovery not within control limits

ug/kg- micrograms per kilogram

mg/kg- milligrams per kilogram

TABLE 4-8 (continued)
 POSITIVE DETECTIONS IN SUBSURFACE SOILS
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID DEPTH SAMPLE DATE	IR84-MW23-01 1 - 3 08-03-2001	IR84-DP15-03 5 - 7 07-18-2001	IR84-DP18-02 3 - 5 07-19-2001	IR84-DP45-03 5 - 7 07-21-2001	IR84-DP46-02 3 - 5 07-21-2001	IR84-DP47-01 1 - 3 07-21-2001	IR84-DP49-01 1 - 3 07-21-2001	IR84-DP50-01 1 - 3 07-21-2001
VOLATILES (ug/kg)								
1,2-Dichloroethene (total)	2 U	93 U	NA	1.5 U	1.6 U	1.6 U	1.5 U	1.5 U
2-Butanone	3.8 U	260 U	NA	3 U	3 U	3 U	2.9 U	2.9 U
Acetone	14 J	240 U	NA	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U
Benzene	0.92 U	54 U	NA	0.72 U	0.72 U	0.72 U	0.7 U	0.69 U
Chloroform	1.2 U	32 U	NA	0.91 U	0.91 U	0.91 U	0.89 U	0.87 U
Ethylbenzene	0.89 J	140 J	NA	0.65 U	0.65 U	0.65 U	0.64 U	0.63 U
Methylene chloride	1.8 U	130 U	NA	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Styrene	2.1 J	54 U	NA	0.55 U	0.55 U	0.55 U	0.54 U	0.53 U
Toluene	0.75 U	32 U	NA	0.59 U	0.59 U	0.59 U	0.57 U	0.56 U
Xylenes (total)	4.1 J	63 U	NA	2.1 U	2.1 U	2.1 U	2.1 U	2 U
SEMIVOLATILES (ug/kg)								
2-Methylnaphthalene	72 U	9100	NA	53 U	130 U	53 U	52 U	51 U
Acenaphthene	77 U	950 J	NA	61 J	370 J	230 J	55 U	54 U
Anthracene	74 U	630 U	NA	190 J	830 J	320 J	53 U	52 U
Benzo(a)anthracene	83 U	700 U	NA	780	3000	640	60 U	58 U
Benzo(a)pyrene	90 U	770 U	NA	660	2600	590	65 U	64 U
Benzo(b)fluoranthene	87 U	740 U	NA	880	2800	720	63 U	62 U
Benzo(ghi)perylene	83 U	700 U	NA	350 J	1200	340 J	60 U	58 U
Benzo(k)fluoranthene	80 U	680 U	NA	280 J	1700	350 J	57 U	56 U
Carbazole	78 U	660 U	NA	110 J	480 J	180 J	56 U	55 U
Chrysene	69 U	590 U	NA	750	3100	710	50 U	49 U
Dibenz(a,h)anthracene	77 U	650 U	NA	98 J	430 J	100 J	55 U	54 U
Dibenzofuran	75 U	1300 J	NA	55 U	200 J	160 J	54 U	53 U
Fluoranthene	84 U	720 U	NA	1200	4800	1500	61 U	60 U
Fluorene	72 U	1500 J	NA	61 J	310 J	230 J	52 U	51 U
Hexachlorocyclopentadiene	90 U	770 U	NA	66 U	170 U	94 J	65 U	64 U
Indeno(1,2,3-cd)pyrene	110 U	890 U	NA	340 J	1200	350 J	76 U	74 U

TABLE 4-8 (continued)
 POSITIVE DETECTIONS IN SUBSURFACE SOILS
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID DEPTH SAMPLE DATE	IR84-MW23-01 1-3 08-03-2001	IR84-DP15-03 5-7 07-18-2001	IR84-DP18-02 3-5 07-19-2001	IR84-DP45-03 5-7 07-21-2001	IR84-DP46-02 3-5 07-21-2001	IR84-DP47-01 1-3 07-21-2001	IR84-DP49-01 1-3 07-21-2001	IR84-DP50-01 1-3 07-21-2001
Naphthalene	74 U	2000 J	NA	54 U	140 U	55 J	53 U	52 U
Phenanthrene	78 U	3400 J	NA	610	3100	1400	56 U	55 U
Phthalic anhydride		NA	NA	NA	NA	NA	NA	NA
Pyrene	77 U	650 U	NA	900	4100	1100	55 U	54 U
bis(2-Chloroethoxy)methane	71 U	600 U	NA	52 U	130 U	52 U	51 U	50 U
bis(2-Ethylhexyl) phthalate	81 U	690 U	NA	300 J	150 J	60 U	59 U	57 U
HERBICIDES (ug/kg)								
No exceedances								
PESTICIDES/PCBs (ug/kg)								
4,4'-DDD	5.3	9.1 J	NA	46 J	88 U	880 U	0.86 U	0.84 U
4,4'-DDE	1.7 U	3.6 U	NA	13 U	63 U	630 U	0.62 U	0.61 U
4,4'-DDT	3.9 U	8.3 U	NA	29 U	140 U	1400 U	1.4 U	1.4 U
Dieldrin	4.5 U	9.6 U	NA	33 U	170 U	1700 U	1.8	1.6 U
Endrin aldehyde	4.5 U	10 J	NA	33 U	170 U	1700 U	1.6 U	1.6 U
Heptachlor	1.8 U	3.9 U	NA	200 J	790	6900	1.6 J	2.4
Heptachlor epoxide	2 U	4.2 U	NA	63 J	200 J	730 U	0.72 U	0.7 U
Methoxychlor	2.5 U	24 J	NA	18 U	91 U	910 U	0.89 U	0.87 U
PCB-1248	6.9 U	59 U	520 U	510 U	510 U	47000	5 U	4.9 U
PCB-1254	30 U	260 U	2300 U	2200 U	5000	2200 U	22 U	21 U
PCB-1260	11 U	1100	45000	820 U	820 U	820 U	8 U	7.9 U
alpha-Chlordane	1.8 U	3.8 U	NA	620 J	2200 J	14000 J	0.64 U	0.63 U
beta-BHC	1.4 U	2.9 U	NA	10 U	51 U	510 U	0.5 U	0.49 U
gamma-Chlordane	1.7 U	3.6 U	NA	730	2600	18000	0.62 U	0.61 U
METALS (mg/kg)								
Aluminum	4900	6500	NA	3140	2770	2740	2860	3050
Antimony	0.74 U	1.3 B	NA	0.54 U	0.54 U	0.6 J	1.2 J	1.2 J
Arsenic	0.94 B	2	NA	0.37 J	0.63 J	0.7 J	1.2	1.5
Barium	21.6 B	15.1 J	NA	6.2 J	7.1 J	11.8 J	24.3	23.5
Beryllium	0.1 B	0.13 B	NA	0.051 U	0.051 U	0.064 J	0.058 J	0.051 J
Cadmium	0.065 U	0.097 J	NA	0.048 U	0.048 U	0.048 U	0.18 J	0.15 J
Calcium	1400	21500	NA	3260 J	3220 J	1640 J	2270 J	8790 J
Chromium	4.8	9.7	NA	9.9	3.5	2.8	4.1	4.8

TABLE 4-8 (continued)
POSITIVE DETECTIONS IN SUBSURFACE SOILS
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-MW23-01	IR84-DP15-03	IR84-DP18-02	IR84-DP45-03	IR84-DP46-02	IR84-DP47-01	IR84-DP49-01	IR84-DP50-01
DEPTH	1-3	5-7	3-5	5-7	3-5	1-3	1-3	1-3
SAMPLE DATE	08-03-2001	07-18-2001	07-19-2001	07-21-2001	07-21-2001	07-21-2001	07-21-2001	07-21-2001
Cobalt	0.38 B	0.68 J	NA	0.37 J	0.17 U	0.21 J	0.36 J	0.51 J
Copper	4.2	5.1	NA	3.4	3	1.8 J	22.2	25.5
Iron	1700	6140	NA	2320	1710	1680	2190	5400
Lead	9.1	11.4	NA	5	8.9	5.7	52.7	40.9
Magnesium	168 B	648	NA	147 J	124 J	101 J	178 J	200 J
Manganese	7.8	35	NA	9.7	6.4	10	18.8	40
Mercury	0.028 B	0.02 J	NA	0.013 J	0.055 J	0.023 J	0.038 J	0.026 J
Nickel	1.1 B	2.3 J	NA	1.1 J	0.91 J	0.91 J	1.8 J	3.5 J
METALS (mg/kg) (cont.)								
Potassium	111 B	134 J	NA	102 J	137 J	102 J	104 J	109 J
Selenium	0.47 U	0.82 U	NA	0.34 U	0.34 U	0.39 U	0.34 U	0.33 U
Sodium	75.4 U	63.8 U	NA	55.3 U	55.5 U	55.4 U	54.2 U	53.2 U
Thallium	0.75 U	0.64 U	NA	0.55 U	0.55 U	0.55 U	0.54 U	0.53 U
Vanadium	7.2 B	11.2	NA	5 J	4.5 J	4.4 J	4.8 J	5.6
Zinc	13.7	19.4 J	NA	16.2 J	23 J	6.8 J	42.6 J	32.7 J
TOTAL PETROLEUM HYDROCARBONS								
TPH (as Diesel) (mg/kg)	NA	5500	NA	27	61	67	19	15
TPH (as Gasoline) (ug/kg)	NA	580000	NA	19 U	220	19 U	18 U	18 U
CONVENTIONAL								
Percent Solids (%)	66.3	78.3	88.9	90.4	90.2	90.2	92.2	94.1

ug/kg- micrograms per kilogram
mg/kg- milligrams per kilogram

NOTES:

- NA = Not analyzed
- U = Not detected at method detection limit
- J = Value is estimated
- B (inorganics) = value is less than contract required detection limit but greater than instrument detection limit
- N = sample recovery not within control limits

TABLE 4-8 (continued)
 POSITIVE DETECTIONS IN SUBSURFACE SOILS
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID DEPTH SAMPLE DATE	IR84-DP51-01 1-3 07-21-2001	IR84-DP52-01 1-3 07-21-2001	IR84-DP63-01 1-3 07-22-2001	IR84-DP65-02 3-5 07-22-2001	IR84-DP74-04 7-9 08-02-2001	IR84-DP75-05 9-11 08-02-2001	IR84-DP76-04 7-9 08-02-2001	IR84-DP77-03 5-7 08-05-2001
VOLATILES (ug/kg)								
1,2-Dichloroethene (total)	1.5 U		NA	NA	1.5 U	37 U	1.6 U	1.6 U
2-Butanone	3 U	3 U	NA	NA	2.9 U	100 U	3.2 U	3.1 U
Acetone	2.3 U	2.3 U	NA	NA	2.2 U	95 U	2.5 U	2.4 U
Benzene	0.72 U	0.72 U	NA	NA	0.69 U	120 J	0.76 U	0.74 U
Chloroform	0.91 U	0.91 U	NA	NA	0.87 U	13 U	0.96 U	0.93 U
Ethylbenzene	0.65 U	0.65 U	NA	NA	0.63 U	1300	0.69 U	0.67 U
Methylene chloride	1.4 U	1.4 U	NA	NA	1.4 U	52 U	1.5 U	1.5 U
Styrene	0.55 U	0.55 U	NA	NA	0.53 U	21 U	0.59 U	0.57 U
Toluene	0.59 U	0.59 U	NA	NA	0.56 U	75 J	0.62 U	0.6 U
Xylenes (total)	2.1 U	2.1 U	NA	NA	2 U	3100	2.2 U	2.2 U
SEMIVOLATILES (ug/kg)								
2-Methylnaphthalene	53 U	53 U	NA	NA	59 U	1000	58 U	56 U
Acenaphthene	56 U	56 U	NA	NA	62 U	66 U	62 U	60 U
Anthracene	54 U	54 U	NA	NA	60 U	63 U	59 U	58 U
Benzo(a)anthracene	61 U	61 U	NA	NA	67 U	71 U	66 U	65 U
Benzo(a)pyrene	66 U	66 U	NA	NA	73 U	77 U	73 U	71 U
Benzo(b)fluoranthene	64 U	77 J	NA	NA	71 U	75 U	70 U	68 U
Benzo(ghi)perylene	65 J	83 J	NA	NA	67 U	71 U	66 U	65 U
Benzo(k)fluoranthene	59 U	59 U	NA	NA	65 U	68 U	64 U	62 U
Carbazole	57 U	58 U	NA	NA	63 U	67 U	63 U	61 U
Chrysene	51 U	57 J	NA	NA	56 U	59 U	56 U	54 U
Dibenz(a,h)anthracene	56 U	56 U	NA	NA	62 U	66 U	62 U	60 U
Dibenzofuran	55 U	55 U	NA	NA	61 U	64 U	60 U	59 U
Fluoranthene	62 U	74 J	NA	NA	68 U	72 U	68 U	66 U
Fluorene	53 U	53 U	NA	NA	59 U	80 J	58 U	56 U
Hexachlorocyclopentadiene	66 U	66 U	NA	NA	73 U	77 U	73 U	71 U
Indeno(1,2,3-cd)pyrene	77 U	77 U	NA	NA	85 U	90 U	85 U	82 U

TABLE 4-8 (continued)
 POSITIVE DETECTIONS IN SUBSURFACE SOILS
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID DEPTH SAMPLE DATE	IR84-DP51-01 1 - 3 07-21-2001	IR84-DP52-01 1 - 3 07-21-2001	IR84-DP63-01 1 - 3 07-22-2001	IR84-DP65-02 3 - 5 07-22-2001	IR84-DP74-04 7 - 9 08-02-2001	IR84-DP75-05 9 - 11 08-02-2001	IR84-DP76-04 7 - 9 08-02-2001	IR84-DP77-03 5 - 7 08-05-2001
Naphthalene	54 U	54 U	NA	NA	60 U	400 J	59 U	58 U
Phenanthrene	57 U	58 U	NA	NA	63 U	150 J	63 U	61 U
Phthalic anhydride	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	56 U	69 J	NA	NA	62 U	66 U	62 U	60 U
bis(2-Chloroethoxy)methane	52 U	52 U	NA	NA	57 U	61 U	57 U	55 U
bis(2-Ethylhexyl) phthalate	60 U	60 U	NA	NA	66 U	70 U	65 U	63 U
HERBICIDES (ug/kg)								
No exceedances								
PESTICIDES/PCBs (ug/kg)								
4,4'-DDD	5.5	4.4 U	NA	NA	0.96 U	1 U	0.95 U	0.93 U
4,4'-DDE	9.4	16	NA	NA	0.7 U	0.73 U	0.69 U	0.67 U
4,4'-DDT	30	120 J	NA	NA	1.6 U	1.7 U	1.6 U	1.5 U
Dieldrin	3.3 U	8.3 U	NA	NA	1.8 U	1.9 U	1.8 U	1.8 U
Endrin aldehyde	3.3 U	8.3 U	NA	NA	1.8 U	1.9 U	1.8 U	1.8 U
Heptachlor	1.3 U	3.4 U	NA	NA	0.74 U	0.79 U	0.74 U	0.72 U
Heptachlor epoxide	1.5 U	3.7 U	NA	NA	0.81 U	0.85 U	0.8 U	0.78 U
Methoxychlor	1.8 U	14 J	NA	NA	1 U	1.1 U	0.99 U	0.96 U
PCB-1248	5.1 U	51 U	52 U	530 U	5.6 U	5.9 U	5.6 U	5.4 U
PCB-1254	22 U	220 U	230 U	2300 U	24 U	26 U	24 U	24 U
PCB-1260	23 J	1300	2500	8900	9 U	9.5 U	8.9 U	8.7 U
alpha-Chlordane	1.3 U	9.4	NA	NA	0.72 U	0.76 U	0.71 U	0.69 U
beta-BHC	1 U	2.5 U	NA	NA	0.56 U	0.59 U	0.56 U	0.54 U
gamma-Chlordane	1.3 U	10	NA	NA	0.7 U	0.73 U	0.69 U	0.67 U
METALS (mg/kg)								
Aluminum	2000	1680	NA	NA	2990	2550	3110	7210
Antimony	0.54 U	0.54 U	NA	NA	0.6 UJ	0.63 UJ	0.59 UJ	0.58 UJ
Arsenic	0.36 J	0.57 J	NA	NA	0.4 J	0.39 U	0.53 J	0.78 J
Barium	14 J	11.7 J	NA	NA	4 U	2.9 U	4.8 U	11.2 J
Beryllium	0.051 U	0.051 U	NA	NA	0.056 U	0.059 U	0.056 U	0.12 U
Cadmium	0.061 J	0.087 J	NA	NA	0.052 U	0.055 U	0.052 U	0.051 U
Calcium	16400 J	12100 J	NA	NA	253 J	164 J	231 J	931
Chromium	2.6	2.7	NA	NA	3.3	2.2	3.6	9.3

TABLE 4-8 (continued)
POSITIVE DETECTIONS IN SUBSURFACE SOILS
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID DEPTH SAMPLE DATE	IR84-DP51-01 1-3 07-21-2001	IR84-DP52-01 1-3 07-21-2001	IR84-DP63-01 1-3 07-22-2001	IR84-DP65-02 3-5 07-22-2001	IR84-DP74-04 7-9 08-02-2001	IR84-DP75-05 9-11 08-02-2001	IR84-DP76-04 7-9 08-02-2001	IR84-DP77-03 5-7 08-05-2001
Cobalt	0.25 J	0.69 J	NA	NA	0.31 J	0.19 U	0.27 J	0.51 J
Copper	2.7 J	3.3	NA	NA	0.33 U	0.37 J	0.33 U	1.4 J
Iron	1110	1050	NA	NA	1250	155	1120	1850
Lead	10.2	12.2	NA	NA	2.7 J	3.8 J	3.1 J	5.5
Magnesium	255 J	209 J	NA	NA	105 J	40.2 J	88.6 J	229 J
Manganese	19	10.7	NA	NA	2.4	1.5 J	4.4	4.2
Mercury	0.02 J	0.01 J	NA	NA	0.013 J	0.021 J	0.019 J	0.0099 U
Nickel	1.1 J	1.5 J	NA	NA	1 J	0.48 J	0.88 J	1.3 J
METALS (mg/kg) (cont.)								
Potassium	84.3 J	76.3 J	NA	NA	86.7 J	41.5 J	65.9 J	195 J
Selenium	0.34 U	0.34 U	NA	NA	0.39 J	0.69	0.45 J	0.36 U
Sodium	55.3 U	55.4 U	NA	NA	61 U	64.4 U	60.4 U	58.8 U
Thallium	0.55 U	0.55 U	NA	NA	0.65 J	0.64 U	0.6 U	0.59 U
Vanadium	3.1 J	3.5 J	NA	NA	3.4 J	2.3 J	4 J	8.1
Zinc	11.9 J	13.5 J	NA	NA	1.5 U	1.5 U	2 J	2.7 J
TOTAL PETROLEUM HYDROCARBONS								
TPH (as Diesel) (mg/kg)	27	100	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	19 U	19 U	NA	NA	NA	NA	NA	NA
CONVENTIONAL								
Percent Solids (%)	90.5	90.3	88.6	86.9	81.9	77.6	82.8	85.1

NOTES:

NA = Not analyzed

U = Not detected at method detection limit

J = Value is estimated

B (inorganics) = value is less than contract required detection limit but greater than instrument detection limit

N = sample recovery not within control limits

ug/kg- micrograms per kilogram
mg/kg- milligrams per kilogram

TABLE 4-8 (continued)
 POSITIVE DETECTIONS IN SUBSURFACE SOILS
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID DEPTH SAMPLE DATE	IR84-DP78-03 5-7 08-05-2001	IR84-DP79-02 3-5 08-05-2001	IR84-DP79-02D 3-5 08-05-2001	IR84-DP80-02 3-5 08-05-2001	IR84-DP81-04 7-9 08-05-2001	IR84-DP82-04 7-9 08-05-2001	IR84-DP83-03 5-7 08-05-2001	IR84-SB01-02 3-5 08-02-2001
VOLATILES (ug/kg)								
1,2-Dichloroethene (total)	1.4 U	1.6 U	1.6 U	1.4 U	1.5 U	91 J	1.5 U	1.4 U
2-Butanone	2.7 U	3.1 U	3.1 U	2.7 U	2.9 U	76 U	2.8 U	2.7 U
Acetone	2.1 U	2.4 U	2.4 U	2.1 U	2.2 U	940 U	2.2 U	2.1 U
Benzene	0.65 U	0.68 U	0.74 U	0.64 U	0.7 U	16 U	0.68 U	0.65 U
Chloroform	0.82 U	0.86 U	0.93 U	0.81 U	0.88 U	9.4 U	0.86 U	0.82 U
Ethylbenzene	0.59 U	0.62 U	0.67 U	0.58 U	0.63 U	250	0.62 U	0.59 U
Methylene chloride	1.3 J	1.4 U	1.5 U	1.3 U	1.4 U	38 U	1.4 U	1.3 U
Styrene	0.5 U	0.52 U	0.57 U	0.49 U	0.53 U	16 U	0.52 U	0.50 U
Toluene	0.53 U	0.56 U	0.6 U	0.52 U	0.57 U	9.4 U	0.55 U	0.53 U
Xylenes (total)	1.9 U	2 U	2.2 U	1.9 U	2 U	95 J	2 U	1.9 U
SEMIVOLATILES (ug/kg)								
2-Methylnaphthalene	57 U	52 U	56 U	52 U	55 U	50 U	51 U	54 U
Acenaphthene	61 U	56 U	60 U	55 U	59 U	53 U	54 U	58 U
Anthracene	59 U	53 U	58 U	53 U	56 U	51 U	52 U	56 U
Benzo(a)anthracene	66 U	60 U	65 U	59 U	63 U	57 U	58 U	62 U
Benzo(a)pyrene	72 U	65 U	70 U	65 U	69 U	63 U	63 U	68 U
Benzo(b)fluoranthene	69 U	63 U	68 U	63 U	67 U	60 U	61 U	68 J
Benzo(ghi)perylene	66 U	60 U	65 U	59 U	63 U	57 U	58 U	62 U
Benzo(k)fluoranthene	63 U	58 U	62 U	57 U	61 U	55 U	56 U	60 U
Carbazole	62 U	57 U	61 U	56 U	60 U	54 U	55 U	59 U
Chrysene	55 U	50 U	54 U	50 U	53 U	48 U	49 U	52 U
Dibenz(a,h)anthracene	61 U	56 U	60 U	55 U	59 U	53 U	54 U	58 U
Dibenzofuran	60 U	55 U	59 U	54 U	58 U	52 U	53 U	57 U
Fluoranthene	67 U	61 U	66 U	60 U	64 U	58 U	59 U	63 U
Fluorene	57 U	52 U	56 U	52 U	55 U	50 U	51 U	54 U
Hexachlorocyclopentadiene	72 U	65 U	70 U	65 U	69 U	63 U	63 U	68 U
Indeno(1,2,3-cd)pyrene	84 U	76 U	82 U	76 U	81 U	73 U	74 U	79 U

TABLE 4-8 (continued)
 POSITIVE DETECTIONS IN SUBSURFACE SOILS
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID DEPTH SAMPLE DATE	IR84-DP78-03 5-7 08-05-2001	IR84-DP79-02 3-5 08-05-2001	IR84-DP79-02D 3-5 08-05-2001	IR84-DP80-02 3-5 08-05-2001	IR84-DP81-04 7-9 08-05-2001	IR84-DP82-04 7-9 08-05-2001	IR84-DP83-03 5-7 08-05-2001	IR84-SB01-02 3-5 08-02-2001
Naphthalene	59 U	53 U	58 U	53 U	56 U	51 U	52 U	56 U
Phenanthrene	62 U	57 U	61 U	56 U	60 U	54 U	55 U	59 U
Phthalic anhydride	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	61 U	56 U	60 U	55 U	59 U	53 U	54 U	58 U
bis(2-Chloroethoxy)methane	56 U	51 U	55 U	51 U	54	49 U	50 U	53 U
bis(2-Ethylhexyl) phthalate	65 U	730 J	63 U	160 J	62 U	56 U	57 U	61 U
HERBICIDES (ug/kg)								
No exceedances								
PESTICIDES/PCBs (ug/kg)								
4,4'-DDD	0.94 U	0.86 U	0.93 U	0.85 U	0.91 U	0.82 U	0.83 U	0.9 U
4,4'-DDE	0.68 U	0.62 U	0.67 U	0.62 U	0.66 U	0.59 U	0.6 U	0.65 U
4,4'-DDT	1.6 U	1.4 U	1.5 U	1.4 U	1.5 U	1.4 U	1.4 U	1.5 U
Dieldrin	1.8 U	1.6 U	1.8 U	1.6 U	1.7 U	1.6 U	1.6 U	2.4
Endrin aldehyde	1.8 U	1.6 U	1.8 U	1.6 U	1.7 U	1.6 U	1.6 U	1.7 U
Heptachlor	0.73 U	0.67 U	0.72 U	0.66 U	0.7 U	0.64 U	0.64 U	0.69 U
Heptachlor epoxide	0.79 U	0.72 U	0.78 U	0.71 U	0.76 U	0.69 U	0.7 U	0.75 U
Methoxychlor	0.98 U	0.89 U	0.96 U	0.89 U	0.94 U	0.85 U	0.86 U	0.93 U
PCB-1248	5.5 U	5 U	5.4 U	5 U	5.3 U	4.8 U	4.9 U	5.2 U
PCB-1254	24 U	22 U	23 U	22 U	23 U	21 U	21 U	23 U
PCB-1260	8.9 U	8.1 U	8.7 U	8 U	8.5 U	13 J	7.8 U	77
alpha-Chlordane	0.71 U	0.64 U	0.69 U	0.64 U	0.68 U	0.61 U	0.62 U	0.67 U
beta-BHC	0.55 U	0.5 U	0.54 U	0.5 U	0.53 U	0.48 U	0.49 U	0.52 U
gamma-Chlordane	0.68 U	0.62 U	0.67 U	0.62 U	0.66 U	0.59 U	0.6 U	0.65 U
METALS (mg/kg)								
Aluminum	5540	2090	5390	2090	2700	589	1110	3930
Antimony	0.59 UJ	0.53 UJ	0.58 UJ	0.53 UJ	0.56 UJ	0.51 UJ	0.52 UJ	0.56 U
Arsenic	1.4	0.48 J	2	1.1	0.35 U	0.31 U	0.33 J	1.6
Barium	11 J	6.5 J	13.3 J	4.2 J	2.6 J	1.5 J	1.2 J	8.4 U
Beryllium	0.099 U	0.085 U	0.13 U	0.078 U	0.12 U	0.063 U	0.066 U	0.052 U
Cadmium	0.051 U	0.047 U	0.051 U	0.046 U	0.049 U	0.045 U	0.045 U	0.049 U
Calcium	846	341 J	498 J	194 J	854	3870	167 J	23900 J
Chromium	7.9	8.3	6.7	4.7	2	1.4	1.6	5.5

TABLE 4-8 (continued)
POSITIVE DETECTIONS IN SUBSURFACE SOILS
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID DEPTH SAMPLE DATE	IR84-DP78-03 5 - 7 08-05-2001	IR84-DP79-02 3 - 5 08-05-2001	IR84-DP79-02D 3 - 5 08-05-2001	IR84-DP80-02 3 - 5 08-05-2001	IR84-DP81-04 7 - 9 08-05-2001	IR84-DP82-04 7 - 9 08-05-2001	IR84-DP83-03 5 - 7 08-05-2001	IR84-SB01-02 3 - 5 08-02-2001
Cobalt	0.3 J	0.18 J	0.55 J	0.27 J	0.17 U	0.16 J	0.16 U	0.31 J
Copper	1.1 J	1.2 J	1.6 J	0.52 J	0.4 J	0.46 J	0.28 U	1.3 J
Iron	3320	2080	5220	1740	503	475	1340	1970
Lead	5.4	3	4.2	2.3	1.6	3.5	1.4	5.4 J
Magnesium	149 J	56.4 J	169 J	78.7 J	33.9 J	79 J	25.8 J	406 J
Manganese	3.2	11.4	7.6	3.5	0.48 J	3	1.1 J	12.8
Mercury	0.01 U	0.0092 J	0.014 J	0.0091 U	0.0097 U	0.0088 U	0.0089 U	0.0095 U
Nickel	1 J	0.96 J	1.6 J	0.66 J	0.44 J	0.51 J	0.42 J	1.1 J
METALS (mg/kg) (cont.)								
Potassium	161 J	44.6 U	138 J	73.2 U	32.9 U	42.3 U	59.7 U	187 J
Selenium	0.37 U	0.34 U	0.36 U	0.33 U	0.36 U	0.32 U	0.33 U	0.44 J
Sodium	59.8 U	54.6 U	58.7 U	54 U	57.5 U	52.1 U	52.7 U	56.7 U
Thallium	0.6 U	0.55 U	0.59 U	0.54 U	0.67 J	0.52 U	0.53 U	0.57 U
Vanadium	9.7	4.5 J	11.4	5.1 J	1.4 J	1.1 J	2.2 J	7.1
Zinc	2.9 J	2.6 J	4.8 J	1.4 J	1.8 J	3.9 J	1.3 U	4.2
TOTAL PETROLEUM HYDROCARBONS								
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
CONVENTIONAL								
Percent Solids (%)	83.6	91.6	85.1	92.6	86.9	96	94.8	88.2

ug/kg- micrograms per kilogram
mg/kg- milligrams per kilogram

NOTES:

- NA = Not analyzed
- U = Not detected at method detection limit
- J = Value is estimated
- B (inorganics) = value is less than contract required detection limit but greater than instrument detection limit
- N = sample recovery not within control limits

TABLE 4-8 (continued)
 POSITIVE DETECTIONS IN SUBSURFACE SOILS
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID DEPTH SAMPLE DATE	IR84-SB02-02 3 - 5 08-02-2001	IR84-SB03-02 3 - 5 08-02-2001	IR84-SB04-02 3 - 5 08-02-2001	IR84-SB05-01 1 - 3 08-03-2001	IR84-SB06-01 1 - 3 08-02-2001	IR84-SB06-01D 1 - 3 08-02-2001	IR84-SB07-01 1 - 3 08-02-2001	IR84-SB08-01 1 - 3 08-02-2001
VOLATILES (ug/kg)								
1,2-Dichloroethene (total)	1.3 U	1.6 U	1.3 U	1.7 U	1.6 U	1.5 U	1.6 U	1.4 U
2-Butanone	2.6 U	3.2 U	2.6 U	3.4 U	3.1 U	2.9 U	3.1 U	2.8 U
Acetone	2.0 U	2.3 U	2.0 U	2.6 U	2.4 U	2.2 U	2.4 U	2.2 U
Benzene	0.62 U	0.76 U	0.62 U	0.81 U	0.74 U	0.69 U	0.75 U	0.67 U
Chloroform	0.78 U	0.96 U	0.78 U	2.3 J	5.7 U	1.5 J	0.94 U	0.85 U
Ethylbenzene	0.56 U	0.69 U	0.56 U	0.73 U	0.67 U	0.63 U	0.68 U	0.61 U
Methylene chloride	1.2 U	1.5 U	1.2 U	1.6 U	1.5 U	1.4 U	1.5 U	1.3 U
Styrene	0.48 U	0.58 U	0.48 U	0.62 U	0.57 U	0.53 U	0.57 U	0.52 U
Toluene	0.50 U	0.62 U	0.50 U	0.66 U	0.60 U	0.56 U	0.61 U	0.55 U
Xylenes (total)	1.8 U	2.2 U	1.8 U	2.4 U	2.2 U	2.0 U	2.2 U	2.0 U
SEMIVOLATILES (ug/kg)								
2-Methylnaphthalene	53 U	61 U	53 U	60 U	53 U	53 U	54 U	53 U
Acenaphthene	56 U	65 U	56 U	63 U	57 U	56 U	57 U	57 U
Anthracene	54 U	62 U	54 U	61 U	54 U	54 U	55 U	54 U
Benzo(a)anthracene	60 U	70 U	61 U	68 U	61 U	60 U	62 U	61 U
Benzo(a)pyrene	66 U	76 U	66 U	75 U	67 U	66 U	68 U	67 U
Benzo(b)fluoranthene	63 U	74 U	64 U	72 U	64 U	64 U	65 U	64 U
Benzo(ghi)perylene	60 U	70 U	61 U	68 U	61 U	60 U	62 U	61 U
Benzo(k)fluoranthene	58 U	67 U	59 U	66 U	59 U	58 U	60 U	59 U
Carbazole	57 U	66 U	58 U	65 U	58 U	57 U	59 U	58 U
Chrysene	50 U	59 J	51 U	57 U	51 U	50 U	52 U	51 U
Dibenz(a,h)anthracene	56 U	65 U	56 U	63 U	57 U	56 U	57 U	57 U
Dibenzofuran	55 U	63 U	55 U	62 U	56 U	55 U	56 U	55 U
Fluoranthene	61 U	82 J	62 U	70 U	62 U	61 U	63 U	62 U
Fluorene	53 U	61 U	53 U	60 U	53 U	53 U	54 U	53 U
Hexachlorocyclopentadiene	66 U	76 U	66 U	75 U	67 U	66 U	68 U	67 U
Indeno(1,2,3-cd)pyrene	77 U	89 U	77 U	87 U	78 U	77 U	79 U	78 U

TABLE 4-8 (continued)
POSITIVE DETECTIONS IN SUBSURFACE SOILS
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID DEPTH SAMPLE DATE	IR84-SB02-02 3-5 08-02-2001	IR84-SB03-02 3-5 08-02-2001	IR84-SB04-02 3-5 08-02-2001	IR84-SB05-01 1-3 08-03-2001	IR84-SB06-01 1-3 08-02-2001	IR84-SB06-01D 1-3 08-02-2001	IR84-SB07-01 1-3 08-02-2001	IR84-SB08-01 1-3 08-02-2001
Naphthalene	54 U	62 U	54 U	61 U	54 U	54 U	55 U	54 U
Phenanthrene	57 U	66 U	58 U	65 U	57 U	57 U	59 U	58 U
Phthalic anhydride	NA	120 NJ	170 NJ	NA	NA	NA	NA	NA
Pyrene	56 U	91 J	56 U	63 U	57 U	56 U	57 U	57 U
bis(2-Chloroethoxy)methane	51 U	60 U	52 U	58 U	52 U	51 U	53 U	52 U
bis(2-Ethylhexyl) phthalate	59 U	69 U	60 U	67 U	60 U	59 U	61 U	60 U
HERBICIDES (ug/kg)								
No exceedances								
PESTICIDES/PCBs (ug/kg)								
4,4'-DDD	0.86 U	2.4	0.87 U	1.7 J	1.9 J	0.87 UJ	0.89 U	0.88 U
4,4'-DDE	2.2	4.4	0.63 U	0.71 U	2 J	0.62 UJ	0.64 U	0.63 U
4,4'-DDT	2.5	8.7	1.4 U	1.6 U	4.3	1.4 UJ	1.5 U	1.4 U
Dieldrin	1.6 U	1.9 U	1.7 U	1.9 U	2 J	1.6 UJ	1.7 U	1.7 U
Endrin aldehyde	1.6 U	1.9 U	1.7 U	1.9 U	1.7 U	1.6 U	1.7 U	1.7 U
Heptachlor	0.67 U	0.77 U	0.68 U	3.1	0.68 U	0.67 U	0.69 U	0.68 U
Heptachlor epoxide	0.72 U	0.84 U	0.73 U	0.82 U	0.73 U	0.72 U	0.74 U	0.73 U
Methoxychlor	0.9 U	1 U	0.91 U	1 U	0.91 U	0.9 U	0.92 U	0.91 U
PCB-1248	5 U	5.8 U	5.1 U	5.7 U	5.1 U	5 U	5.2 U	5.1 U
PCB-1254	22 U	25 U	22 U	25 U	22 U	22 U	23 U	22 U
PCB-1260	8.1 U	40 J	8.2 U	9.2 U	29 J	8.1 U	8.3 U	8.2 U
alpha-Chlordane	0.65 U	5.9 J	0.65 U	28 J	22 J	3.3 J	0.66 U	0.65 U
beta-BHC	0.5 U	0.58 U	0.51 U	0.57 U	0.51 U	0.5 U	0.52 U	0.51 U
gamma-Chlordane	0.62 U	6.3	0.63 U	33	26	3.3 J	0.64 U	0.63 U
METALS (mg/kg)								
Aluminum	7100	1660	2610	2810	2590	2830	2750	2570
Antimony	0.54 UJ	0.62 UJ	0.54 UJ	0.61 U	0.91 J	0.65 J	0.6 J	0.69 J
Arsenic	1.6	1.1 J	0.89 J	0.59 J	1.4	0.86 J	0.87 J	0.8 J
Barium	56.6 U	9.4 U	5.8 U	10.7 J	5.5 U	29.1 U	6.3 U	6.3 U
Beryllium	0.05 U	0.058 U	0.051 U	0.057 U	0.051 U	0.05 U	0.052 U	0.051 U
Cadmium	0.047 U	0.12 J	0.048 U	0.053 U	0.05 J	0.047 U	0.048 U	0.048 U
Calcium	377 J	66800 J	795	1150	1820 J	741 J	699 J	447 J
Chromium	6.2	3.8	2.8	3.2	3	3	3.2	3.1

TABLE 4-8 (continued)
POSITIVE DETECTIONS IN SUBSURFACE SOILS
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID DEPTH SAMPLE DATE	IR84-SB02-02 3 - 5 08-02-2001	IR84-SB03-02 3 - 5 08-02-2001	IR84-SB04-02 3 - 5 08-02-2001	IR84-SB05-01 1 - 3 08-03-2001	IR84-SB06-01 1 - 3 08-02-2001	IR84-SB06-01D 1 - 3 08-02-2001	IR84-SB07-01 1 - 3 08-02-2001	IR84-SB08-01 1 - 3 08-02-2001
Cobalt	0.4 J	0.46 J	0.27 J	0.26 J	0.22 J	0.24 J	0.21 J	0.22 J
Copper	1.8 J	1.6 J	1.6 J	2.1 J	4.1	2 J	0.67 J	0.8 J
Iron	4430	1490	1780	1800	1830	1670	1840	1560
Lead	3.3 J	10 J	5 J	4	10.5 J	4.6 J	3.9 J	3.7 J
Magnesium	118 J	943	83.7 J	137 J	111 J	123 J	105 J	92.3 J
Manganese	8.2	50.5	8.1	7.6	8.3	7.6	6.2	7.3
Mercury	0.015 J	0.017 J	0.02 J	0.01 U	0.029 J	0.0092 U	0.017 J	0.013 J
Nickel	1.9 J	2 J	0.91 J	0.88 J	1 J	1 J	0.85 J	0.83 J
METALS (mg/kg) (cont.)								
Potassium	79.5 J	182 J	67.3 J	79.8 U	78.2 J	88.1 J	81.7 J	93.1 J
Selenium	0.34 U	0.73	0.46 J	0.39 U	0.34 U	0.42 J	0.48 J	0.34 U
Sodium	54.7 U	89.7 J	55.3 U	62.2 U	55.5 U	54.8 U	56.3 U	55.5 U
Thallium	0.86 J	0.9 J	0.55 U	0.62 U	0.56 U	0.55 U	0.56 U	0.64 J
Vanadium	9.6	3.8 J	4.1 J	4.5 J	4.1 J	4.2 J	5.4 J	4.2 J
Zinc	2.6	33.2	3.2	5.7	11.4	6.8	3.5	4.4
TOTAL PETROLEUM HYDROCARBONS								
TPH (as Diesel) (mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
CONVENTIONAL								
Percent Solids (%)	91.4	78.8	90.4	80.4	90.1	91.3	88.8	90.1

ug/kg- micrograms per kilogram
mg/kg- milligrams per kilogram

NOTES:

- NA = Not analyzed
- U = Not detected at method detection limit
- J = Value is estimated
- B (inorganics) = value is less than contract required detection limit but greater than instrument detection limit
- N = sample recovery not within control limits

TABLE 4-9
SUBSURFACE SOIL DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

Region IX PRG Residential soil (units as indicated)	North Carolina Soil-to-Groundwater Concentration (units as indicated)	Background Mean + 2 Standard Deviations (mg/kg)	Minimum Detected	Maximum Detected	Frequency of Detection	Location of Maximum Detect
VOLATILES (ug/kg)	(ug/kg)					
1,2-Dichloroethene (total)	380	NE	91 J	91 J	1/24	IR84-DP82-04
2-Butanone	7300000	NE	3.8 J	3.8 J	1/24	IR84-MW21-04
Acetone	1600000	NE	14 J	18 J	2/24	IR84-MW21-04
Benzene	670	NE	120 J	160 J	2/24	84-MW15-04
Chloroform	240	NE	0.98 J	2.3 J	3/24	IR84-SB05-01
Ethylbenzene	230000	NE	0.89 J	1300	5/24	IR84-DP75-05
Methylene chloride	8900	NE	1.3 J	1.3 J	1/24	IR84-DP78-03
Styrene	1700000	NE	2.1 J	2.1 J	1/24	IR84-MW23-01
Toluene	520000	NE	75 J	75 J	1/24	IR84-DP75-05
Xylenes (total)	210000	NE	4.1 J	3100	4/24	IR84-DP75-05
SEMIVOLATILES (ug/kg)	(ug/kg)					
2-Methylnaphthalene	1600000	NE	1000	27000	3/33	84-MW15-04
Acenaphthene	3700000	NE	61 J	950 J	4/33	IR84-DP15-03
Anthracene	22000000	NE	190 J	830 J	3/33	IR84-DP46-02
Benzo(a)anthracene	620	NE	640	3000	3/33	IR84-DP46-02
Benzo(a)pyrene	62	NE	590	2600	3/33	IR84-DP46-02
Benzo(b)fluoranthene	620	NE	68 J	2800	5/33	IR84-DP46-02
Benzo(ghi)perylene	NE	NE	65 J	1200	5/33	IR84-DP46-02
Benzo(k)fluoranthene	6200	NE	280 J	1700	3/33	IR84-DP46-02
Carbazole	24000	NE	110 J	480 J	3/33	IR84-DP46-02
Chrysene	62000	NE	57 J	3100	5/33	IR84-DP46-02
Dibenz(a,h)anthracene	62	NE	98 J	430 J	3/33	IR84-DP46-02
Dibenzofuran	290000	NE	160 J	1300 J	3/33	IR84-DP15-03
Fluoranthene	2300000	NE	74 J	4800	5/33	IR84-DP46-02
Fluorene	2600000	NE	61 J	1500 J	5/33	IR84-DP15-03
Hexachlorocyclopentadiene	420000	NE	94 J	94 J	1/33	IR84-DP47-01
Indeno(1,2,3-cd)pyrene	620	NE	340 J	1200	3/33	IR84-DP46-02
Naphthalene	56000	NE	55 J	8500	4/33	84-MW15-04
Phenanthrene	NE	NE	150 J	3400 J	6/33	84-MW15-04, IR84-DP15-03
Phthalic anhydride	NE	NE	120 NJ	170 NJ	2/2	IR84-SB04-02
Pyrene	2300000	NE	69 J	4100	5/33	IR84-DP46-02
bis(2-Chloroethoxy)methane	NE	NE	54	54	1/33	IR84-DP81-04
bis(2-Ethylhexyl) phthalate	35000	NE	91 J	1800	7/33	IR84-MW22-02

TABLE 4-9 (continued)
SUBSURFACE SOIL DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

Region IX PRG Residential soil (units as indicated)	North Carolina Soil-to-Groundwater Concentration (units as indicated)	Background Mean + 2 Standard Deviations (mg/kg)	Minimum Detected	Maximum Detected	Frequency of Detection	Location of Maximum Detect
PESTICIDES/PCBs (ug/kg)						
4,4'-DDD	(ug/kg) 2400	NE	1.7 J	46 J	7/33	IR84-DP45-03
4,4'-DDE	1700	NE	2 J	16	5/33	IR84-DP52-01
4,4'-DDT	1700	NE	2.5	120 J	5/33	IR84-DP52-01
Dieldrin	30	NE	1.8	2.4	3/33	IR84-SB01-02
Endrin aldehyde	18,000 (2)	NE	10 J	10 J	1/33	IR84-DP15-03
Heptachlor	110	NE	1.6 J	6900	7/33	IR84-DP47-01
PESTICIDES/PCBs (ug/kg)						
Heptachlor epoxide	53	NE	63 J	200 J	2/33	IR84-DP46-02
Methoxychlor	310000	NE	2.9 J	24 J	3/33	IR84-DP15-03
PCB-1248	220	NE	47000	47000	1/39	IR84-DP47-01
PCB-1254	220	NE	5000	5000	1/39	IR84-DP46-02
PCB-1260	220	NE	13 J	45000	11/39	IR84-DP18-02
alpha-Chlordane	1,600 (3)	NE	3.3 J	14000 J	8/33	IR84-DP47-01
beta-BHC	90	NE	1.7 J	1.7 J	1/33	84-MW17-07
gamma-Chlordane	1,600 (3)	NE	3.3 J	18000	8/33	IR84-DP47-01
METALS (mg/kg)						
Aluminum	76000	(mg/kg) 14,538	589	7210	33/33	IR84-DP77-03
Antimony	31	0.597	0.6 J	1.3 B	8/33	IR84-DP15-03
Arsenic	0.39	1.62	0.33 J	2	29/33	R84-DP15-03, IR84-DP79-02
Barium	5400	23.9	0.92 J	24.3	21/33	IR84-DP49-01
Beryllium	150	0.140	0.051 J	0.13 B	5/33	IR84-DP15-03
Cadmium	37	0.0136	0.05 J	0.18 J	7/33	IR84-DP49-01
Calcium	NE	426	71.4 J	66800 J	33/33	IR84-SB03-02
Chromium	30	17.1	1.2	9.9	33/33	IR84-DP45-03
Cobalt	4700	1.26	0.16 J	0.69 J	27/33	IR84-DP52-01
Copper	2900	4.31	0.34 J	25.5	29/33	IR84-DP50-01
Iron	23000	5,881	155	6140	33/33	IR84-DP15-03
Lead	400	8.16	0.87	52.7	33/33	IR84-DP49-01

TABLE 4-9 (continued)
SUBSURFACE SOIL DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

	Region IX PRG Residential soil (units as indicated)	North Carolina Soil-to-Groundwater Concentration (units as indicated)	Background Mean + 2 Standard Deviations (mg/kg)	Minimum Detected	Maximum Detected	Frequency of Detection	Location of Maximum Detect
METALS (mg/kg) (Cont.)							
Magnesium	(mg/kg) NE	(mg/kg) NE	(mg/kg) 361	16.4 J	943	33/33	IR84-SB03-02
Manganese	1800	65200	8.90	0.48 J	50.5	33/33	IR84-SB03-02
Mercury	23	15.4	0.0937	0.0092 J	0.055 J	23/33	IR84-DP46-02
Nickel	1600	NE	4.29	0.42 J	3.5 J	32/33	IR84-DP50-01
Potassium	NE	NE	373	21.3 J	195 J	27/33	IR84-DP77-03
Selenium	390	12200	0.687	0.39 J	0.73	8/33	IR84-SB03-02
Sodium	NE	NE	83.3	89.7 J	89.7 J	1/33	IR84-SB03-02
Thallium	5.5	512	0.225	0.64 J	0.9 J	5/33	IR84-SB03-02
Vanadium	550	NE	19.7	1.1 J	11.4	33/33	IR84-DP79-02D
Zinc	23000	1100000	8.83	1.4 J	42.6 J	29/33	IR84-DP49-01
TOTAL PETROLEUM HYDROCARBONS							
TPH (as Diesel) (mg/kg)	NE	NE	NE	15	5500	8/8	IR84-DP15-03
TPH (as Gasoline) (ug/kg)	NE	NE	NE	220	580000	2/8	IR84-DP15-03
CONVENTIONAL							
Percent Solids (%)	NE	NE	NE	66.3	96	39/39	IR84-DP82-04

NOTES:

(1) No Region IX PRG is available, value is Region 3 Residential Risk Based Concentration (RBC) based on ingestion.

(2) Total endrin consisting of endrin, endrin aldehyde, and endrin ketone.

(3) Value for chlordane

Region IX PRG = Region 9 Preliminary Remediation Goal (www.epa.gov/region09/waste/sfund/prg updated 11/01/00)

B (inorganics) = value is less than contract required detection limit but greater than instrument detection limit

NE = not established
 NA = Not applicable
 U = Not detected at method d
 J = Value is estimated
 N = sample recovery not with

TABLE 4-9 (continued)
SUBSURFACE SOIL DATA COMPARED TO SCREENING CRITERIA
REMEDIATION INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

	Region IX PRG	North Carolina Soil-to-Groundwater Concentration Exceedance Count	Background Mean + 2 Standard Deviations Exceedance Count
VOLATILES (ug/kg)			
1,2-Dichloroethene (total)	0	0	NA
2-Butanone	0	0	NA
Acetone	0	0	NA
Benzene	0	2	NA
Chloroform	0	2	NA
Ethylbenzene	0	3	NA
Methylene chloride	0	0	NA
Styrene	0	0	NA
Toluene	0	0	NA
Xylenes (total)	0	0	NA
SEMIVOLATILES (ug/kg)			
2-Methylnaphthalene	0	0	NA
Acenaphthene	0	0	NA
Anthracene	0	0	NA
Benzo(a)anthracene	3	3	NA
Benzo(a)pyrene	3	3	NA
Benzo(b)fluoranthene	3	0	NA
Benzo(ghi)perylene	0	0	NA
Benzo(k)fluoranthene	0	0	NA
Carbazole	0	0	NA
Chrysene	0	0	NA
Dibenz(a,h)anthracene	3	1	NA
Dibenzofuran	0	0	NA
Fluoranthene	0	0	NA
Fluorene	0	0	NA
Hexachlorocyclopentadiene	0	0	NA
Indeno(1,2,3-cd)pyrene	1	0	NA
Naphthalene	0	2	NA
Phenanthrene	0	0	NA
Phthalic anhydride	0	0	NA
Pyrene	0	0	NA
bis(2-Chloroethoxy)methane	0	0	NA
bis(2-Ethylhexyl) phthalate	0	0	NA

TABLE 4-9 (continued)
SUBSURFACE SOIL DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

	Region IX PRG	North Carolina Soil-to-Groundwater Concentration Exceedance Count	Background Mean + 2 Standard Deviations Exceedance Count
PESTICIDES/PCBs (ug/kg)			
4,4'-DDD	0	0	NA
4,4'-DDE	0	0	NA
4,4'-DDT	0	0	NA
Dieldrin	0	3	NA
Endrin aldehyde	0	0	NA
Heptachlor	3	4	NA
PESTICIDES/PCBs (ug/kg)			
Heptachlor epoxide	2	2	NA
Methoxychlor	0	0	NA
PCB-1248	1	0	NA
PCB-1254	1	0	NA
PCB-1260	5	0	NA
alpha-Chlordane	2	0	NA
beta-BHC	0	0	NA
gamma-Chlordane	2	0	NA
METALS (mg/kg)			
Aluminum	0	0	0
Antimony	0	0	8
Arsenic	25	0	2
Barium	0	0	3
Beryllium	0	0	0
Cadmium	0	0	7
Calcium	0	0	23
Chromium	0	0	0
Cobalt	0	0	0
Copper	0	0	9
Iron	0	0	1
Lead	0	0	9

TABLE 4-9 (continued)
SUBSURFACE SOIL DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

	Region IX PRG	North Carolina Soil-to-Groundwater Concentration Exceedance Count	Background Mean + 2 Standard Deviations Exceedance Count
METALS (mg/kg) (Cont.)			
Magnesium	0	0	3
Manganese	0	0	10
Mercury	0	0	0
Nickel	0	0	2
Potassium	0	0	0
Selenium	0	0	2
Sodium	0	0	1
Thallium	0	0	5
Vanadium	0	0	0
Zinc	0	0	11
TOTAL PETROLEUM HYDROCARBO			
TPH (as Diesel) (mg/kg)	NA	NA	NA
TPH (as Gasoline) (ug/kg)	NA	NA	NA
CONVENTIONAL			
Percent Solids (%)	NA	NA	NA

NOTES:

- (1) No Region IX PRG is available, value i
- (2) Total endrin consisting of endrin, endrin
- (3) Value for chlordane detection limit
- Region IX PRG = Region 9 Preliminary Re
- B (inorganics) = value is less than contract in control limits

TABLE 4-10
POSITIVE DETECTIONS IN TEST PIT SOIL SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID B_DEPTH SAMPLE DATE	Minimum Non-Detect	Maximum Non-Detect	Minimum Detected	Maximum Detected	Frequency of Detection	Arithmetic Mean Positive Detects	Median Positive Detects	Arithmetic Mean Half Non-Detects	Location of Maximum Detect
PCBs (ug/kg)									
PCB-1016	5.6 U	59 U	0	0	0 0/6	0	0	0	7.975
PCB-1221	20 U	210 U	0	0	0 0/6	0	0	0	28.4167
PCB-1232	12 U	120 U	0	0	0 0/6	0	0	0	16.3333
PCB-1242	19 U	200 U	0	0	0 0/6	0	0	0	27
PCB-1248	4.9 U	51 U	0	0	0 0/6	0	0	0	6.8833
PCB-1254	21 U	220 U	0	0	0 0/6	0	0	0	29.8333
PCB-1260	0	0	56	990	6/6	394.3333	315	394.3333	IR84-TP03A
CONVENTIONAL									
Percent Solids (%)	0	0	1	1	1/1	1	1	1	IR84-TP01A
	0	0	81.3	94.5	6/6	88.4	89.35	88.4	IR84-TP02B

TABLE 4-10 (Continued)
 POSITIVE DETECTIONS IN TEST PIT SOIL SAMPLES
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-TP01A	IR84-TP01B	IR84-TP02A	IR84-TP02B	IR84-TP03A	IR84-TP03B
B_DEPTH	0	0	0	0	0	0
SAMPLE DATE	07-23-2001	07-23-2001	07-23-2001	07-23-2001	07-23-2001	07-23-2001
PCBs (ug/kg)						
PCB-1260	500	130	110 J	56	990	580
CONVENTIONAL						
Percent Solids (%)	90	88.7	93.4	94.5	81.3	82.5

Notes

ug/kg = micrograms per kilogram

TABLE 4-11
POSITIVE DETECTIONS IN GW SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
MCB, CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID SAMPLE DATE	AST781-GW03-98B 4/23/98	AST781-GW04-98B 4/23/98	AS1781-GW07-98B 4/22/98	AST781-GW08-98B 4/22/98	AST781-GW11-98B 4/23/98	AST781-GW12-98B 4/23/98
VOLATILES (ug/L)						
2-Butanone	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	3.4 J	1.5 J	10 U	10 U	10 U	10 U
Carbon disulfide	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	10 U	10 U	10 U	10 U	16	16
Chloromethane	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	3.6 J	6.7 J	10 U	10 U	10 U	10 U
Methyl tert-butyl ether	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10 U	10 U	10 U	10 U	10 U	10 U
Xylenes (total)	10 U	10 U	10 U	10 U	10 U	10 U
SEMIVOLATILES (ug/L)						
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA
Naphthalene	NA	NA	NA	NA	NA	NA
PCBs (ug/L)						
4,4'-DDD	NA	NA	NA	NA	NA	NA
4,4'-DDE	NA	NA	NA	NA	NA	NA
4,4'-DDT	NA	NA	NA	NA	NA	NA
Endosulfan I	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	NA	NA	NA	NA	NA	NA
beta-BHC	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NA	NA	NA	NA	NA	NA
HERBICIDES (ug/L)						
Dimoseb	NA	NA	NA	NA	NA	NA
MCPA	NA	NA	NA	NA	NA	NA

TABLE 4-11 (continued)
POSITIVE DETECTIONS IN GW SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
MCB, CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID SAMPLE DATE	AST781-GW03-98B 4/23/98	AST781-GW04-98B 4/23/98	AST781-GW07-98B 4/22/98	AST781-GW08-98B 4/22/98	AST781-GW11-98B 4/23/98	AST781-GW12-98B 4/23/98
METALS (mg/L)						
Aluminum	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA
Calcium	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA
Potassium	NA	NA	NA	NA	NA	NA
Sodium	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA

NOTES:

U = not detected at detection limit

J = value is estimated

ug/L = micrograms per liter

mg/L = micrograms per liter

NA = Not analyzed

TABLE 4-11 (continued)
 POSITIVE DETECTIONS IN GW SAMPLES
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 MCB, CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID SAMPLE DATE	84-GW01-01 11/7/95	84-GW07-01 11/26/95	84-GW13-01 10/26/95	IR84-MW10-01C 08-05-2001	IR84-MW07-01C 08-06-2001	IR84-MW08-01C 08-06-2001	IR84-MW09-01C 08-05-2001
VOLATILES (ug/L)							
2-Butanone	NA	NA	NA	0.41 U	0.41 U	0.41 U	0.41 U
Benzene	NA	NA	NA	0.16 U	0.16 U	0.16 U	0.16 U
Carbon disulfide	NA	NA	NA	0.2 U	0.2 U	0.2 U	0.2 U
Chloroform	NA	NA	NA	0.14 U	0.14 U	0.14 U	0.14 U
Chloromethane	NA	NA	NA	0.13 U	0.13 U	0.13 U	0.13 U
Ethylbenzene	NA	NA	NA	0.12 U	0.12 U	0.12 U	0.12 U
Methyl tert-butyl ether	NA	NA	NA	0.13 U	0.13 U	0.13 U	0.13 U
Methylene chloride	NA	NA	NA	0.34 U	0.34 U	0.34 U	0.57 J
Trichloroethene	NA	NA	NA	0.14 U	0.14 U	0.14 U	0.14 U
Xylenes (total)	NA	NA	NA	0.33 U	0.33 U	0.33 U	0.33 U
SEMIVOLATILES (ug/L)							
2-Methylnaphthalene	NA	NA	NA	0.64 U	0.64 U	0.64 U	0.64 U
Naphthalene	NA	NA	NA	0.75 U	0.75 U	0.75 U	0.75 U
PCBs (ug/L)							
4,4'-DDD	NA	NA	NA	0.0064 U	0.0064 U	0.0064 U	0.0064 U
4,4'-DDE	NA	NA	NA	0.0074 U	0.0074 U	0.0074 U	0.0074 U
4,4'-DDT	NA	NA	NA	0.0072 U	0.0072 U	0.0072 U	0.0072 U
Endosulfan I	NA	NA	NA	0.0069 U	0.0069 U	0.0069 U	0.0069 U
Heptachlor epoxide	NA	NA	NA	0.0068 U	0.0068 U	0.0068 U	0.0068 U
beta-BHC	NA	NA	NA	0.0062 U	0.0062 U	0.0062 U	0.0062 U
gamma-Chlordane	NA	NA	NA	0.0065 U	0.0065 U	0.0065 U	0.0065 U
HERBICIDES (ug/L)							
Dinoseb	NA	NA	NA	0.013 U	0.013 J	0.013 U	0.013 U
MCPA	NA	NA	NA	8 U	8 U	8 U	8 U

TABLE 4-11 (continued)
POSITIVE DETECTIONS IN GW SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
MCB, CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID SAMPLE DATE	84-GW01-01 11/7/95	84-GW07-01 11/26/95	84-GW13-01 10/26/95	IR84-MW10-01C 08-05-2001	IR84-MW07-01C 08-06-2001	IR84-MW08-01C 08-06-2001	IR84-MW09-01C 08-05-2001
METALS (mg/L)							
Aluminum	NA	NA	NA	0.55	0.11 U	0.11 U	0.44
Antimony	NA	NA	NA	0.0022 U	0.0022 U	0.0022 U	0.0022 U
Arsenic	NA	NA	NA	0.0039 U	0.013	0.03	0.0039 U
Barium	NA	NA	NA	0.049 J	0.028 J	0.0036 J	0.014 J
Beryllium	NA	NA	NA	0.0011 J	0.00067 J	0.00067 J	0.00061 J
Cadmium	NA	NA	NA	0.00028 U	0.00028 U	0.00028 U	0.00028 U
Calcium	NA	NA	NA	10	106	49.1	1.4 J
Chromium	NA	NA	NA	0.0014 U	0.0014 U	0.0014 U	0.0014 U
Cobalt	NA	NA	NA	0.0022 J	0.0013 U	0.0013 U	0.0013 U
Iron	NA	NA	NA	0.088 U	51.1	67.7	0.74
Magnesium	NA	NA	NA	10	5.8	4.4 J	0.34 J
Manganese	NA	NA	NA	0.04	0.45	0.18	0.004 J
Mercury	NA	NA	NA	0.000069 U	0.000069 U	0.000069 U	0.000069 U
Nickel	NA	NA	NA	0.0022 U	0.0022 U	0.0022 U	0.0022 U
Potassium	NA	NA	NA	0.86 J	0.69 U	1.3 J	0.26 U
Sodium	NA	NA	NA	2.1 J	9.7	4.2 J	3.9 J
Thallium	NA	NA	NA	0.005 U	0.005 U	0.0057 J	0.005 U
Vanadium	NA	NA	NA	0.00082 U	0.0018 J	0.0016 J	0.0018 J
Zinc	NA	NA	NA	0.012 U	0.012 U	0.012 U	0.012 U

NOTES:

U = not detected at detection limit

J = value is estimated

ug/L = micrograms per liter

mg/L = micrograms per liter

NA = Not analyzed

TABLE 4-11 (continued)
 POSITIVE DETECTIONS IN GW SAMPLES
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 MCB, CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID SAMPLE DATE	IR84-MW10-01C 08-05-2001	IR84-MW16-01C 08-04-2001	IR84-MW17-01C 08-06-2001	IR84-MW18-01C 08-04-2001	IR84-MW19-01C 08-04-2001	IR84-MW20-01C 08-05-2001
VOLATILES (ug/L)						
2-Butanone	0.41 U	0.41 U	0.41 U	0.53 J	0.41 U	0.41 U
Benzene	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
Carbon disulfide	0.2 U	0.2 U	0.2 U	0.49 J	0.2 U	0.2 U
Chloroform	0.14 U	0.14 U	6.5 U	1 U	0.14 U	0.14 U
Chloromethane	0.13 U	0.17 J	0.13 U	0.62 J	0.13 U	0.13 U
Ethylbenzene	0.12 U	0.12 U	0.6 J	0.12 U	0.12 U	0.12 U
Methyl tert-butyl ether	0.13 U	0.52 J	0.13 U	0.13 U	0.13 U	0.13 U
Methylene chloride	0.34 U	0.34 U	1 U	0.34 U	0.34 U	0.34 U
Trichloroethene	0.14 U	0.14 U	0.19 J	0.14 U	0.14 U	0.14 U
Xylenes (total)	0.33 U	0.33 U	1.8	0.33 U	0.33 U	0.33 U
SEMIVOLATILES (ug/L)						
2-Methylnaphthalene	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	1 J
Naphthalene	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
PCBs (ug/L)						
4,4'-DDD	0.0064 U	0.0064 U	0.0064 UJ	0.044 J	0.0064 U	0.028 J
4,4'-DDE	0.0074 U	0.0074 U	0.0074 UJ	0.0074 U	0.0074 U	0.024 J
4,4'-DDT	0.0072 U	0.029 J	0.0072 UJ	0.0072 U	0.0072 U	0.042 J
Endosulfan I	0.0069 U	0.0069 U	0.0069 UJ	0.023 J	0.0069 U	0.0069 U
Heptachlor epoxide	0.0068 U	0.0068 U	0.0068 UJ	0.0068 U	0.0068 U	0.03 J
beta-BHC	0.0062 U	0.0062 U	0.021 J	0.026 J	0.0062 U	0.025 J
gamma-Chlordane	0.0065 U	0.0065 U	0.0065 UJ	0.04 J	0.0065 U	0.0065 U
HERBICIDES (ug/L)						
Dinoseb	0.013 U	0.13 U	1.5 J	0.013 U	0.057 J	0.013 U
MCPA	8 U	80 U	16 U	44 J	8 U	8 U

TABLE 4-11 (continued)
POSITIVE DETECTIONS IN GW SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
MCB, CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID SAMPLE DATE	IR84-MW10-01C 08-05-2001	IR84-MW16-01C 08-04-2001	IR84-MW17-01C 08-06-2001	IR84-MW18-01C 08-04-2001	IR84-MW19-01C 08-04-2001	IR84-MW20-01C 08-05-2001
METALS (mg/L)						
Aluminum	0.55	0.17 U	0.73	0.54	0.58	0.23 U
Antimony	0.0022 U	0.0024 J	0.011 J	0.0022 U	0.0022 U	0.0022 UJ
Arsenic	0.0039 U	0.0039 U	0.0039 U	0.0039 U	0.0039 U	0.0077 J
Barium	0.049 J	0.02 J	0.012 J	0.12 J	0.04 J	0.038 J
Beryllium	0.0011 J	0.00057 J	0.00067 J	0.00068 J	0.00057 J	0.00076 J
Cadmium	0.00028 U	0.00028 U	0.00028 U	0.00056 J	0.00028 U	0.00028 U
Calcium	10	32.8	34.5	63.8	44.7	72.5
Chromium	0.0014 U	0.0014 U	0.0014 U	0.0015 J	0.0022 J	0.0015 J
Cobalt	0.0022 J	0.0013 U	0.0013 U	0.0057 J	0.0013 U	0.0013 U
Iron	0.088 U	0.18	1	0.53	0.39	24.9
Magnesium	10	3.4 J	0.89 J	11.3	2.2 J	3.1 J
Manganese	0.04	0.008 J	0.0047 J	0.24	0.012 J	0.16
Mercury	0.000069 U	0.000069 U	0.000072 J	0.000069 U	0.000069 U	0.000069 U
Nickel	0.0022 U	0.0022 U	0.0022 U	0.011 J	0.0022 U	0.0022 U
Potassium	0.86 J	1.8 J	1.1 J	2.4 J	5.2	2 J
Sodium	2.1 J	5.9	9	8	22	8.7
Thallium	0.005 U	0.005 U	0.0054 J	0.005 U	0.005 U	0.005 U
Vanadium	0.00082 U	0.00082 U	0.0027 J	0.0011 J	0.00084 J	0.0029 J
Zinc	0.012 U	0.027 J	0.012 U	0.31	0.012 U	0.012 U

NOTES:

U = not detected at detection limit

J = value is estimated

ug/L = micrograms per liter

mg/L = micrograms per liter

NA = Not analyzed

TABLE 4-11 (continued)
POSITIVE DETECTIONS IN GW SAMPLES
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
MCB, CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID SAMPLE DATE	IR84-MW20-01CD 08-05-2001	IR84-MW21-01C 08-05-2001	IR84-MW22-01C 08-05-2001	IR84-MW23-01C 08-06-2001
VOLATILES (ug/L)				
2-Butanone	0.41 U	0.41 U	0.69 J	0.41 U
Benzene	0.16 U	0.16 U	0.16 U	0.16 U
Carbon disulfide	0.2 U	0.2 U	0.2 U	0.2 U
Chloroform	0.14 U	1 U	8.8 U	0.14 U
Chloromethane	0.13 U	0.13 U	0.13 U	0.13 U
Ethylbenzene	0.12 U	0.12 U	3.6	0.12 U
Methyl tert-butyl ether	0.13 U	0.13 U	0.13 U	0.13 U
Methylene chloride	1 U	0.37 J	0.7 J	0.34 U
Trichloroethene	0.14 U	0.14 U	0.14 U	0.14 U
Xylenes (total)	0.33 U	0.33 U	0.33 U	0.33 U
SEMIVOLATILES (ug/L)				
2-Methylnaphthalene	1.1 J	0.64 U	0.64 U	0.64 U
Naphthalene	0.75 U	0.75 U	2.2 J	0.75 U
PCBs (ug/L)				
4,4'-DDD	0.029 J	0.036 J	0.13 U	0.0064 U
4,4'-DDE	0.026 J	0.0074 U	0.15 U	0.0074 U
4,4'-DDT	0.047 J	0.046 J	0.14 U	0.0072 U
Endosulfan I	0.0069 U	0.0069 U	0.14 U	0.0069 U
Heptachlor epoxide	0.0068 U	0.0068 U	0.14 U	0.0068 U
beta-BHC	0.0062 U	0.029 J	0.12 U	0.0062 U
gamma-Chlordane	0.0065 U	0.0065 U	0.13 U	0.0065 U
HERBICIDES (ug/L)				
Dinoseb	0.013 U	0.16 J	0.026 UJ	0.013 U
MCPA	8 U	8 U	16 U	8 U

TABLE 4-11 (continued)
 POSITIVE DETECTIONS IN GW SAMPLES
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 MCB, CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID SAMPLE DATE	IR84-MW20-01CD 08-05-2001	IR84-MW21-01C 08-05-2001	IR84-MW22-01C 08-05-2001	IR84-MW23-01C 08-06-2001
METALS (mg/L)				
Aluminum	0.22 U	0.56	0.52	0.52
Antimony	0.0022 U	0.0022 J	0.0022 U	0.0022 U
Arsenic	0.0071 J	0.0039 U	0.0039 U	0.0039 U
Barium	0.037 J	0.11 J	0.033 J	0.0073 J
Beryllium	0.00068 J	0.0006 J	0.00089 J	0.00063 J
Cadmium	0.00028 U	0.00028 U	0.00028 U	0.00061 J
Calcium	70.3	87.8	49.7	34.6
Chromium	0.0014 U	0.0014 U	0.0014 U	0.0014 U
Cobalt	0.0013 U	0.0013 U	0.0013 U	0.0013 U
Iron	24.1	0.33	0.37	25.8
Magnesium	3 J	7.6	3.3 J	1.7 J
Manganese	0.16	0.069	0.022	0.066
Mercury	0.000069 U	0.000069 U	0.000069 U	0.000069 U
Nickel	0.0022 U	0.0027 J	0.0022 U	0.0022 U
Potassium	1.9 J	11	9.1	0.69 U
Sodium	8.4	13.9	17.6	3.2 J
Thallium	0.005 U	0.005 U	0.005 U	0.005 U
Vanadium	0.0026 J	0.0037 J	0.0012 J	0.00082 U
Zinc	0.012 U	0.013 J	0.012 U	0.012 U

NOTES:

U = not detected at detection limit

J = value is estimated

ug/L = micrograms per liter

mg/L = micrograms per liter

NA = Not analyzed

TABLE 4-12
GROUNDWATER DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

	NCWQS (2L) (units as noted)	US Primary MCL (units as noted)	Minimum Detected	Maximum Detected	Frequency of Detection	Location of Maximum Detect
VOLATILES (ug/L)						
2-Butanone	(ug/L) 170	(ug/L) 1,900 (1)	0.53 J	0.69 J	2/20	IR84-MW22-01C
Benzene	1	5	1.5 J	3.4 J	2/20	AST781-GW03-98B
Carbon disulfide	700 (1)	1,000 (1)	0.49 J	0.49 J	1/20	IR84-MW18-01C
Chloroform	0.19	100	16	16	2/20	AST781-GW11-98B, AST781-GW12-98B
Chloromethane	NE	NE	0.17 J	0.62 J	2/20	IR84-MW18-01C
Ethylbenzene	29	700	0.6 J	6.7 J	4/20	AST781-GW04-98B
Methyl tert-butyl ether	200	NE	0.52 J	0.52 J	1/20	IR84-MW16-01C
Methylene chloride	5	5	0.37 J	0.7 J	3/20	IR84-MW22-01C
Trichloroethene	2.8	5	0.19 J	0.19 J	1/20	IR84-MW17-01C
Xylenes (total)	530	10,000	1.8	1.8	1/20	IR84-MW17-01C
SEMIVOLATILES (ug/L)						
2-Methylnaphthalene	(ug/L) 28 (1)	(ug/L) NE	1 J	1.1 J	2/14	IR84-MW20-01CD
Naphthalene	21	6.2 (1)	2.2 J	2.2 J	1/14	IR84-MW22-01C
PCBs (ug/L)						
No Exceedances						
PESTICIDES (ug/L)						
4,4'-DDD	0.14 (1)	0.28 (1)	0.028 J	0.044 J	4/14	IR84-MW18-01C
4,4'-DDE	NE	0.2 (1)	0.024 J	0.026 J	2/14	IR84-MW20-01CD
4,4'-DDT	0.1 (1)	0.2 (1)	0.029 J	0.047 J	4/14	IR84-MW20-01CD
Endosulfan I	NE	220 (1)	0.023 J	0.023 J	1/14	IR84-MW18-01C
Heptachlor epoxide	0.004	0.2	0.03 J	0.03 J	1/14	IR84-MW20-01C
beta-BHC	NE	0.037 (1)	0.021 J	0.029 J	4/14	IR84-MW21-01C
gamma-Chlordane	0.027 (2)	2 (2)	0.04 J	0.04 J	1/14	IR84-MW18-01C
HERBICIDES (ug/L)						
Dinoseb	(ug/L)	(ug/L)				
MCPA	NE	7	0.015 J	1.5 J	4/14	IR84-MW17-01C
METALS (mg/L)						
Aluminum	(mg/L)	(mg/L)				
Antimony	NE	0.20 (s)	0.44	0.73	9/14	IR84-MW17-01C
Arsenic	NE	0.006	0.0022 J	0.011 J	3/14	IR84-MW17-01C
Barium	0.05	0.01	0.0071 J	0.03	4/14	IR84-MW08-01C
Beryllium	2	2	0.0036 J	0.12 J	14/14	IR84-MW18-01C
Cadmium	NE	0.004	0.00057 J	0.0011 J	14/14	IR84-MW10-01C, IR84-MW10-01C
Calcium	0.005	0.005	0.00056 J	0.00061 J	2/14	IR84-MW23-01C
Chromium	NE	NE	1.4 J	106	14/14	IR84-MW07-01C
Cobalt	0.05 (total Cr)	0.1 (total Cr)	0.0015 J	0.0022 J	3/14	IR84-MW19-01C
	NE	2.2 (1)	0.0022 J	0.0057 J	3/14	IR84-MW18-01C

TABLE 4-12 (continued)
GROUNDWATER DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

	NCWQS (2L) (units as noted)	US Primary MCL (units as noted)	Minimum Detected	Maximum Detected	Frequency of Detection	Location of Maximum Defect
METALS (mg/L) (Cont.)	(mg/L)	(mg/L)				
Iron	0.3	0.3	0.18	67.7	12/14	IR84-MW08-01C
Magnesium	NE	NE	0.34 J	11.3	14/14	IR84-MW18-01C
Manganese	0.05	0.05	0.004 J	0.45	14/14	IR84-MW07-01C
Mercury	0.0011	0.002	0.000072 J	0.000072 J	1/14	IR84-MW17-01C
Nickel	0.1	0.730 (1)	0.0027 J	0.011 J	2/14	IR84-MW18-01C
Potassium	NE	NE	0.86 J	11	11/14	IR84-MW21-01C
Sodium	NE	NE	2.1 J	22	14/14	IR84-MW19-01C
Thallium	NE	0.002	0.0054 J	0.0057 J	2/14	IR84-MW08-01C
Vanadium	NE	0.260 (1)	0.00084 J	0.0037 J	10/14	IR84-MW21-01C
Zinc	2.1	5 (s)	0.013 J	0.31	3/14	IR84-MW18-01C

NOTES:

NCWQS = North Carolina Water Quality Standard for groundwater protection (2L)

MCL = Maximum Contaminant Level

(1) No MCL available, value is Region 9 Tapwater standard

(2) Value is for chlordane

(1) Interim standard

(s) Secondary drinking water standard

NE = Not established

NA = Not applicable

ug/L = micrograms per liter

mg/L = micrograms per liter

TABLE 4-12 (continued)
GROUNDWATER DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

	NCWQS (2L)	US Primary MCL
	Exceedance Count	Exceedance Count
VOLATILES (ug/L)		
2-Butanone	0	0
Benzene	2	0
Carbon disulfide	0	0
Chloroform	2	0
Chloromethane	NA	NA
Ethylbenzene	0	0
Methyl tert-butyl ether	0	NA
Methylene chloride	0	0
Trichloroethene	0	0
Xylenes (total)	0	0
SEMIVOLATILES (ug/L)		
2-Methylnaphthalene	0	NA
Naphthalene	0	0
PCBs (ug/L)		
No Exceedances		
PESTICIDES (ug/L)		
4,4'-DDD	0	0
4,4'-DDE	NA	0
4,4'-DDT	0	0
Endosulfan I	NA	0
Heptachlor epoxide	1	0
beta-BHC	NA	0
gamma-Chlordane	1	0
HERBICIDES (ug/L)		
Dinoseb	NA	0
MCPA	NA	NA
METALS (mg/L)		
Aluminum	NA	9
Antimony	NA	1
Arsenic	0	2
Barium	0	0
Beryllium	NA	0
Cadmium	0	0
Calcium	NA	NA
Chromium	0	0
Cobalt	NA	0

TABLE 4-12 (continued)
GROUNDWATER DATA COMPARED TO SCREENING CRITERIA
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

METALS (mg/L) (Cont.)	NCWQS		US Primary MCL	
	Exceedance Count	(2L)	Exceedance Count	Exceedance Count
Iron	11	11	11	11
Magnesium	NA	NA	NA	NA
Manganese	7	7	7	7
Mercury	0	0	0	0
Nickel	0	0	0	0
Potassium	NA	NA	NA	NA
Sodium	NA	NA	NA	NA
Thallium	NA	NA	2	2
Vanadium	NA	NA	0	0
Zinc	0	0	0	0

NOTES:

NCWQS = North Carolina Water Quality

MCL = Maximum Contaminant Level

(1) No MCL available, value is Region 9 T

(2) Value is for chlordane

(f) Interim standard

(s) Secondary drinking water standard

NE = Not established

NA = Not applicable

ug/L = micrograms per liter

mg/L = micrograms per liter

TABLE 4- 13
 POSITIVE DETECTIONS IN SURFACE WATER SAMPLES- LAGOON
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-SW05-01	84-SW06-01	84-SW07-01	84-SW08-01	IR84-SW01-98B	IR84-SW02-98B	IR84-SW03-98B	IR84-SW04-98B
SAMPLE DATE	10/26/95	10/26/95	10/26/95	10/26/95	04-19-1998	04-19-1998	04-19-1998	04-19-1998
VOLATILES (ug/L)								
Acetone	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA	NA

SEMIVOLATILES (no detections)
PCBs (no detections)

NOTES:

J = value is estimated

TABLE 4-13
 POSITIVE DETECTIONS IN SURFACE WATER SAMPLES- LAGOON
 REMEDIAL INVESTIGATION, CTO-0219
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	IR84-SW05-98B	IR84-SW06-98B	IR84-SW07-98B
SAMPLE DATE	04-19-1998	04-19-1998	04-23-1998
VOLATILES (ug/L)			
Acetone	NA	NA	5.6 J
Benzene	NA	NA	1.2 J
Toluene	NA	NA	2.7 J
Xylenes (total)	NA	NA	3.5 J
SEMIVOLATILES (no detections)			
PCBs (no detections)			

NOTES:

J = value is estimated

TABLE 4-14
SURFACE WATER DATA COMPARED TO SCREENING CRITERIA - LAGOON
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

	North Carolina Water Quality Standard or Fresh Surface Water (ug/L)	USEPA Region 4 Fresh Surface Water Chronic Screening Values (ug/L)	Minimum Detected	Maximum Detected	Frequency of Detection	Location of Maximum Detect	North Carolina Water Quality Standards for Fresh Surface Water Exceedance Count	USEPA Region 4 Fresh Surface Water Chronic Screening Values Exceedance Count
VOLATILES (ug/L)								
Acetone	NE	NE	5.6 J	5.6 J	1/1	IR84-SW07-98B	NA	NA
Benzene	71.4	53	1.2 J	1.2 J	1/1	IR84-SW07-98B	0	0
Toluene	11*	175	2.7 J	2.7 J	1/1	IR84-SW07-98B	0	0
Xylenes (total)	NE	NE	3.5 J	3.5 J	1/1	IR84-SW07-98B	NA	NA
SEMIVOLATILES (no detections)								
PCBs (no detections)								

NOTES:

J = value is estimated
NE = Not established
NA = Not applicable

* North Carolina Water Quality Standards for Freshwater Classifications are human health standards; where human health standards are not available, standards for aquatic life are used and are denoted by an asterisk.
USEPA Region 4 standards are surface water chronic screening values protective of freshwater aquatic life (USEPA, 2000).

TABLE 4-15
POSITIVE DETECTIONS IN SEDIMENT SAMPLES - LAGOON
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

SAMPLE ID	84-SD05-01	84-SD06-01	84-SD07-01	84-SD08-01	IR84-SD01-98B	IR84-SD01-98BD	IR84-SD05-98B	IR84-SD06-98B	IR84-SD07-98B
DEPTH (inches bgs)	0 - 6 "	0 - 6 "	0 - 6 "	0 - 6 "	0 - 6 "	0 - 6 "	0 - 6 "	0 - 6 "	0 - 6 "
SAMPLE DATE	10-26-1995	10-26-1995	10-26-1995	10-26-1995	4/19/98	4/19/98	4/19/98	4/19/98	4/23/98
VOLATILES (ug/kg)									
Xylenes (total)	NA	NA	NA	NA	NA	NA	NA	NA	910 J
SEMIVOLATILES (ug/kg)									
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	10000
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	2000
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	2500
bis(2-Ethylhexyl) phthalate	NA	NA	NA	NA	NA	NA	NA	NA	2400 J
PCBs (ug/kg)									
AROCOR-1248	2800	3300 U	4700 U	450 U	810 U	NA	180 U	160 U	NA
AROCOR-1260	20000	8100	17000	3700	40000	NA	5900	4300	NA
DIESEL RANGE ORGANICS (mg/kg)									
CONVENTIONAL	NA	NA	NA	NA	9200	14000	4300	3500	NA
pH (solid)	NA	NA	NA	NA	6.6	6.6	6.9	6.3	6.6
Percent moisture (%)	NA	NA	NA	NA	59.2	56.3	28	19.6	43.9

NOTES:

J = value is estimated
U = not detected at detection limit
NA = Not Analyzed
ug/kg = micrograms per kilogram
mg/kg = micrograms per kilogram

TABLE 4-16
SEDIMENT DATA COMPARED TO SCREENING CRITERIA - LAGOON
REMEDIAL INVESTIGATION, CTO-0219
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
MCB CAMP LEJEUNE, NORTH CAROLINA

	NOAA Sediment Screening Value (units as indicated)	Region 4 Sediment Screening Value (units as indicated)	Minimum Detected	Maximum Detected	Frequency of Detection	Location of Maximum Detect	NOAA Sediment Screening Value Exceedance Count	Region 4 Sediment Screening Value Exceedance Count
VOLATILES (ug/kg)								
Xylenes (total)	NE	NE	910 J	910 J	1/1	IR84-SD07-98B	NA	MA
SEMIVOLATILES (ug/kg)								
2-Methylnaphthalene	70	20.2	10000	10000	1/1	IR84-SD07-98B	1	1
Naphthalene	160	34.6	2000	2000	1/1	IR84-SD07-98B	1	1
Phenanthrene	240	86.7	2500	2500	1/1	IR84-SD07-98B	1	1
bis(2-Ethylhexyl) phthalate	NE	182	2400 J	2400 J	1/1	IR84-SD07-98B	NA	1
PCBs (ug/kg)								
AROCLOK-1248	21.6 (total PCBs)	20 (total PCBs)	2800	2800	1/7	84-SD05-01	1	1
AROCLOK-1260	21.6 (total PCBs)	20 (total PCBs)	3700	40000	7/7	IR84-SD01-98B	1	1
DIESEL RANGE ORGANICS (mg/kg)								
CONVENTIONAL	NE	NE	3500	14000	4/4	IR84-SD01-98BD	NA	NA
pH (solid)	NE	NE						
Percent moisture (%)	NE	NE	6.3	6.9	5/5	IR84-SD05-98B	NA	NA
			19.6	59.2	5/5	IR84-SD01-98B	NA	NA

NOTES:

J = value is estimated

U = not detected at detection limit

NOAA Sediment - National Oceanic and Atmospheric Administration; Effects Range Low (ER-L) (Jones, Suter, and Hull, 1997)

Region 4 Sediment - US Environmental Protection Agency, Region 4. Memorandum: Amended Guidance on Ecological Risk Assessment at Military Bases:

Attachment 3: Ecological Screening Levels for Fresh Water (June 2000)

NE = Not established

NA = Not applicable

mg/kg = milligram per kilogram

ug/kg = microgram per kilogram

FIGURES

FIGURE 4-1
PCB ENSYST™ KIT RESULTS-SURFACE SOILS
REMEDIAL INVESTIGATION
CTO - 219 (CLEAN II)
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

LEGEND

- DIRECT PUSH SOIL BORING (2001)
- EXISTING MONITORING WELL (1992)
- TEST PIT (2001)
- NEW MONITORING WELL (2001)
- SOIL SAMPLING LOCATION (1998)
- SOIL SAMPLING LOCATION (1995)

NOTE

- DP-05, DP-16, DP-22, DP-68, DP-73, TP-01, TP-02 ARE APPROXIMATE LOCATIONS NOT BASED ON SURVEY DATA
- MW-15 IS A SOIL BORING
- ppm = PARTS PER MILLION

PCB CONCENTRATION RANGES

- PCB $\geq$ 50 ppm
- 10 $\leq$ PCB $<$ 50 ppm
- 1.0 $\leq$ PCB $<$ 10 ppm
- PCB DETECTED AT LESS THAN 1.0 ppm OR NON-DETECT
- 1 TO $<$ 10 ppm PCB AREA OF CONCERN (AOC)
- 10 TO $<$ 50 ppm PCB AOC
- $\geq$ 50 ppm PCB AOC

Scale: 1 inch = 100 ft

Map Labels: FLOW, 500-FOOT FLOOD PLAIN, WELLS, CAMP LEJEUNE DATABASE, PIPE OUTLET, FORMER AST, BUILDING FOUNDATION, MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA.

FIGURE 4-1
PCB ENSYST™ KIT RESULTS-SURFACE SOILS
REMEDIAL INVESTIGATION
CTO - 219 (CLEAN II)
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

LEGEND

- DIRECT PUSH SOIL BORING (2001)
- EXISTING MONITORING WELL (1992)
- TEST PIT (2001)
- NEW MONITORING WELL (2001)
- SOIL SAMPLING LOCATION (1998)
- SOIL SAMPLING LOCATION (1995)

NOTE

- DP-05, DP-16, DP-22, DP-68, DP-73, TP-01, TP-02 ARE APPROXIMATE LOCATIONS NOT BASED ON SURVEY DATA
- MW-15 IS A SOIL BORING
- ppm = PARTS PER MILLION

PCB ENSYST™ KIT RESULTS

- PCB $\geq$ 50 ppm
- $10 \leq$ PCB $<$ 50 ppm
- $1.0 \leq$ PCB $<$ 10 ppm
- PCB DETECTED AT LESS THAN 1.0 ppm OR NON-DETECT
- 1 TO $<$ 10 ppm PCB AREA OF CONCERN (AOC)
- 10 TO $<$ 50 ppm PCB AOC
- $\geq$ 50 ppm PCB AOC

Scale: 1 inch = 100 ft

Map Features: 500-FOOT FLOOD PLAIN, CAMP LEJEUNE DATABASE, PIPE OUTLET, DRAINAGE MILE, BUILDING FOUNDATION, MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA.

FIGURE 4-1
PCB ENSYST™ KIT RESULTS—SURFACE SOILS
REMEDIAL INVESTIGATION
CTO — 219 (CLEAN II)
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

Baker
Baker Environmental

LEGEND

- DIRECT PUSH SOIL BORING (2001)
- EXISTING MONITORING WELL (1992)
- TEST PIT (2001)
- NEW MONITORING WELL (2001)
- SOIL SAMPLING LOCATION (1998)
- SOIL SAMPLING LOCATION (1995)

NOTE

- DP-05, DP-16, DP-22, DP-68, DP-73, TP-01, TP-02 ARE APPROXIMATE LOCATIONS NOT BASED ON SURVEY DATA
- MW-15 IS A SOIL BORING
- ppm = PARTS PER MILLION

PCB CONCENTRATIONS

- PCB $\geq$ 50 ppm
- 10 $\leq$ PCB $<$ 50 ppm
- 1.0 $\leq$ PCB $<$ 10 ppm
- PCB DETECTED AT LESS THAN 1.0 ppm OR NON-DETECT
- 1 TO $<$ 10 ppm PCB AREA OF CONCERN (AOC)
- 10 TO $<$ 50 ppm PCB AOC
- $\geq$ 50 ppm PCB AOC

Map Labels: 500-FOOT FLOOD PLAIN, CAMP LEJEUNE DATABASE, PIPE OUTLET, DRAINAGE MILE, BUILDING FOUNDATION, MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA.

Scale: 1 inch = 100 feet

North Arrow: Located in the bottom right corner of the map.

FIGURE 4-1
PCB ENSYST™ KIT RESULTS—SURFACE SOILS
REMEDIAL INVESTIGATION
CTO — 219 (CLEAN II)
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

Baker
Baker Environmental

LEGEND

- DIRECT PUSH SOIL BORING (2001)
- EXISTING MONITORING WELL (1992)
- TEST PIT (2001)
- NEW MONITORING WELL (2001)
- SOIL SAMPLING LOCATION (1998)
- SOIL SAMPLING LOCATION (1995)

NOTE

- DP-05, DP-16, DP-22, DP-68, DP-73, TP-01, TP-02 ARE APPROXIMATE LOCATIONS NOT BASED ON SURVEY DATA
- MW-15 IS A SOIL BORING
- ppm = PARTS PER MILLION

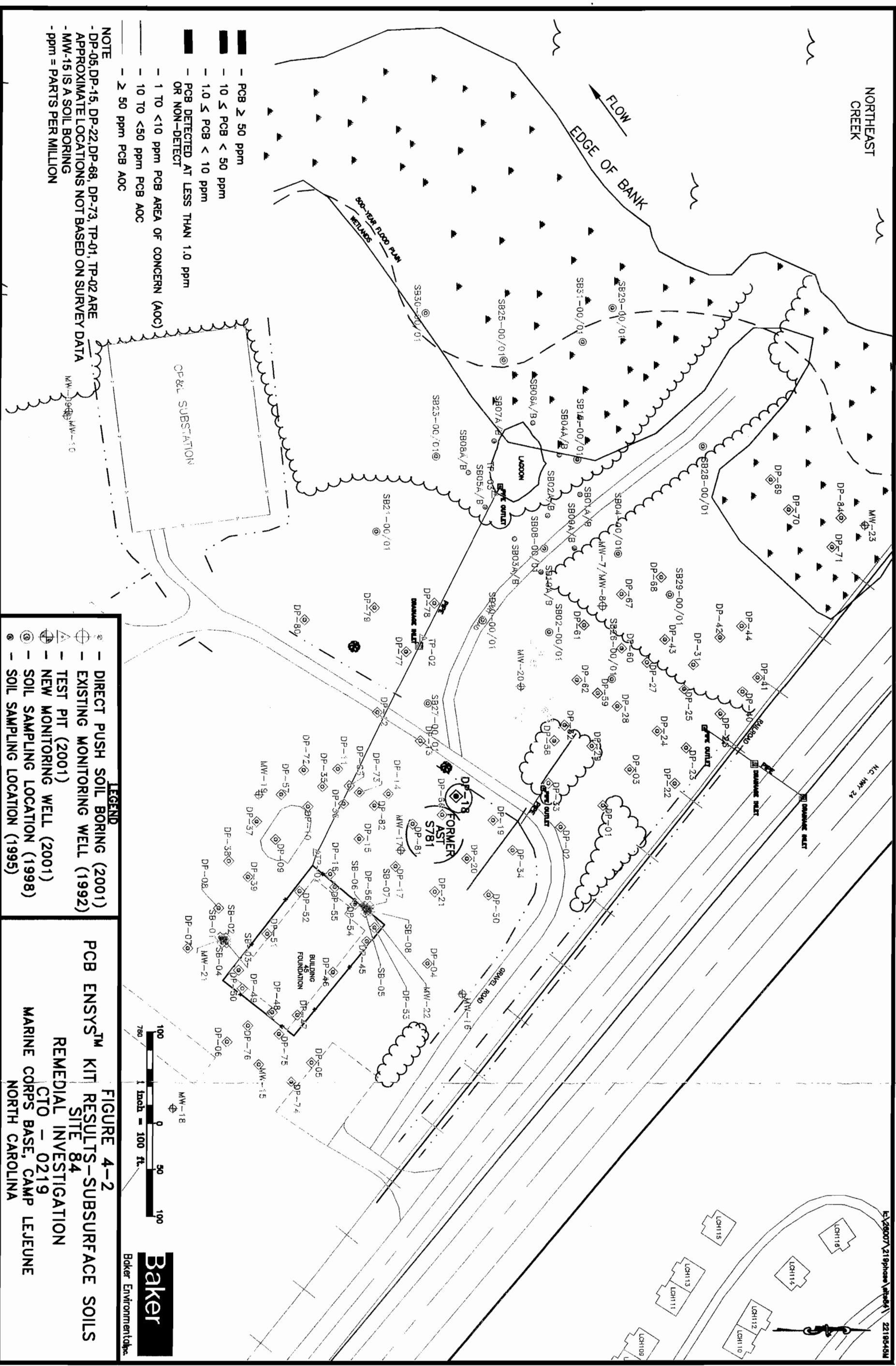
PCB CONCENTRATIONS

- PCB $\geq$ 50 ppm
- $10 \leq$ PCB $<$ 50 ppm
- $1.0 \leq$ PCB $<$ 10 ppm
- PCB DETECTED AT LESS THAN 1.0 ppm OR NON-DETECT
- 1 TO $<$ 10 ppm PCB AREA OF CONCERN (AOC)
- 10 TO $<$ 50 ppm PCB AOC
- $\geq$ 50 ppm PCB AOC

Map Labels: 500-FOOT FLOOD PLAIN, CAMP LEJEUNE DATABASE, PIPE OUTLET, DRAINAGE MILE, BUILDING FOUNDATION, MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA.

Scale: 1 inch = 100 feet

North Arrow: Located in the bottom right corner of the map.



SAMPLE ID	64-MW-7-00
DEPTH	0-1 m
START DATE	07-31-2001
END DATE	08-01-2001
SAMPLING SITE (lat/lon)	
2-Methylnaphthalene	350 J
Acenaphthene	2,500
Anthracene	3,500
Benzo(a)anthracene	5,800
Benzo(a)pyrene	5,900
Benzo(b)fluoranthene	7,100
Benzo(g,h,i)perylene	13,500
Benzo(k)fluoranthene	3,600
Carbazole	2,100
Chrysene	6,700
Dibenz(a,h)anthracene	1,260 J
Dibenzofuran	1,800 J
Fluoranthene	16,000
Fluorene	2,600
Indeno(1,2,3-cd)pyrene	3,200
Naphthalene	440 J
Phenanthrene	15,000
Pyrene	10,000 J

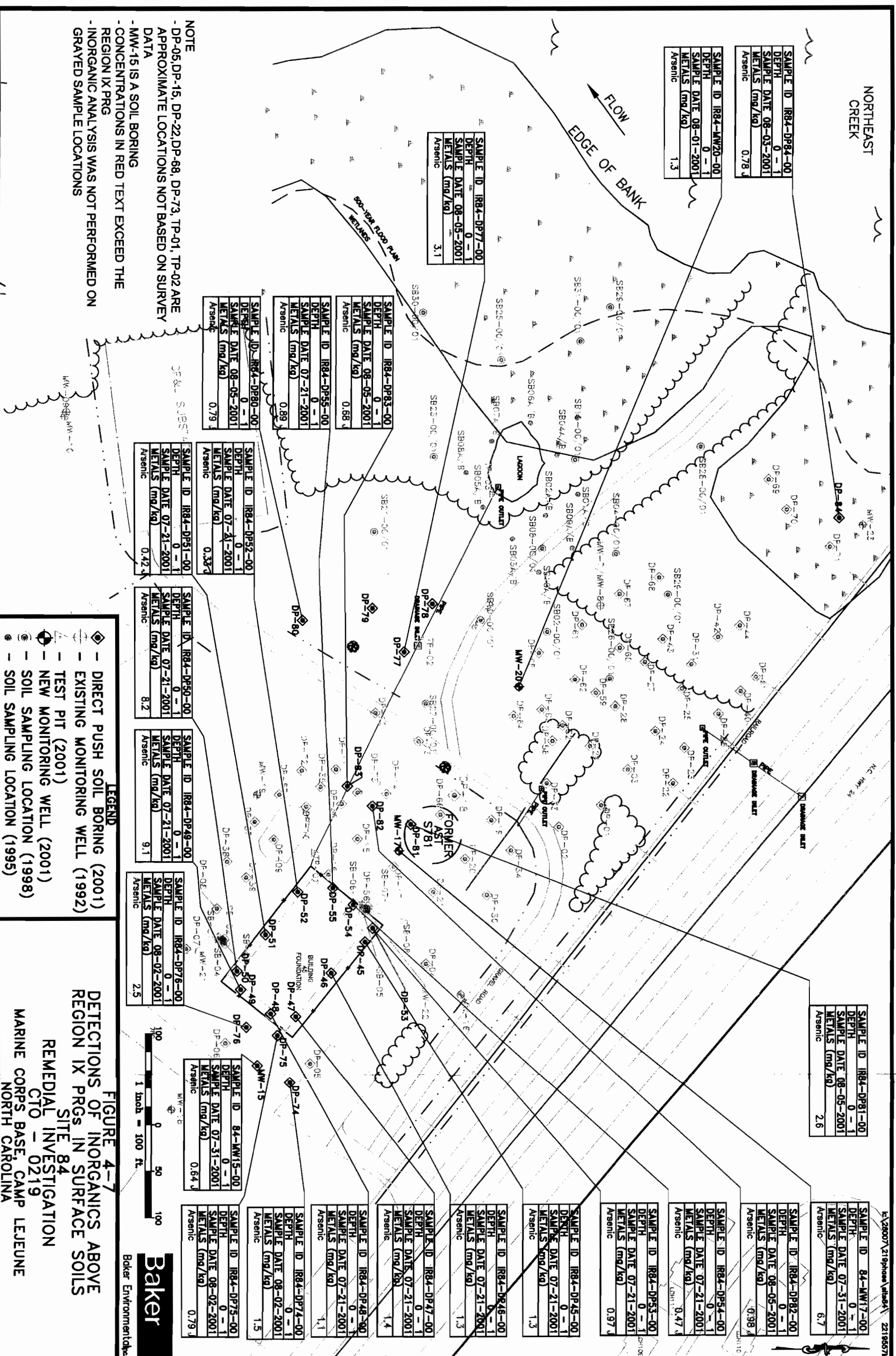
SAMPLE ID	IR64-DPS1-00
DEPTH	0 - 1
SAMPLE DATE	07-21-2001
VOLATILES (ug/kg)	
SEMIVOLATILES (ug/kg)	
Benzene (g/l)	74 J

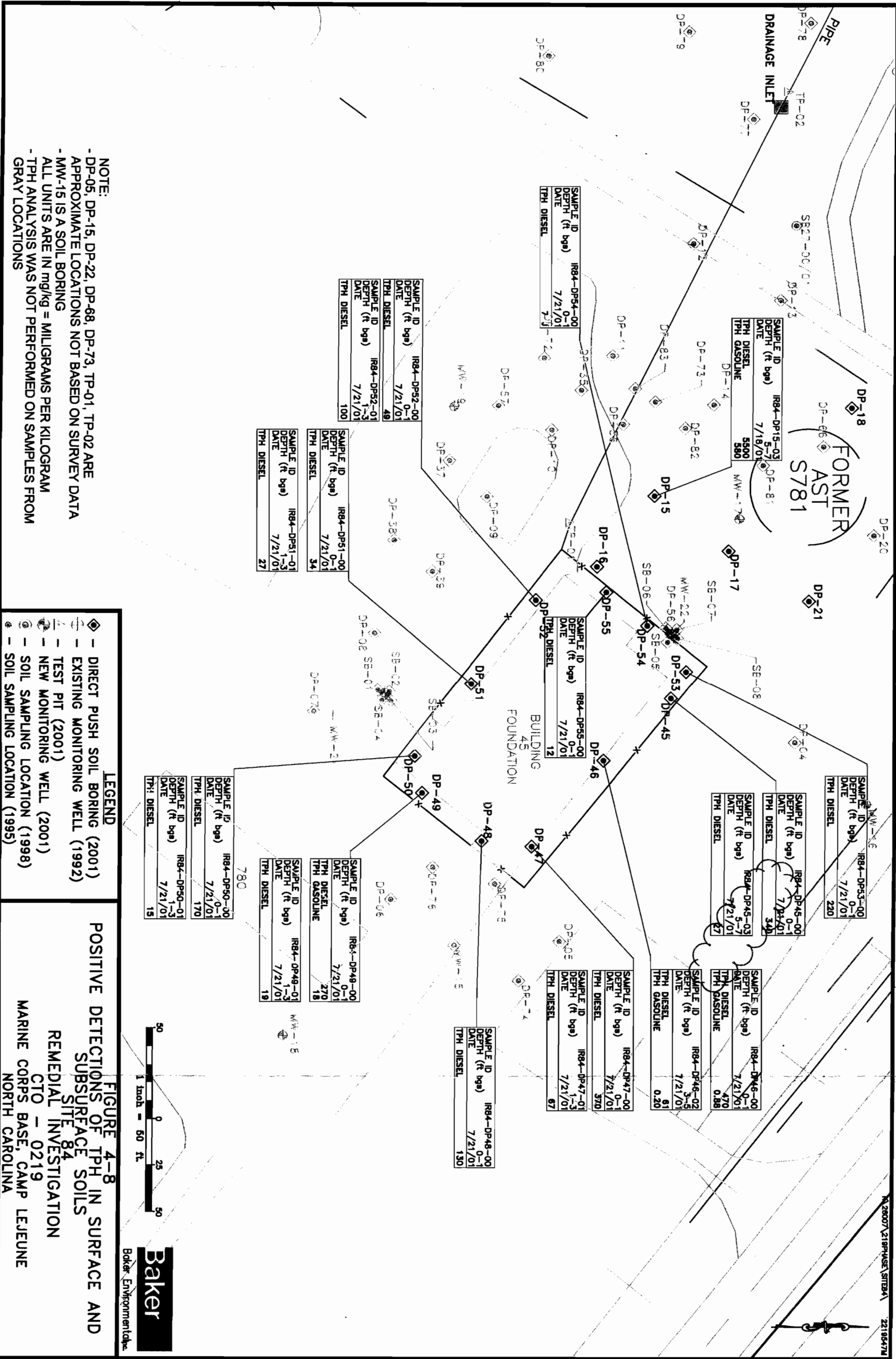
SAMPLE NO.	162-0074-00
DATE	9-2-80
TIME	0-21-200
TEMP. (°C)	25
WAVELENGTH (nm)	254
CONC. (mg/ml)	0.1
EXT. COEFF. (L/g-cm)	1.0
Substance	Extinction
Acetophenone	180
Anthracene	910
Benz(a)anthracene	3380
Benz(b)fluoranthene	3300
Benz(k)fluoranthene	4300
Benz(a)pyrene	1800
Benz(b)fluoranthene	1800
Carbazole	570
Chrysene	3300
Dibenz(a,h)anthracene	530
Dibenzofuran	250
Fluoranthene	5800
Fluorene	410
Indene(1,2,3-cd)pyrene	1300
Phenanthrene	3300
Pyrene	5400



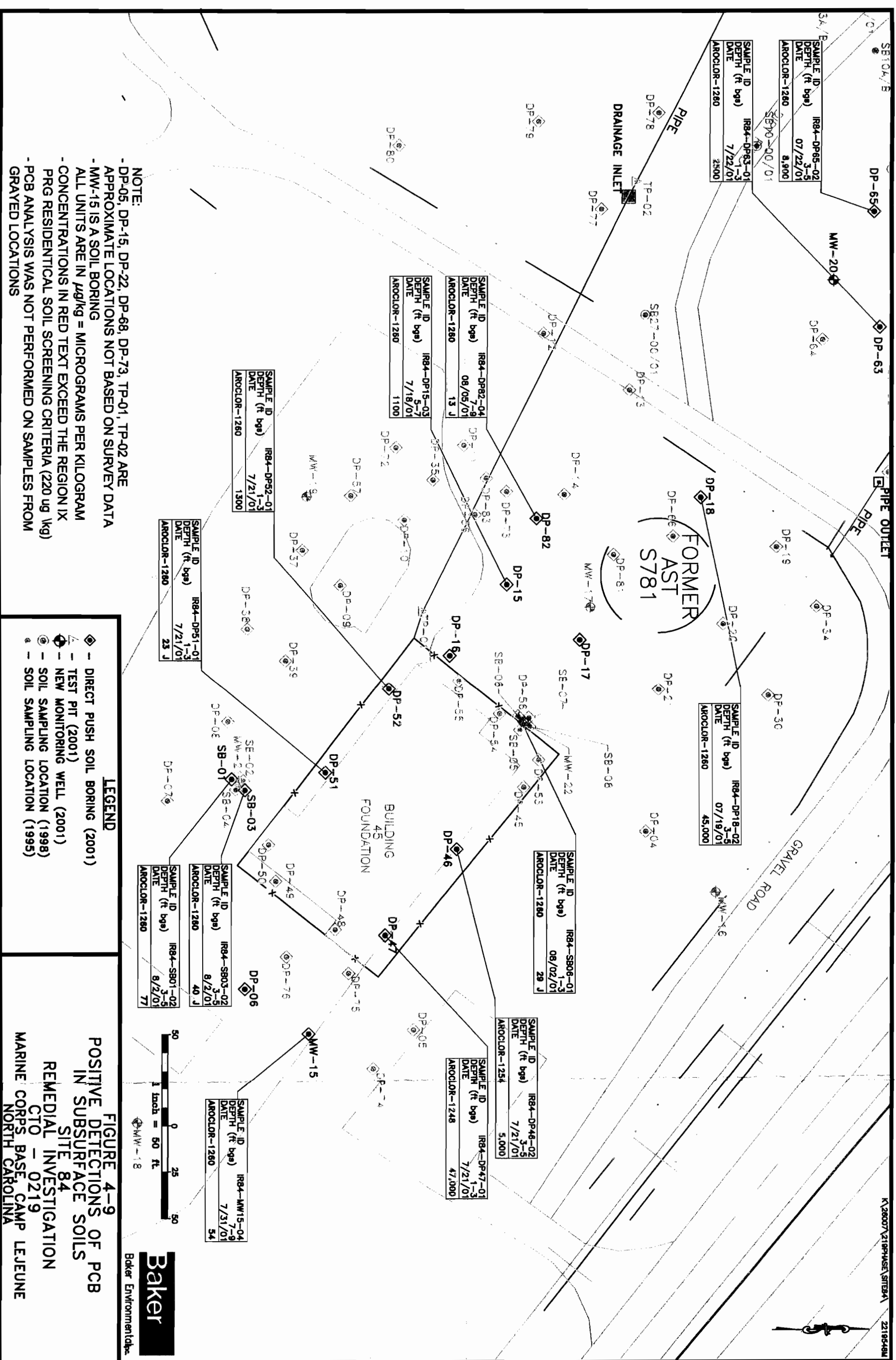
FIGURE 4-5
POSITIVE DETECTIONS OF VOCs AND SVOCs IN
SURFACE SOIL

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA





NOTE:
- DP-05, DP-15, DP-22, DP-68, DP-73, TP-01, TP-02 ARE APPROXIMATE LOCATIONS NOT BASED ON SURVEY DATA
- MW-15 IS A SOIL BORING
- TPH ANALYSIS WAS NOT PERFORMED ON SAMPLES FROM GRAY LOCATIONS



SAMPLE ID	IR84-MW23-01
DEPTH	1-3
SAMPLE DATE	08-03-2001
VOLATILES (ug/kg)	
Ethylbenzene	140 J
Styrene	2 J
Xylenes (total)	4 J

SAMPLE ID	IR84-DP13-03
DEPTH	5-7
SAMPLE DATE	07-18-2001
VOLATILES (ug/kg)	
Ethylbenzene	140 J
Styrene	2 J
Xylenes (total)	4 J

SAMPLE ID	IR84-DP78-02
DEPTH	3-5
SAMPLE DATE	08-03-2001
VOLATILES (ug/kg)	
Ethylbenzene	130 J
Styrene	75 J
Xylenes (total)	3,100 J

SAMPLE ID	IR84-DP75-05
DEPTH	8-11
SAMPLE DATE	08-02-2001
VOLATILES (ug/kg)	
Ethylbenzene	130 J
Styrene	75 J
Xylenes (total)	3,100 J

SAMPLE ID	IR84-DP47-01
DEPTH	1-3
SAMPLE DATE	07-21-2001
VOLATILES (ug/kg)	
Ethylbenzene	320 J
Styrene	640 J
Xylenes (total)	720 J

SAMPLE ID	IR84-DP81-04
DEPTH	7-9
SAMPLE DATE	08-05-2001
VOLATILES (ug/kg)	
Ethylbenzene	54 J
Styrene	2 J
Xylenes (total)	85 J

SAMPLE ID	IR84-MW17-07
DEPTH	13-15
SAMPLE DATE	07-31-2001
VOLATILES (ug/kg)	
Ethylbenzene	250 J
Styrene	85 J
Xylenes (total)	85 J

SAMPLE ID	IR84-MW22-02
DEPTH	3-5
SAMPLE DATE	08-03-2001
VOLATILES (ug/kg)	
Ethylbenzene	1,800 J
Styrene	2 J
Xylenes (total)	85 J

SAMPLE ID	IR84-DP45-03
DEPTH	3-5
SAMPLE DATE	07-21-2001
VOLATILES (ug/kg)	
Ethylbenzene	61 J
Styrene	180 J
Xylenes (total)	780 J

SAMPLE ID	IR84-DP48-02
DEPTH	3-5
SAMPLE DATE	07-21-2001
VOLATILES (ug/kg)	
Ethylbenzene	330 J
Styrene	660 J
Xylenes (total)	880 J

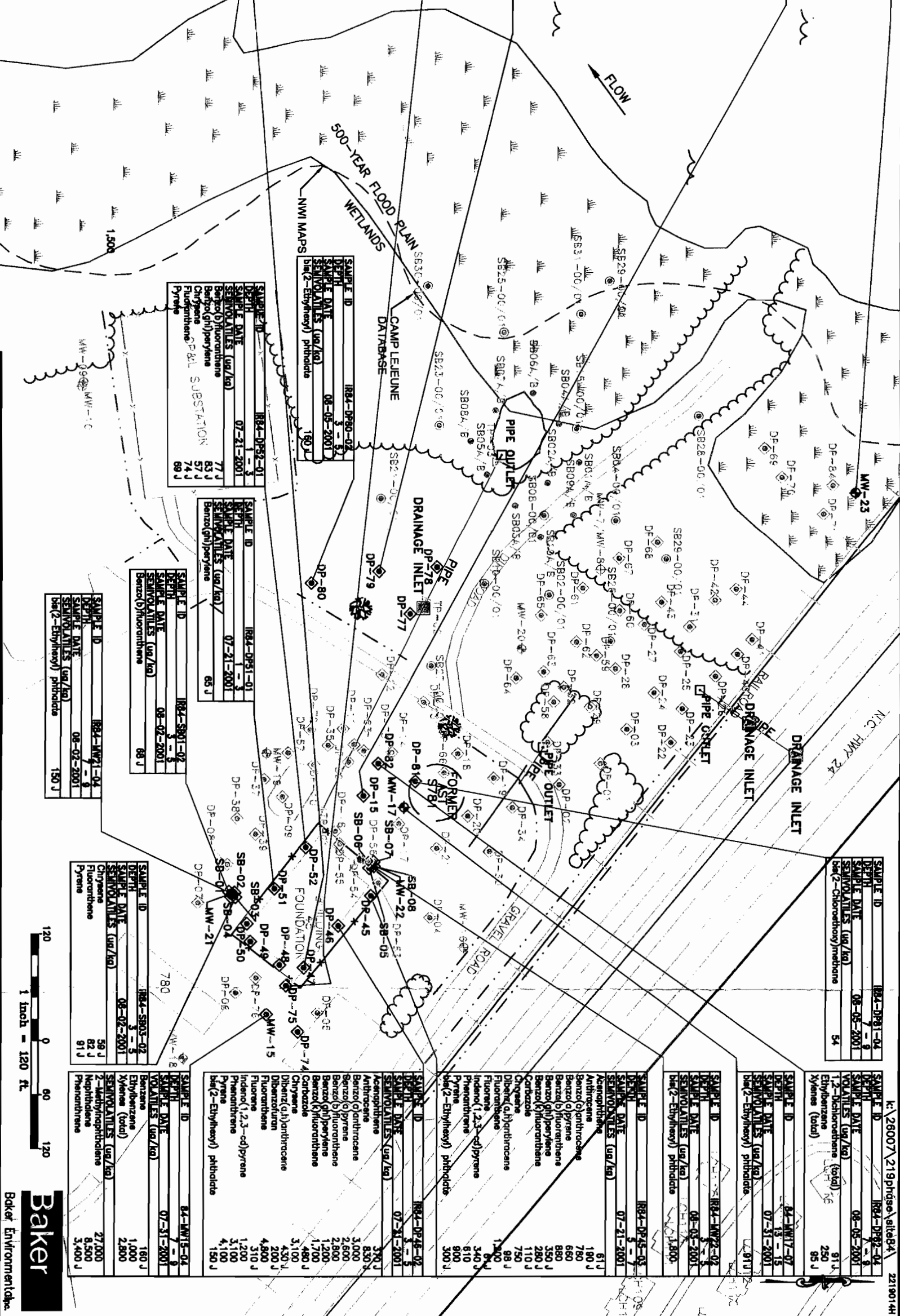
SAMPLE ID	IR84-MW21-04
DEPTH	7-9
SAMPLE DATE	08-02-2001
VOLATILES (ug/kg)	
Ethylbenzene	59 J
Styrene	82 J
Xylenes (total)	81 J

SAMPLE ID	IR84-MW13-04
DEPTH	7-9
SAMPLE DATE	07-21-2001
VOLATILES (ug/kg)	
Ethylbenzene	1,800 J
Styrene	2 J
Xylenes (total)	2,800 J

SAMPLE ID	IR84-DP48-02
DEPTH	3-5
SAMPLE DATE	07-21-2001
VOLATILES (ug/kg)	
Ethylbenzene	330 J
Styrene	660 J
Xylenes (total)	880 J

SAMPLE ID	IR84-DP48-02
DEPTH	3-5
SAMPLE DATE	07-21-2001
VOLATILES (ug/kg)	
Ethylbenzene	330 J
Styrene	660 J
Xylenes (total)	880 J

SAMPLE ID	IR84-DP48-02
DEPTH	3-5
SAMPLE DATE	07-21-2001
VOLATILES (ug/kg)	
Ethylbenzene	330 J
Styrene	660 J
Xylenes (total)	880 J



NOTE

- DP-05, DP-15, DP-22, DP-68, DP-73, TP-01, TP-02 ARE APPROXIMATE LOCATIONS NOT BASED ON SURVEY DATA
- MW-15 IS A SOIL BORING
- ug/kg = MICROGRAMS PER KILOGRAM (SAME AS PARTS PER BILLION)
- VOL & SVOC ANALYSIS NOT PERFORMED ON SAMPLES FROM GRAYED LOCATIONS
- EXCEEDANCES OF EPA REGION IX PRG RESIDENTIAL SOIL VALUES

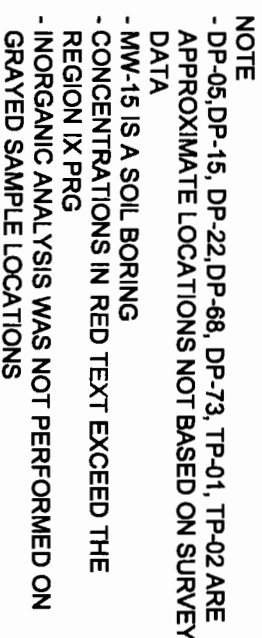
LEGEND

- ◆ - DIRECT PUSH SOIL BORING (2001)
- - EXISTING MONITORING WELL (1992)
- △ - TEST PIT (2001)
- - NEW MONITORING WELL (2001)
- ⊙ - SOIL SAMPLING LOCATION (1998)
- ⊙ - SOIL SAMPLING LOCATION (1995)

FIGURE 4-10
POSITIVE DETECTIONS OF VOCs AND SVOCs
IN SUBSURFACE SOIL
SITE 84
REMEDIAL INVESTIGATION
C/O - 0219
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

Baker Environmental





SAMPLE ID	1B84-SB04-02
DEPTH	3 - 5
DEPOSITION	
SAMPLE DATE	08-02-2001
METALS (mg/kg)	
Arsenic	0.89 J

SAMPLE ID	IR84-SB01-02
DEPTH	3 - 5
SAMPLE DATE	08-02-2001
METALS (mg/kg)	
Arsenic	1.6

SAMPLE ID	IR84-DP76-04
DEPTH	7 - 9
SAMPLE DATE	08-02-2001
METALS (mg/kg)	
Arsenic	0.53 J

SAMPLE ID	84-MW15-03
DEPTH	7 - 9
SAMPLE DATE	07-31-2000
METALS (mg/kg)	
Arsenic	0.62

SAMPLE ID	IR84-DP74-0
DEPTH	7 -
SAMPLE DATE	08-02-2000
METALS (mg/kg)	
Arsenic	0.4 J

DEPTH	1 - 3
SAMPLE DATE	07-21-200
METALS (mg/kg)	
Arsenic	0.7 J

SAMPLE ID	IPRA-DB47-0
METALS (mg/kg)	0.63 J
Arsenic	

SAMPLE DATE	08-03-200
METALS (mg/kg)	
Arsenic	0.59 J
SAMPLE ID	IR84-DR46-02
DEPTH	3-5

METALS (mg/kg)	
Arsenic	0.58 J

SAMPLE ID	IR84-MW22-02
DEPTH	3 - 5
SAMPLE DATE	08-03-2001
WET WEIGHT	1.00 g
DRY WEIGHT	0.80 g

This aerial map shows two lots, Lot 12 and Lot 16, situated near a road. Lot 12 is a rectangular parcel on the left, and Lot 16 is a larger, irregularly shaped parcel on the right. The road runs diagonally across the bottom of the image.

SAMPLE ID:	IR84-SB08-01
DEPTH	1 - 3
SAMPLE DATE	08-02-2007
METALS (mg/kg)	
Arsenic	0.8 U

AMPLE ID	R84-SB07-01
PTH	1 - 3
AMPLE DATE	08-02-2001
TOTALS (mg/kg)	
eseenic	0.87 J

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Baker Baker Environment

Baker Environmental

FIGURE 4-12
DETECTIONS OF INORGANICS ABOVE
REGION IX PRGS IN SUBSURFACE SOILS

SITE 84
REMEDIAL INVESTIGATION
CTO - 0219
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

SAMPLE ID	IR84-MW07-01C
SAMPLE DATE	08-06-2001
HERBICIDES (ug/L)	
MCPA	0.015 J

SAMPLE ID	IR84-MW20-01C
SAMPLE DATE	08-05-2001
SEMIVOLATILES (ug/L)	
2-Methylnaphthalene	1 J
PESTICIDES (ug/L)	
4,4'-DDE	0.028 J
4,4'-DDT	0.024 J
Endosulfon I	0.042 J
beta-BHC	0.03 J
gamma-Chlordane	0.025 J

SAMPLE ID	IR84-MW20-01CD
SAMPLE DATE	08-05-2001
SEMIVOLATILES (ug/L)	
2-Methylnaphthalene	1.1 J
PESTICIDES (ug/L)	
4,4'-DDE	0.029 J
4,4'-DDT	0.026 J
Endosulfon I	0.047 J

SAMPLE ID	IR84-MW17-01C
SAMPLE DATE	08-06-2001
VOLATILES (ug/L)	
Ethylbenzene	0.6 J
Trichloroethene	0.19 J
Xylenes (total)	1.8
PESTICIDES (ug/L)	
gamma-Chlordane	0.021 J
HERBICIDES (ug/L)	
MCPA	1.5 J

SAMPLE ID	AST781-GW03-988
SAMPLE DATE	4/23/98
VOLATILES (ug/L)	
Benzene	3.4 J
Ethylbenzene	3.6 J

SAMPLE ID	AST781-GW04-988
SAMPLE DATE	4/23/98
VOLATILES (ug/L)	
Benzene	1.5 J
Ethylbenzene	6.7 J

SAMPLE ID	IR84-MW19-01C
SAMPLE DATE	08-04-2001
HERBICIDES (ug/L)	
MCPA	0.057 J

SAMPLE ID	IR84-MW16-01C
SAMPLE DATE	08-04-2001
PESTICIDES (ug/L)	
Endosulfon I	0.029 J

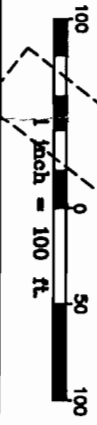
SAMPLE ID	IR84-MW22-01C
SAMPLE DATE	08-05-2001
VOLATILES (ug/L)	
Ethylbenzene	3.6
SEMIVOLATILES (ug/L)	
Naphthalene	2.2 J

SAMPLE ID	AST781-GW11-988
SAMPLE DATE	4/23/98
VOLATILES (ug/L)	
Chloroform	16

SAMPLE ID	IR84-MW21-01C
SAMPLE DATE	08-05-2001
PESTICIDES (ug/L)	
4,4'-DDE	0.036 J
Endosulfon I	0.046 J
gamma-Chlordane	0.029 J
HERBICIDES (ug/L)	
MCPA	0.16 J

SAMPLE ID	IR84-MW18-01C
SAMPLE DATE	08-04-2001
VOLATILES (ug/L)	
Carbon disulfide	0.49 J
PESTICIDES (ug/L)	
4,4'-DDE	0.044 J
Heptachlor epoxide	0.023 J
gamma-Chlordane	0.026 J

SAMPLE ID	AST781-GW12-988
SAMPLE DATE	4/23/98
VOLATILES (ug/L)	
Chloroform	16



Baker
Baker Environmental

LEGEND

- INTERMITTENT DRAINAGE SWELL
- TREE LINE
- GRAVEL ROAD
- MONITORING WELL (2001)
- MONITORING WELL (1992)

FIGURE 4-13
SITE 84
POSITIVE DETECTIONS OF ORGANIC COMPOUNDS IN GROUNDWATER
REMEDIAL INVESTIGATION
CTO - 0219

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

UNDERGROUND WIRES, LINES, PIPES AND OTHER UTILITIES
WERE NOT ATTEMPTED TO BE SURVEYED AT THIS TIME.
CONCENTRATIONS RED TEXT EXCEED THE FEDERAL MCL
CONCENTRATIONS GREEN TEXT EXCEED THE NC WQS.

SAMPLE ID	IR84-MW08-01C
SAMPLE DATE	08-06-2001
INORGANICS (ug/L)	
Iron	67.7
Manganese	0.18

SAMPLE ID	IR84-MW07-01C
SAMPLE DATE	08-06-2001
INORGANICS (ug/L)	
Iron	51.1
Manganese	0.45

SAMPLE ID	IR84-MW20-01C
SAMPLE DATE	08-05-2001
INORGANICS (ug/L)	
Iron	24.9
Manganese	0.16

SAMPLE ID	IR84-MW20-01CD
SAMPLE DATE	08-05-2001
INORGANICS (ug/L)	
Iron	24.1
Manganese	0.16

SAMPLE ID	IR84-MW17-01C
SAMPLE DATE	08-06-2001
INORGANICS (ug/L)	
Aluminum	0.73
Antimony	0.011 J
Iron	1
Manganese	0.0047 J

SAMPLE ID	IR84-MW19-01C
SAMPLE DATE	08-04-2001
INORGANICS (ug/L)	
Aluminum	0.58
Iron	0.39
Manganese	0.012 J

SAMPLE ID	IR84-MW09-01C
SAMPLE DATE	08-05-2001
INORGANICS (ug/L)	
Aluminum	0.44
Iron	0.74
Manganese	0.004 J

SAMPLE ID	IR84-MW10-01C
SAMPLE DATE	08-05-2001
INORGANICS (ug/L)	
Aluminum	0.55
Manganese	0.04

SAMPLE ID	IR84-MW23-01C
SAMPLE DATE	08-06-2001
INORGANICS (ug/L)	
Aluminum	0.52
Iron	25.8
Manganese	0.066

UNDERGROUND WIRES, LINES, PIPES AND OTHER UTILITIES WERE NOT ATTEMPTED TO BE SURVEYED AT THIS TIME. CONCENTRATIONS IN RED TEXT EXCEED THE FEDERAL MCL CONCENTRATIONS IN GREEN TEXT EXCEED THE NC WQS. CONCENTRATIONS IN PURPLE TEXT EXCEED BOTH THE FEDERAL MCL AND NC WQS.

LEGEND

INTERMITTENT DRAINAGE SWELL

TREE LINE

GRAVEL ROAD

MONITORING WELL (2001)

MONITORING WELL (1992)

FIGURE 4-14

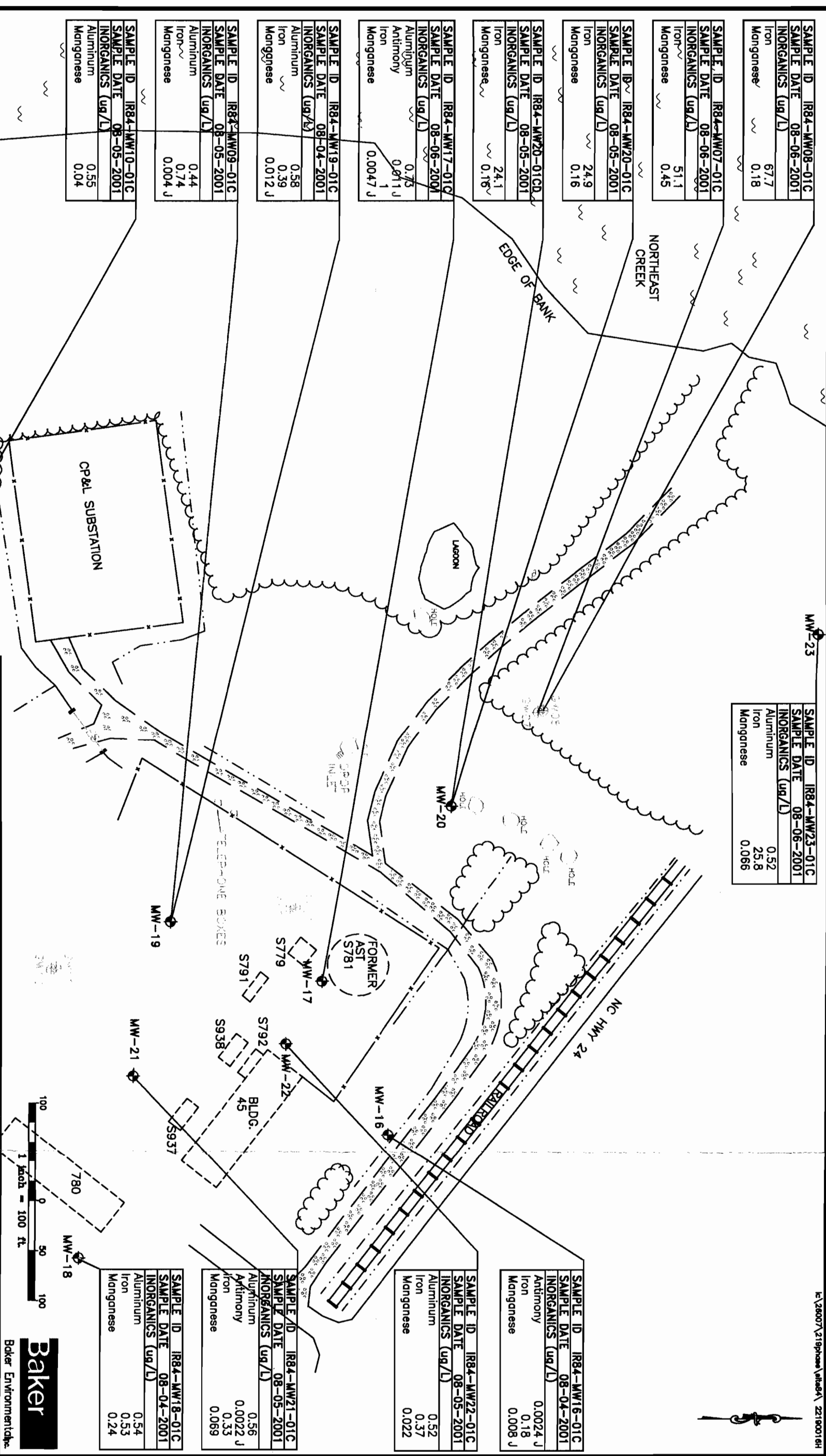
SITE 84

REMEDIAL INVESTIGATION

CTO - 0219

MARINE CORPS BASE, CAMP LEJEUNE

NORTH CAROLINA



5.0 CONTAMINANT FATE AND TRANSPORT

The potential for a contaminant to migrate and persist in an environmental medium is critical to consider when evaluating the potential for a chemical to elicit an adverse human health or ecological effect. The environmental mobility of a chemical is influenced by its physical and chemical properties, the physical characteristics of the site, and the site chemistry. This section presents a discussion of the various physical and chemical properties of contaminants detected at Site 84 and their fate and transport through the environment.

5.1 Chemical and Physical Properties Impacting Fate and Transport

Table 5-1 presents the physical and chemical properties associated with the organic contaminants detected during this investigation. These properties determine the inherent environmental mobility and fate of a contaminant. These properties include:

- Vapor pressure
- Water solubility
- Octanol/water partition coefficient
- Organic carbon adsorption coefficient
- Specific gravity
- Henry's Law constant
- Mobility index

A discussion of the environmental significance of each of these properties follows.

Vapor pressure provides an indication of the rate at which a chemical may volatilize. It is of primary significance at environmental interfaces such as surface soil/air and surface water/air. Volatilization can be important when evaluating groundwater and subsurface soils, particularly when selecting remedial technologies. Vapor pressure for monocyclic and polycyclic aromatics are generally higher than vapor pressures for PCBs. Contaminants with higher vapor pressures (e.g., VOCs) will enter the atmosphere at a quicker rate than the contaminants with low vapor pressure (e.g., PCBs).

A quantitative assessment of mobility has been developed that uses water solubility (S), vapor pressure (VP), and organic carbon partition coefficient (K_{oc}) (Laskowski, 1983). This value is referred to as the Mobility Index (MI). It is defined as:

$$MI = \log((S \cdot VP) / K_{oc})$$

A scale to evaluate MI is presented by Ford and Gurba (1984):

<u>Relative MI</u>	<u>Mobility Description</u>
>5	extremely mobile
0 to 5	very mobile
-5 to 0	slightly mobile
-10 to -5	immobile
<-10	very immobile

The relative mobilities of many organic and inorganic constituents are presented in Tables 5-1 and 5-2, respectively.

5.2 Contaminant Transport Pathways

Based on the evaluation of existing conditions at Site 84, the following potential contaminant transport pathways have been identified.

- Leaching of soil contaminants to groundwater;
- Migration of groundwater contaminants off site;
- Migration of contaminants off site via surface runoff; and
- Migration of groundwater to surface water/sediment.

Contaminants released to the environment could also undergo the following during transportation:

- Physical transformations: volatilization, precipitation
- Chemical transformations: photolysis, hydrolysis, oxidation, reduction
- Biological transformation: biodegradation
- Accumulation in one or more media

groundwater flow velocities, in sandy aquifers, under natural gradient conditions are probably between 10 meters/year to 100 meters/year (32.8 to 328 feet/year) (Lyman, et al., 1982). Specific groundwater flow velocities were estimated for Site 84 at 47 feet/year to 73 feet/year.

When monitoring wells or supply wells in silty sand aquifers are located hundreds or thousands of meters downgradient of a contaminated source, the average travel time for the groundwater to flow from the source to the well point is typically on the order of decades. Site 84 includes a wetland area that lies adjacent to a tidally influenced portion of Northeast Creek so this pathway could be significant at this site.

Dispersion

Dispersion results from two basic processes, molecular diffusion and mechanical mixing. The kinetic activity of dissolved solutes results in diffusion of solutes from a zone of high concentration to a lower concentration. Dispersion and spreading during transport result in the dilution of contaminants (maximum concentration of contaminant decreases with distance from the source). For simple hydrogeological systems, the spreading is reported to be proportional to the flow rate. Spreading is largely scale dependent. Furthermore, dispersion in the direction of flow is often observed to be markedly greater than dispersion in the directions transverse (perpendicular) to the flow. Because detailed studies to determine dispersive characteristics at the site were not conducted, longitudinal and transverse dispersivities are estimated based on similar hydrogeological systems (Mackay, et al., 1985).

Chemical Mechanisms

Some dissolved contaminants may interact with the aquifer solids encountered along the flow path through adsorption, partitioning, ion exchange, and other processes. The interactions result in the contaminant distribution between aqueous phase and aquifer solids, diminution of concentrations in the aqueous phase, and retardation of the movement of the contaminant relative to groundwater flow. The higher the fraction of the contaminant sorbed, the more retarded its transport. Certain halogenated organic solvents sorption is affected by hydrophobicity (antipathy for dissolving in water) and the fraction of solid organic matter in the aquifer solids (organic carbon content). If the aquifer is homogeneous, sorption of hydrophobic organic solute should be constant in space and time. If the sorptive interaction is at equilibrium and completely reversible, the solute should move at a constant average velocity equal to the groundwater average velocity divided by the retardation factor.

content of organic matter. The extent of adsorption depends on either the respective charges on the adsorbing surface and the metallic cation.

In addition to these adsorption reactions, precipitation of new mineral phases also may occur if the chemical composition of the soil solution becomes supersaturated with respect to the insoluble precipitates. Of the probable precipitates, the most important of these phases are hydroxides, carbonates, and sulfides. The precipitation of hydroxide minerals is important for metals such as iron and aluminum, the precipitation of carbonate minerals is significant for calcium and barium, and the precipitation of sulfide minerals dominates the soil chemistry of zinc, cadmium and mercury. A number of precipitates may form if metals are added to soils. The concentration of metals in solution will be controlled, at equilibrium, by the solid phase that results in the lowest value of the activity of the metallic ion in solution.

The study area has a higher elevation area where Building 45 was located, with a small slope to the west towards the wetlands bordering Northeast Creek. The site area is open in the higher elevation area and mostly wooded in the low -lying area, and all surface water runoff is directed to Northeast Creek. Groundwater flow direction across the site is to the northeast, with discharge to Northeast Creek.

Table 5-3 presents the general processes that influence the aquatic fate of contaminants at Site 84, these processes include: sorption, volatilization, biodegradation, photolysis, hydrolysis, and bioaccumulation. For organic priority pollutants, consulting the rates contained in this table concerning the relative importance or aquatic processes for the fate of each compound may aid in the elimination of unimportant processes.

5.3 Fate and Transport Summary

The following paragraphs summarize the contaminant group fate and transport data for contaminants detected in media at Site 84.

5.3.1 Volatile Organic Compounds (VOCs)

Volatile organic compounds (i.e., benzene) tend to be mobile in environmental media as indicated by their presence in groundwater and their corresponding MI values. Their environmental mobility is a function of high water solubilities, high vapor pressure, low K_{ow} and K_{oc} values, and high mobility indices.

strongly to soil and sediments and can remain there for years or decades. Adsorption of these contaminants to soil and sediment is the major fate of these contaminants in the environment. PCBs in water concentrate in fish to levels hundreds to thousands of times higher than water concentrations. PCBs will not typically be leached from the shallow soil to deeper soils or groundwater by infiltration of rainwater. PCBs in sediments in large water bodies such as lakes, rivers, and oceans can act as a reservoir for adding small amounts of PCBs to water. PCBs can be present in the air in solid, liquid aerosol, or vapor form which then can be washed back onto land by snow or rain. PCBs can partially evaporate from soil surface to air. Airborne PCBs can be carried long distances. At Site 84, PCBs would most likely be released to the air when soil particles are disturbed during earth moving activities.

5.3.4 Inorganics

Inorganics can be found as solid complexes at ambient temperature and pressure in soils at the site. Inorganic ions exist in pure solutions as hydrated ions. Groundwater, as opposed to a pure solution, is a highly complex chemical system that is heavily influenced by the mineralogy of the substrate. Factors affecting the transport of inorganics in saturated soils are interactive and far more complex and numerous than those affecting the transport of organic contaminants.

The most complicated pathway for inorganic contaminants is migration in subsurface soils and groundwater, where oxidation reduction potential (Eh) and pH play critical roles. Table 5-2 presents an assessment of relative inorganic environmental mobilities as a function of Eh and pH. Soils at Site 84 are relatively acidic (see Section 3.2.2), therefore, selenium, zinc, copper, nickel, mercury, and silver will be highly mobile in soils while remaining inorganics will have moderate to low mobilities.

Transport of inorganic species in groundwater is mainly a function of the inorganic's solubility in solution under chemical conditions of the soil-solution matrix. The inorganic must be dissolved (i.e., in solution) for leaching and transport by advection with the groundwater to occur. Generally, dynamic and reversible processes control solubility and transport of the dissolved metal ions. Such processes include precipitation/dissolution, adsorption/desorption, and ion exchange.

TABLES

TABLE 5-1

PHYSICAL AND CHEMICAL PROPERTIES FOR ORGANIC COPCS
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJEUNE, NORTH CAROLINA

Constituents	Specific Gravity ⁽¹⁾ (g/cm ³)	Vapor Pressure ⁽²⁾ (mm Hg)	Water Solubility ⁽²⁾ (mg/L)	Octanol / Water Coefficient (Log Kow) ⁽²⁾	Sediment Partition Coefficient (Log Koc) ⁽³⁾	Henry's Law Constant ⁽²⁾ (atm-m ³ /mole)	Mobility Index ⁽⁴⁾	Mobility Description
Acetone	0.79	2.30E+02	1.00E+06 ⁽⁷⁾	-0.24	-0.24	3.88E-05	9	Extremely Mobile
Benzene	0.88	9.50E+01	1.79E+03	2.13	1.77	5.55E-03	3	Very Mobile
Chloroform	1.50	1.97E+02	7.92E+03	1.97	1.60	3.67E-03	5	Very Mobile
Xylenes, total	0.86	5.10E+00 ⁽⁶⁾	1.75E+02 ⁽¹⁰⁾	3.15 ⁽¹¹⁾	2.57	2.15E-01 ⁽¹¹⁾	0	Very Mobile
2-Methylnaphthalene	1.00	5.50E-02	2.46E+01	3.86	3.35	5.18E-04	-3	Slightly Mobile
Benzo(a)anthracene	1.27	1.05E-07	9.40E-03	5.66	5.60	3.35E-06	-15	Very Immobile
Benzo(a)pyrene	1.35	5.49E-09	1.62E-03	5.97	6.01	1.13E-06	-17	Very Immobile
Benzo(b)fluoranthene	--	5.00E-07	1.50E-03	6.12	6.09	1.11E-04	-15	Very Immobile
Benzo(k)fluoranthene	--	2.00E-09	8.00E-04	6.12	6.09	8.29E-07	-18	Very Immobile
Bis(2-chloroethoxy)methane	--	1.40E-04	1.21E+05	0.75	0.74	1.70E-07	0	Very Mobile
Carbazole	1.10	7.00E-04	1.20E+00	3.72	3.53	6.26E-07 ⁽¹¹⁾	-7	Immobile
Chrysene	1.22	6.23E-09	6.30E-03	5.66	5.60	9.46E-05	-16	Very Immobile
Dibenz(a,h)anthracene	--	1.00E-10	2.49E-03	6.50	6.58	1.47E-08	-19	Very Immobile
Dibenzothiophene	--	2.00E-03 ⁽⁷⁾	1.47E+00	4.38	--	4.37E-04 ⁽⁷⁾	--	--
Fluoranthene	--	1.23E-08	2.06E-01	4.95	5.03	1.61E-05	-14	Very Immobile
Indeno(1,2,3-cd)pyrene	--	1.00E-10	2.20E-05	6.58	6.54	1.60E-06	-21	Very Immobile
Naphthalene	1.00	8.50E-02	3.10E+01	3.30	3.30	4.83E-04	-3	Slightly Mobile
Pyrene	1.27	2.45E-06	1.35E+00	4.88	5.02	1.10E-05	-11	Very Immobile
4,4'-DDD	1.39	6.70E-07	9.00E-02	6.02	6.00	4.00E-06	-13	Very Immobile
Chlordane, alpha-	--	9.80E-06 ⁽⁸⁾	5.60E-02 ⁽⁸⁾	5.54 ⁽⁸⁾	5.08 ⁽⁸⁾	4.86E-05 ⁽⁸⁾	-11	Very Immobile
Chlordane, gamma-	--	9.80E-06 ⁽⁸⁾	5.60E-02 ⁽⁸⁾	5.54 ⁽⁸⁾	5.08 ⁽⁸⁾	4.86E-05 ⁽⁸⁾	-11	Very Immobile
Dieldrin	1.75	5.89E-06	1.95E-01	4.55	4.33	1.51E-05	-10	Very Immobile
Heptachlor	1.58	4.00E-04	1.80E-01	4.27	6.15	1.48E+00	-10	Very Immobile
Heptachlor Epoxide	--	1.95E-05	2.00E-01	5.40	4.92	9.50E-06	-10	Very Immobile

TABLE 5-1 (Continued)

PHYSICAL AND CHEMICAL PROPERTIES FOR ORGANIC COPCs
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Constituents	Specific Gravity ⁽¹⁾ (g/cm ³)	Vapor Pressure ⁽²⁾ (mm Hg)	Water Solubility ⁽²⁾ (mg/L)	Octanol / Water Coefficient (Log Kow) ⁽²⁾	Sediment Partition Coefficient (Log Koc) ⁽³⁾	Henry's Law Constant ⁽²⁾ (atm-m ³ /mole)	Mobility Index ⁽⁴⁾	Mobility Description
Aroclor-1248	1.40 ⁽⁵⁾	3.75E-01 ⁽⁹⁾	6.00E-03 ⁽¹⁰⁾	5.80 ⁽¹¹⁾	5.70	1.19E-02 ⁽¹¹⁾⁽¹²⁾	-8	Immobile
Aroclor-1254	1.50	3.75E-01 ⁽⁹⁾	7.00E-02	6.00 ⁽¹¹⁾	5.30	8.20E-02 ⁽¹¹⁾	-7	Immobile
Aroclor-1260	--	3.75E-01 ⁽⁹⁾	8.00E-02 ⁽¹⁰⁾	7.10 ⁽¹¹⁾	5.46	1.89E-01 ⁽¹¹⁾	-7	Immobile
MCPA	--	2.92E-04	1.17E+03	2.86	2.26	6.89E-08	-3	Slightly Mobile
Diesel Range Organics	--	--	--	--	--	--	--	--
Gasoline Range Organics	--	--	--	--	--	--	--	--

Notes:

- - Criteria not available
g/cm³ - grams per cubic centimeter
mm Hg - millimeters of mercury
mg/L - milligrams per liter
ppm - parts per million
atm-m³/mole - atmosphere - cubic meter per mole
- (1) Values provided by ChemFinder unless otherwise noted
(2) Values provided by Environmental Fate Data Base: CHEMFATE Chemical Search (<http://esc-plaza.syrres.com/efdb/Chemfate.htm>) unless otherwise noted
(3) Risk Assessment Information System (RAIS) unless otherwise noted
(4) Calculated using the equation: $MI = \text{LOG}((WS \cdot VP) / Koc)$
where MI = Mobility Index, WS = Water Solubility, VP = Vapor Pressure, and Koc = Organic Carbon Partition Coefficient
(5) Sigma-Aldrich Technical Library. <http://www.sigma-aldrich.com/saws.nsf/Technical+Library?OpenFrameset>
(6) Chemfinder Program CD (MolTable Tab on Spreadsheet)
(7) PA DEP Land Recycling Program Chemical and Physical Properties Database <http://www.dep.state.pa.us/physicalproperties/Default.htm>
(8) Value for Chlordane
(9) Value for total PCBs
(10) ChemFinder. 2000.
(11) Risk Assessment Information System (RAIS) - <http://risk.lsd.ornl.gov/cgi-bin/tox/>
(12) Value for Aroclor-1016

TABLE 5-2
RELATIVE MOBILITIES OF INORGANICS AS A FUNCTION OF
ENVIRONMENTAL CONDITIONS (Eh, pH)
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Relative Mobility	Environmental Conditions			
	Oxidizing	Acidic	Neutral/Alkaline	Reducing
Very High			Se	
High	Se, Zn	Se, Zn, Cu, Ni, Hg, Ag		
Medium	Cu, Ni, Hg, Ag, As, Cd	As, Cd	As, Cd	
Low	Pb, Ba, Se	Pb, Ba, Be	Pb, Ba, Be	
Very Low	Fe, Cr	Cr	Cr, Se, Zn, Cu, Ni, Hg, Ag	Cr, Se, Zn, Cu, Ni, Hg, Pb, Ba, Be, Ag

Notes:

As = Arsenic
Ag = Silver
Ba = Barium
Be = Beryllium
Cd = Cadmium
Cr = Chromium
Cu = Copper

Fe = Iron
Hg = Mercury
Ni = Nickel
Pb = Lead
Se = Selenium
Zn = Zinc

Source: Swartzbaugh, et al. "Remediating Sites Contaminated with Heavy Metals."
Hazardous Materials Control, November/December 1992.

TABLE 5-2
RELATIVE MOBILITIES OF INORGANICS AS A FUNCTION OF
ENVIRONMENTAL CONDITIONS (Eh, pH)
OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Relative Mobility	Environmental Conditions			
	Oxidizing	Acidic	Neutral/Alkaline	Reducing
Very High			Se	
High	Se, Zn	Se, Zn, Cu, Ni, Hg, Ag		
Medium	Cu, Ni, Hg, Ag, As, Cd	As, Cd	As, Cd	
Low	Pb, Ba, Se	Pb, Ba, Be	Pb, Ba, Be	
Very Low	Fe, Cr	Cr	Cr, Se, Zn, Cu, Ni, Hg, Ag	Cr, Se, Zn, Cu, Ni, Hg, Pb, Ba, Be, Ag

Notes:

As = Arsenic
Ag = Silver
Ba = Barium
Be = Beryllium
Cd = Cadmium
Cr = Chromium
Cu = Copper

Fe = Iron
Hg = Mercury
Ni = Nickel
Pb = Lead
Se = Selenium
Zn = Zinc

Source: Swartzbaugh, et al. "Remediating Sites Contaminated with Heavy Metals."
Hazardous Materials Control, November/December 1992.

TABLE 5-3

RELATIVE IMPORTANCE OF PROCESSES INFLUENCING AQUATIC FATE OF ORGANIC POLLUTANTS
 OPERABLE UNIT NO. 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJEUNE, NORTH CAROLINA

Constituents	Sorption	Volatilization	Biodegradation	Photolysis-Direct	Hydrolysis	Bioaccumulation
Volatiles:						
1,1,2,2-Tetrachloroethane	?	+	--	--	--	?
1,1,2-Tetrachloroethane	?	+	--	--	--	?
1,1-Dichloroethene (Total)	?	+	?	--	--	?
Cis-1,2-Dichloroethene	--	+	?	--	--	--
Toluene	+	+	?	--	--	--
Trans-1,2-Dichloroethene	--	+	?	--	--	--
Trichloroethene	--	+	?	--	--	--
Vinyl chloride	+	--	--	--	--	--
Semivolatiles:						
Benzo(a)pyrene	+	+	+	+	--	--
PCBs:						
Aroclor-1254	+	--				+
Aroclor-1260	+	--				+

Key to Symbols:

- + Could be an important fate process
- Not likely to be an important process
- ? Importance of process uncertain or not known
- NA - Information not available

Source: U.S. Environmental Protection Agency. September 1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water - Part I. EPA/600-6-85/022a.



6.0 HUMAN HEALTH RISK ASSESSMENT

A baseline human health risk assessment (RA) was performed as part of the RI/FS for Site 84 to evaluate if unacceptable risks may be associated with potential exposure to existing conditions at the site. The baseline RA considers the most likely routes of potential human exposure for both current and future risk scenarios. The baseline RA was conducted in accordance with the Risk Assessment Guidance for Superfund (RAGS), Part A, Human Health Evaluation Manual (USEPA, 1989a) and the most recent updates, including the reporting format as set forth in RAGS Part D (USEPA, 1998). USEPA Region IV Supplemental Risk Guidance (USEPA, 1995a) was also utilized throughout the baseline RA process. North Carolina DENR was consulted for guidance in the State of North Carolina. The RA was based on an evaluation of analytical data acquired during the 1995 Pre-Remedial Investigation (Pre-RI) for Sites 12, 68, 75, 76, 84, 85, and 87 (Baker, 1998) and the RI conducted in 2001.

The baseline RA is comprised of eight sections; Section 6.1 presents the site location and characterization. Section 6.2 presents the hazard identification, which presents criteria for selecting chemicals of potential concern (COPCs). Sections 6.3 and 6.4 present the exposure assessment and toxicity assessment, respectively. The risk characterization, including a discussion of potential human health effects, is presented in Section 6.5. Section 6.6 outlines the potential sources of uncertainty encountered in the process of performing a risk assessment, and their potential effects on the estimation of human health risks. A summary of the baseline RA is provided in Section 6.7. Section 6.8 lists the references.

6.1 Site Location and Characterization

The following information on Site 84 is provided in order to characterize the exposure setting. This background section will provide an overview of the characteristics of Site 84 and will provide a site location, a general site description, and the site-specific chemicals as discussed in past reports. The physical characteristics of the site and the geographical areas of concern will also be briefly discussed. For more detailed information on the previous investigations and the site characteristics of Site 84, a complete discussion is included in Sections 1.0 and 3.0 of this RI report.

Site 84 is located approximately 200 yards south of Highway 24 on the main side of MCB, Camp Lejeune, one mile west of the main gate entrance. A map of the site is presented as Figure 1-2. The northeast edge of the study area runs along railroad tracks and the northwest edge is bordered by Northeast Creek. The site extends to the south and west to encompass the foundation of Building 45, and a small, possibly man-made lagoon. Toward the creek, the site is mostly wooded or covered by thick vegetation or grass. There is an unrestricted access road that runs through the site and terminates at Northeast Creek. The site is relatively flat with some minor surface mounds in the wooded areas. Overland surface water drainage is west in the direction of Northeast Creek.

Building 45 is a former electric substation, where transformers reportedly containing polychlorinated biphenyls (PCBs) were known to be used and possibly stored. A transformer was discovered in the wooded area, east of the substation. Additional transformers (approximately 20) potentially containing PCB transformer oil were discovered and removed from the lagoon. Maintenance personnel at Building 45 have indicated that additional transformers may still be buried in areas near the lagoon; however, it was reported that public works had performed minor excavations in the area and did not discover any buried materials.

Refer to Section 1.0 for details on previous investigations conducted at Site 84. Refer to Section 2.0, "Field Investigation," for details on the collection of the samples for the Site 84 RI conducted in the summer of 2001.

The laboratory results from the Pre-RI and RI site sampling activities that will be utilized in the human health risk assessment are discussed in Section 6.2 "Hazard Identification."

6.2 Hazard Identification

Data generated during the Pre-RI and RI field investigation at Site 84 were used to draw conclusions and to identify data gaps in the baseline RA. The data were evaluated to assess which data were of sufficient quality to include in the risk assessment. The objective when selecting data to include in the risk assessment was to provide accurate and precise data to characterize contamination and evaluate exposure pathways.

6.2.1 Data Evaluation

The initial hazard identification step entailed the validation and evaluation of the site data to determine its usability in the risk assessment. This process resulted in the identification of COPCs for the site. During this validation and evaluation, data that would result in inaccurate conclusions (e.g., data that were rejected or attributed to blank contamination, as qualified by the validator) were reduced within the data set. Data reduction entailed the removal of unreliable data from the original data set based on the guidelines established by USEPA. A summary of the data quality was presented in Section 4.0.

Duplicate sample data were averaged with corresponding environmental sample data and re-included into the data set for these risk evaluations. In instances where the original and duplicate sample result were either both detected or both non-detected, the values were averaged for the risk assessment. In instances when the original and duplicate sample result contained one detection and one non-detection, the detected value was averaged with one-half of the detection limit of the non-detected value and the averaged sample result was considered a detection.

Two soil evaluations were performed for Site 84. The first evaluation ("before non-Time Critical Removal Action [TCRA]" scenario) included surface and subsurface soil sampled from the perimeter of the foundation of Building 45. For surface soil, the before non-TCRA sample size ranged from 11 to 91 data points, depending on the type of analysis. For subsurface soil, the before non-TCRA sample size ranged from 8 to 37 data points, depending on the type of analysis. The second evaluation ("after non-TCRA" scenario) excluded these perimeter samples, which are to be excavated as part of the non-TCRA at Site 84 scheduled for February 2002. For surface soil, the after non-TCRA sample size ranged from 11 to 77 data points, depending on the type of analysis. For subsurface soil, the after non-TCRA sample size ranged from 1 to 24 data points, depending on the type of analysis. Figure 6-1 indicates the planned area of excavation. Please note that for further details the reader is referred to the Draft non-TCRA (Baker, 2001b).

6.2.2 Identification of Data Suitable for Use in a Quantitative Risk Assessment

To provide for accurate conclusions to be drawn from sampling results, analytical data were reviewed and evaluated. This section presents the criteria that were used to review, reduce, and summarize the analytical data. These criteria are consistent with USEPA guidance for data reduction.

Four environmental media were investigated at Site 84 during this RI: surface soils (zero to one foot bgs), subsurface soils (one to fifteen feet bgs), shallow groundwater, and surface water. Sediment samples were collected in October 1995 and March 1998. For the baseline RA, the surface soil and subsurface soil data were evaluated as single data sets. That is, the data were not segregated into areas of concern. Surface water and sediment samples were collected from both the lagoon located near Building 45 and Northeast Creek. These media were assessed for potential risk to human receptors.

Shallow groundwater is currently not utilized as a potable source at the site. Although the shallow aquifer is classified as GA (i.e., existing or potential source of drinking water for humans), it is not used as a potable water source at MCB Camp Lejeune because of its low yielding production rates. However, there remains the possibility that upon closure of this facility, residential housing or industrial/commercial buildings could be constructed, and shallow groundwater could be used for potable purposes in the future. Therefore, in accordance with USEPA guidance, groundwater exposure was conservatively evaluated for future residential receptors.

For current receptors (military Base personnel and recreational users), potable water is supplied by the Base treatment facilities using water supply wells that are set in the lower reaches of the Castle Hayne aquifer (typically 200 to 300 feet bgs). Current operating wells are periodically sampled for control purposes. Hence, assessing current risks to contaminants detected in the shallow aquifer for current receptors is unnecessary and, if estimated, may present an unlikely risk. Based on this, groundwater exposure to current receptors was not estimated for this investigation.

Information relating to the nature and extent of contamination at the site and the selection of COPCs at the site is provided in Section 4.0 of this report. The reduced data sets for all media of concern at the site are provided in Appendix F of this report.

6.2.3 Criteria for Selecting Chemicals of Potential Concern

As recommended in the USEPA Risk Assessment Guidance for Superfund (RAGS) (USEPA, 1989a) and Region IV Bulletin (USEPA, 1995a), the following criteria were used to select the COPCs:

- Comparison to USEPA Region IX PRGs;
- Comparison to field and laboratory blank data;
- Comparison to background or naturally occurring levels; and
- Essential Nutrients

Additional criteria used to assist in the selection of COPCs include:

- Historical information;
- Persistence;
- Mobility;
- Comparison to anthropogenic levels;
- Toxicity; and
- State and federal standards and criteria

As recommended in the Region IV Bulletin, Water Quality Standards for human health (consumption of water and organisms) were used as a screening tool for surface water. A brief description of the selection criteria used in choosing final COPCs is presented below.

Tables 6-1A through 6-5 present the data and COPC selection summary for each media, grouped according to organic compounds and inorganics within each table.

USEPA Region IX PRGs - The screening values used in this baseline RA are Preliminary Remediation Goals (PRGs) for Region IX. PRGs are tools for evaluating and cleaning up contaminated sites. They are risk-based concentrations derived from standardized equations (representing ingestion, dermal contact, and inhalation exposure pathways), combining exposure information assumptions and EPA toxicity data. The PRGs contained in the Region IX PRG Table are generic; they are calculated without site specific information. Region IX PRGs should be viewed as Agency guidelines, not legally enforceable standards. The PRGs for potentially carcinogenic chemicals are based on a target Incremental Lifetime Cancer Risk (ILCR) of 1×10^{-6} . The PRGs for noncarcinogens are based on a target hazard quotient of 1.0. In order to account for cumulative risk from multiple chemicals in a medium, it is necessary to derive the PRGs based on a target hazard quotient of 0.1. Noncarcinogenic PRGs based on a target hazard quotient of 0.1 and the most recent toxicological criteria available, results in a set of values that can be used as screening criteria. In order to yield a hazard index of 0.1, the noncarcinogenic PRGs were divided by a factor of ten. For potential carcinogens, the toxicity criteria applicable to the derivation of PRG values are oral and inhalation cancer slope factors (CSFs); for

noncarcinogens, they are chronic oral and inhalation reference doses (RfDs). These toxicity criteria are subject to change as more updated information and results from the most recent toxicological/epidemiological studies become available. The PRG table is updated annually to reflect such changes. It should be noted that the most recent update was in the year 2000.

Tap water PRGs were used as screening values for groundwater based on the assumption that groundwater will be used as a potable supply in the future. Because of the potential for residential use of this site, residential soil PRGs were used as screening criteria for soil and sediment (USEPA, 1995a).

Ambient Water Quality Criteria (AWQC) - AWQC are non-enforceable regulatory guidelines and are of primary utility in assessing acute and chronic toxic effects in aquatic systems. They may also be used for identifying the potential for human health risks. AWQC consider acute and chronic effects in both freshwater and saltwater aquatic life, and potential carcinogenic and noncarcinogenic health effects in humans from ingestion of both water (2 liters/day) and aquatic organisms (6.5 grams/day), or from ingestion of water alone (2 liters/day). The human health AWQCs for potential carcinogenic substances are based on the USEPA's specified incremental cancer risk range of one additional case of cancer in an exposed population of 10,000,000 to 100,000 (i.e., the 10^{-7} to 10^{-5} range) (USEPA, 1992d). It should be noted that although the AWQC are considered Applicable or Relevant and Appropriate Requirements (ARARs), they were used to select COPCs for surface water based on the recommendation in the Region IV Bulletin (USEPA, 1995a).

Contaminant Concentrations in Blanks - If a chemical is detected in both the environmental sample and a blank sample, it may not be retained as a COPC in accordance with RAGS depending on the concentration of the chemical in the media (USEPA, 1989a). Therefore, blank data were compared with results from environmental samples. If the blanks contained detectable results for common laboratory contaminants (i.e., acetone, 2-butanone, methylene, chloride, toluene, and phthalate esters), environmental sample results were considered as positive results only if they exceeded 10 times the maximum amount detected in the associated blank. If the chemical detected in the blank(s) is not a common laboratory contaminant, environmental sample results were considered as positive results only if they exceeded five times the maximum amount detected in the associated blank(s) (USEPA, 1991a). Furthermore, the elimination of an environmental sample result would directly correlate to a reduction in the prevalence of the contaminant in that media.

Associated blanks for the site included trip blanks and rinsate blanks. The aforementioned methodologies for evaluating blanks were implemented during third party analytical data validation prior to the selection of COPCs in the risk assessments. Quality Assurance/Quality Control (QA/QC) data summaries are presented in Appendix F.

Background or Naturally-Occurring Levels - Generally, a comparison to naturally-occurring levels applies only to inorganic analytes, because the majority of organic chemicals are not naturally occurring. Background samples are collected from areas that are not influenced by site contamination. Sample concentrations for surface and subsurface soil were compared to base-specific (i.e., two times the base-wide average concentration) background levels. If the maximum detected concentration of an inorganic was less than two times the base-wide average concentration, it was not retained as a COPC. Surface soil at Site 84 was classified as fine sands. Therefore, soil from Site 84 was compared to fine sands background data sets. Background soil data (Baker, 2001a) are presented in Tables 6-1A through 6-2B.

Essential Nutrients - Despite their inherent toxicity, certain inorganic constituents are essential nutrients. Essential nutrients need not be considered further in the baseline RA if they are present in relatively low concentrations (i.e., slightly elevated above naturally occurring levels), or if the constituent is toxic at doses much higher than those which could be assimilated through exposures at the site (USEPA, 1989a). Elements evaluated as essential nutrients include calcium, magnesium, potassium, and sodium. Although iron is considered an essential nutrient, it is evaluated quantitatively in this RA since toxicity criteria are available for this analyte.

Re-inclusion of Chemicals as COPCs

Chemicals can be re-included as COPCs for quantitative evaluation in the baseline RA, despite having been eliminated as such from a comparison to PRGs (or other aforementioned criteria). Criteria for reinclusion of chemicals as COPCs are as follows: toxicity, mobility, persistence and bioaccumulation, chemicals by class (i.e., carcinogenic PAHs), historical use, special exposure routes (i.e., daycares, nursing homes, hospitals), and ARARs (chemicals with Applicable or Relevant and Appropriate Requirements). Each criterion is discussed in the paragraphs that follow.

Toxicity, Mobility, Persistence and Bioaccumulation - Certain aspects of toxicity of the chemicals must be considered before eliminating them. For example, before eliminating potentially carcinogenic chemicals, the weight-of-evidence classification, which indicates the quality and quantity of data underlying a chemical's designation as a potential human carcinogen, should be considered in conjunction with the concentrations detected at the site. It may be practical and conservative to retain a chemical that was detected at low concentrations if that chemical is a Group A carcinogen. Three additional factors that must be considered for a chemical's retention as a COPC are mobility, persistence, and bioaccumulation. For example, a highly volatile or mobile chemical such as benzene or a long-lived or persistent chemical such as dioxin, probably should remain in the risk assessment.

Chemicals by Class - Chemicals grouped by class, such as PAHs, may be included as a COPC despite the fact that some were detected at levels below the PRG screening criterion, or if toxicity information is not available. Carcinogenic PAHs are known to occur in groups and so their reinclusion can provide a more conservative evaluation for human health and the environment.

Historical Information - Chemicals reliably associated with site activities based on historical information generally should not be eliminated from the quantitative risk assessment, even if they do not exceed relevant criteria.

Special Exposure Routes - For some chemicals, certain exposure routes need to be considered carefully to determine if they should be reincluded. For example, some chemicals are highly volatile and may pose significant inhalation risk due to the home use of contaminated water, particularly for showering. In addition, sensitive populations can create special exposure routes, such as the location of a daycare center, a nursing home, or a hospital near an area containing potentially harmful chemicals.

ARARs - Chemicals with Applicable or Relevant and Appropriate Requirements or ARARs (including those relevant to land ban compliance) usually are not appropriate for exclusion from the quantitative risk assessment. This may, however, depend in part on how the chemicals' site concentrations in specific media compare with their ARAR concentrations for these media. (USEPA, 1989a).

Contaminant concentrations in aqueous media can be compared to contaminant-specific state and federal criteria. This risk assessment utilizes NC WQS for groundwater and Federal MCLs.

Regulatory guidelines are used, when necessary, to infer potential health risks and environmental impacts. Health Advisories (HA) are relevant regulatory guidelines. An explanation of the federal and state criteria and standards used for qualitative evaluation of chemical compounds and inorganics is presented below. It should be emphasized that COPCs were not chosen based on comparison to state and federal criteria. However, these standards and criteria were used for a qualitative analysis of the COPCs.

North Carolina Water Quality Standards (NC WQSs) - Groundwater - NC WQSs (15A NCAC 2L. 0202) are the maximum allowable concentrations resulting from any discharge of contaminants to the land or waters of the state, which may be tolerated without creating a threat to human health or which otherwise render the groundwater unsuitable for its intended purpose (NC DENR, 1994).

Maximum Contaminant Levels (MCLs) - Federal Groundwater Standards - MCLs are enforceable standards for public water supplies promulgated under the Safe Drinking Water Act and are designed for the protection of human health. MCLs are based on laboratory or epidemiological studies and apply to drinking water supplies consumed by a minimum of 25 persons. They are designed for prevention of human health effects associated with a lifetime exposure (70-year lifetime) of an average adult (70 kg) consuming 2 liters of water per day. MCLs also consider the technical feasibility of removing the contaminant from the public water supply (USEPA, 1996).

6.2.4 Selection of COPCs

As discussed previously, four environmental media (i.e., soil, groundwater, surface water, and sediment) were sampled at Site 84. The data from the Pre-RI are located in Section 1.5 and from the RI field investigation in Section 4.2. Tables 2-1 through 2-6 provide summaries of sampling activities at Site 84. Data were combined for each medium for the human health risk assessment. Tables 6-1A through 6-5 present the selection of COPCs for each environmental medium based on comparisons of maximum detected concentrations of constituents with corresponding USEPA Region IX PRGs, and other applicable criteria (see Section 6.2.1). Constituents retained as COPCs are indicated by shaded cells in the tables. These tables also include exposure concentrations for COPCs, as discussed further in Section 6.3, Exposure Assessment. Information is presented in these tables only for those constituents detected at least once in the medium of interest.

The following subsections present the rationale for selection of COPCs for Site 84. Sample locations, analytical results, and corresponding figures are presented in Sections 1.0 and 4.0 and in the appendices of this RI report.

Surface Soil (Before Non-TCRA)

Surface soil samples (0-12 inches bgs) were collected and analyzed for organics, pesticides/PCBs, herbicides, TPH, and inorganics. VOCs, SVOCs, pesticides, PCBs, TPH, and inorganic compounds were detected in the surface soil. Site 84 surface soil data summary and COPC selection results are presented in Table 6-1A.

Twenty-five surface soil samples were analyzed for VOCs. 2-Butanone, acetone, ethylbenzene, xylenes (total) were detected in the Site 84 surface soil samples. These VOCs were detected at maximum concentrations less than their respective residential soil PRGs. Therefore, these VOCs were not retained as Site 84 surface soil COPCs.

Twenty-five surface soil samples were analyzed for SVOCs. Primarily, PAHs were detected in the surface soil samples. The following PAHs were detected at maximum concentrations greater than their respective residential soil PRGs: 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, and pyrene. Therefore, these SVOCs were retained as Site 84 surface soil COPCs.

Twenty-four surface soil samples were analyzed for pesticides. The following pesticides were detected at maximum concentrations greater than their respective residential soil PRGs: 4,4'-DDD, dieldrin, heptachlor, heptachlor epoxide, alpha-chlordane, and gamma-chlordane. Therefore, these pesticides were retained as Site 84 surface soil COPCs.

Ninety-one surface soil samples were analyzed for PCBs. Aroclor-1248, Aroclor-1254, and Aroclor-1260 were detected at maximum concentrations greater than their respective residential soil PRGs. Therefore, these PCBs were retained as Site 84 surface soil COPCs.

Eleven surface soil samples were analyzed for TPH, gasoline and diesel range. Gasoline range TPH and diesel range TPH were both detected in surface soil. Currently, risk-based screening criteria does not exist with which to evaluate TPH. Therefore, to be conservative, these compounds are retained as COPCs to be evaluated qualitatively in this baseline RA.

Twenty-five surface soil samples were analyzed for inorganics. The following inorganics were detected at maximum concentrations greater than their respective residential soil PRGs: antimony, arsenic, iron, and thallium. Therefore, these metals were retained as surface soil COPCs.

Surface Soil (After Non-TCRA)

Surface soil samples (0-12 inches bgs) were collected and analyzed for organics, pesticides/PCBs, herbicides, TPH, and inorganics. VOCs, SVOCs, pesticides, PCBs, and inorganic compounds were detected in the surface soil. Site 84 surface soil data summary and COPC selection results representing conditions after the non-TCRA are presented in Table 6-1B.

Thirteen surface soil samples were analyzed for VOCs. 2-Butanone, acetone, ethylbenzene, and xylenes (total) were detected in the Site 84 surface soil (after non-TCRA) samples. These VOCs were detected at maximum concentrations less than their respective residential soil PRGs. Therefore, these VOCs were not retained as Site 84 surface soil (after non-TCRA) COPCs.

Thirteen surface soil samples were analyzed for SVOCs. Primarily, PAHs were detected in the surface soil samples. The following PAHs were detected at maximum concentrations greater than their respective residential soil PRGs: 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, fluorene, and indeno(1,2,3-cd)pyrene. Therefore, these SVOCs were retained as Site 84 surface soil (after non-TCRA) COPCs. Benzo(k)fluoranthene, carbazole, and chrysene did not exceed their respective PRGs, but were retained based on chemical class.

Twelve surface soil samples were analyzed for pesticides. Dieldrin was detected at a maximum concentration greater than its residential soil PRG and was retained as a Site 84 surface soil (after non-TCRA) COPC.

Seventy-seven surface soil samples were analyzed for PCBs. Aroclor-1260 was detected at a maximum concentration greater than its residential soil PRG and was retained as a Site 84 surface soil (after non-TCRA) COPC.

Thirteen surface soil samples were analyzed for inorganics. The following inorganics were detected at maximum concentrations greater than their respective residential soil PRGs: arsenic and iron. Therefore, these metals were retained as Site 84 surface soil (after non-TCRA) COPCs.

Subsurface Soil (Before Non-TCRA)

Subsurface soil samples were collected and analyzed for organics, pesticides/PCBs, herbicides, TPH, and inorganics. VOCs, SVOCs, pesticides, PCBs, TPH, and inorganics were detected in the subsurface soil. The data and COPC selection summary for subsurface soil samples collected at Site 84 are presented in Table 6-2A.

Twenty-three subsurface soil samples were analyzed for VOCs. VOCs detected in the subsurface soil samples were present at concentrations below the PRGs. Therefore, none of these chemicals were retained as subsurface soil COPCs.

Thirty-one subsurface soil samples were analyzed for SVOCs. Primarily, PAHs were detected in the subsurface soil samples. The following PAHs were detected at maximum concentrations greater than their respective residential soil PRGs: 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene. Therefore, these SVOCs were retained as Site 84 subsurface soil COPCs. Benzo(k)fluoranthene, carbazole, and chrysene were detected at concentrations less than their respective PRGs but were retained as COPCs because they are members of the carcinogenic PAH chemical class. Bis(2-chloroethoxy)methane were retained as COPCs for qualitative evaluation because of the lack of screening criteria.

Twenty-four subsurface soil samples were analyzed for pesticides. The following pesticides were detected at maximum concentrations greater than their respective residential soil PRGs: heptachlor, heptachlor epoxide, alpha-chlordane, and gamma-chlordane. Therefore, these pesticides were retained as Site 84 subsurface soil COPCs.

Thirty-seven subsurface soil samples were analyzed for PCBs. Aroclor-1248, Aroclor-1254, and Aroclor-1260 were detected at maximum concentrations greater than their respective residential soil PRGs. Therefore, these PCBs were retained as Site 84 subsurface soil COPCs.

Eight subsurface soil samples were analyzed for TPH, gasoline and diesel range. Gasoline range TPH and diesel range TPH were both detected in subsurface soil. Currently, risk-based screening criteria does not exist with which to evaluate TPH. Therefore, to be conservative, these compounds are retained as COPCs to be evaluated qualitatively in this baseline RA.

Thirty-one subsurface soil samples were analyzed for inorganics. The following inorganics were detected at maximum concentrations greater than their respective residential soil PRGs: arsenic, iron, and thallium. Therefore, these metals were retained as subsurface soil COPCs.

Subsurface Soil (After Non-TCRA)

Subsurface soil samples were collected and analyzed for organics, pesticides/PCBs, herbicides, TPH, and inorganics. VOCs, SVOCs, pesticides, PCBs, TPH, and inorganics were detected in the subsurface soil. The data and COPC selection summary for subsurface soil samples representing conditions after the non-TCRA are presented in Table 6-2B.

Fourteen subsurface soil samples were analyzed for VOCs. VOCs detected in the subsurface soil samples were present at concentrations below the PRGs. Therefore, none of these chemicals were retained as subsurface soil (after non-TCRA) COPCs.

Eighteen subsurface soil samples were analyzed for SVOCs. Primarily, PAHs were detected in the subsurface soil samples. 2-Methylnaphthalene and naphthalene were detected at maximum concentrations greater than their respective residential soil PRGs. Therefore, these SVOCs were retained as Site 84 subsurface soil (after non-TCRA) COPCs. Bis(2-chloroethoxy)methane was retained as a COPC for qualitative evaluation because of the lack of screening criterion.

Eighteen subsurface soil samples were analyzed for pesticides. Pesticides detected in the subsurface soil samples were present at concentrations below the PRGs. Therefore, none of these chemicals were retained as subsurface soil (after non-TCRA) COPCs.

Twenty-four subsurface soil samples were analyzed for PCBs. Aroclor-1260 was detected at a maximum concentration greater than its residential soil PRG. Therefore, Aroclor-1260 was retained as a Site 84 subsurface soil (after non-TCRA) COPC.

One subsurface soil sample were analyzed for TPH, gasoline and diesel range. Gasoline range TPH and diesel range TPH were both detected in subsurface soil. Currently, risk-based screening criteria does not exist with which to evaluate TPH. Therefore, to be conservative, these compounds are retained as COPCs to be evaluated qualitatively in this baseline RA.

Eighteen subsurface soil samples were analyzed for inorganics. The following inorganics were detected at maximum concentrations greater than their respective residential soil PRGs: arsenic, iron, and thallium. Therefore, these metals were retained as subsurface soil (after non-TCRA) COPCs.

Groundwater

Groundwater samples were analyzed for organic compounds, pesticides, PCBs, herbicides, and inorganics. The data and COPC selection summary for groundwater samples collected at Site 84 are presented in Table 6-3.

Nineteen groundwater samples were analyzed for VOCs. Benzene and chloroform were detected at maximum concentrations that exceeded their respective tap water PRGs. Therefore, these VOCs were retained as groundwater COPCs.

Nineteen samples were analyzed for SVOCs. 2-Methylnaphthalene and naphthalene were detected at maximum concentrations that exceed their respective tap water PRGs. Therefore, these SVOCs were retained as groundwater COPCs.

Thirteen groundwater samples were analyzed for pesticides. Heptachlor epoxide was detected at a maximum concentration greater than its tap water PRG. Therefore, it was retained as a Site 84 groundwater COPC.

Thirteen groundwater samples were analyzed for PCBs. There were no PCBs detected in the groundwater samples collected at Site 84.

Thirteen groundwater samples were analyzed for herbicides. (4-Chloro-o-tolyloxy) acetic acid (MCPA) was detected at a maximum concentration greater than its tap water PRG. Therefore, it was retained as a Site 84 groundwater COPC.

Thirteen groundwater samples were analyzed for inorganics. The following inorganics were detected at maximum concentrations greater than their respective tap water PRGs: antimony, arsenic, iron, manganese, and thallium. Therefore, these metals were retained as groundwater COPCs.

Surface Water

Four surface water samples were collected from the lagoon in 1995 and analyzed for PCBs. Seven surface water samples were collected from the lagoon in 1998 and analyzed for PCBs, with one sample also analyzed for TCL VOCs and SVOCs. In 1995, three surface water samples were collected from Northeast Creek adjacent to Site 84 and analyzed for PCBs. Inorganics were not sampled because at the time these samples were collected, organics, particularly PCBs, were the focus of the investigations. Inorganic analysis was not included in the scopes of work for these investigations. The data and COPC selection summary for surface water samples collected at Site 84 are presented in Table 6-4.

No PCBs were detected in surface water from the Northeast Creek. Therefore, no COPCs were retained for Northeast Creek surface water.

Four VOCs were detected in the lagoon surface water. Benzene and toluene maximum detected concentrations were below their respective screening criteria. Acetone and total xylenes were retained as COPCs for the lagoon surface water due to lack of screening criteria.

Sediment

Four sediment samples were collected from the lagoon at Site 84 in 1995 and analyzed for PCBs. Three sediment samples were collected from the lagoon in 1998 and analyzed for TCL VOCs and SVOCs, PCBs, and Diesel Range Organics (DRO). In 1995, three sediment samples were collected from Northeast Creek adjacent to Site 84 and analyzed for PCBs. Inorganics were not sampled because at the time these samples were collected, organics, particularly PCBs, were the focus of the investigations. Inorganic analysis was not included in the scopes of work for these investigations. The data and COPC selection summary for sediment samples collected at Site 84 are presented in Table 6-5.

No PCBs were detected in sediments from Northeast Creek. Therefore, no COPCs were retained for Northeast Creek sediment.

VOCs, SVOCs, PCBs, and DRO were detected in the lagoon sediment. Of the detected compounds, 2-methylnaphthalene was detected at a concentration that exceeded its residential soil PRG and was retained as a lagoon sediment COPC. Aroclor-1284 and Aroclor-1260 were detected at maximum concentrations exceeding residential soil PRGs and were retained as sediment COPCs. TPH DRO was detected in the lagoon sediment. It was retained as a lagoon sediment COPC because it has no screening criteria.

6.2.5 Summary of COPCs

The following chemicals exceeded the residential PRG values in the environmental media obtained from Site 84 during the Pre-RI and/or the RI, and were therefore retained as COPCs for further analysis.

Surface Soil (before non-TCRA): 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, naphthalene, 4,4'-DDD, dieldrin, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane, Aroclor-1248, Aroclor-1254, Aroclor-1260, TPH (as gasoline and diesel), antimony, arsenic, iron, and thallium.

Surface Soil (after non-TCRA): 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, dieldrin, Aroclor-1260, arsenic, and iron.

Subsurface Soil (before non-TCRA): 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, pyrene, bis(2-chloroethoxy)methane, heptachlor, heptachlor epoxide, alpha-chlordane, gamma-chlordane, Aroclor-1248, Aroclor-1254, Aroclor-1260, TPH (GRO and DRO), arsenic, iron, and thallium.

Subsurface Soil (after non-TCRA): 2-methylnaphthalene, naphthalene, bis(2-chloroethoxy)methane, Aroclor-1260, TPH (GRO and DRO), arsenic, iron, and thallium.

Groundwater: benzene, chloroform, 2-methylnaphthalene, naphthalene, heptachlor epoxide, MCPA, antimony, arsenic, iron, manganese, and thallium.

Surface Water (Lagoon): acetone and total xylenes.

Sediment (Lagoon): 2-methylnaphthalene, Aroclor-1248, Aroclor-1260, and TPH (DRO).

6.3 Exposure Assessment

The exposure assessment estimates the magnitude of actual and/or potential human exposure, the frequency and duration of those exposures, and the pathways (i.e., inhalation, ingestion, and dermal contact) by which people are potentially. To determine whether human exposure could occur at Site 84 in the absence of remedial action, an exposure assessment, which identifies potential exposure pathways and receptors, was conducted. The following four elements were considered to determine whether a complete exposure pathway was present (USEPA, 1989a):

- A source and potential mechanism of chemical release
- An environmental retention or transport medium
- A point of potential human contact with the contaminated medium; and
- A human exposure route (e.g., ingestion) at the contact point

The exposure scenarios discussed in this report represent USEPA's Reasonable Maximum Exposure (RME). Relevant equations for assessing intakes and exposure factors were obtained from RAGS (USEPA, 1989a), Region IV Bulletin (USEPA, 1995a), Exposure Factors Handbook (USEPA, 1997), Dermal Exposure Assessment: Principles and Applications, Interim Report (USEPA, 1992a), and Standard Default Exposure Factors, Interim Final (USEPA, 1991b). The Central Tendency (CT) risk descriptor was also used for exposure scenarios when the RME scenarios indicated a potential risk to human health, to more completely present the range of possible risks. The CT exposure calculations use less conservative exposure factors (as appropriate) to calculate chemical intakes for the CT-case scenarios. In this baseline RA, the CT exposure scenario was calculated only for future residential adult and child receptors because the residential scenario represents the most conservative estimate of potential human health risk. The inclusion of the CT exposure scenario provides a range of potential carcinogenic risks and noncarcinogenic health hazards with which to make informed risk management decisions when determining remedial action.

6.3.1 Potential Human Receptors

MCB Camp Lejeune operates as a Marine Corps base. It is assumed that long-term plans for the facility are the same as the present plans, with land use also generally the same as at present. Based on information available regarding the physical features, site setting, site historical activities, and current and expected land uses, five potential human receptors have been selected for evaluation. These include:

- Current Military Base Personnel
- Current Adult and Adolescent (7-16 years) Recreational Users
- Future Resident Adults and Children (1-6 years)
- Future Construction Workers
- Future Industrial/Commercial Site Worker

It is possible to access Site 84 from Highway 24 via an access road. This access road is fenced and locked off at the site boundary. The site is relatively flat with some minor surface mounds in the wooded areas. Exposure to surface water and sediment could occur in or around the lagoon and Northeast Creek. Northeast Creek is a large creek that runs into the New River and is used for recreational purposes such as swimming and boating. There is also a certain population that fish and crab out of this creek. Therefore, potential on-site recreational users include younger family members of military Base personnel that may access the site for recreational purposes (such as hiking, fishing, swimming, or boating). Potential exposure to COPCs and media of concern for the current adult and youth recreational users include incidental ingestion and dermal contact with surface soil, surface water, and sediment, and inhalation of fugitive dusts from surface soil. The surface water sampled from the lagoon is not conducive to swimming, and there were no COPCs selected for the Northeast Creek. Therefore, a swimming scenario was not evaluated, rather incidental dermal contact to and ingestion of surface water was evaluated. Currently, fish/crab tissue samples are not available with which to quantitatively evaluate a fish/crab ingestion exposure scenario. Therefore, this potential exposure pathway was qualitatively evaluated in Section 6.6, Sources of Uncertainty.

Current adult military Base personnel may be exposed to COPCs and media of concern at Site 84. These include military personnel stationed at the Base. A standard tour of duty of four years was assumed. Workers were evaluated for incidental ingestion of and dermal contact with surface soil, surface water and sediment, as well as inhalation of fugitive dusts from the surface soil.

For the current receptors (military Base personnel and recreational users), potable water is municipally supplied. Hence, assessing current risks to contaminants detected in the shallow aquifer for current receptors is unnecessary.

Although residential development by the military or general public is unlikely, future hypothetical residential exposure to children and adults was evaluated. The future adult and child residential receptors could potentially be exposed to COPCs in surface soil, groundwater, surface water, and sediment by ingestion and dermal contact, and inhalation of dusts from surface soil. Shallow groundwater is currently not utilized as a potable source at the site. However it is possible that shallow groundwater could be used for potable purposes in the future. Therefore, in accordance with USEPA guidance, groundwater exposure was conservatively evaluated for future residential receptors. Total inorganic results in groundwater were evaluated according to USEPA Region IV guidance. Inhalation of volatiles in groundwater was evaluated only for the future adult receptors using the Foster and Chrostowski shower model (Foster and Chrostowski, 1986). Young children are not expected to shower and therefore, were not evaluated using the shower model. However, dermal contact while bathing is evaluated for the future young child receptor.

Future construction workers that may perform excavation and construction at the site were also evaluated for incidental ingestion and dermal contact exposures to excavated soils, as well as the inhalation of fugitive dusts emanating from soil during excavation/construction activities. Dermal exposure of construction workers to groundwater at Site 84 was evaluated since the groundwater is relatively shallow (approximately 10 to 12 feet bgs). Dermal exposure of construction workers to surface water and sediment was also evaluated based on the swampy nature of the site. The depths of soil samples used in the risk evaluation for construction workers were 0 to 15 feet bgs.

Although commercial development by the military or general public is unlikely, future hypothetical exposure to industrial/commercial site workers was evaluated. These may include future office, plant, or warehouse workers. Workers were evaluated for incidental ingestion of and dermal contact with surface soil, as well as inhalation of fugitive dusts from the surface soil. Assuming that shallow groundwater could be used for potable purposes in the future, the industrial/commercial site worker was evaluated for ingestion of groundwater. In the event that shower facilities would be available to site workers, dermal contact and inhalation of volatiles via showering were also evaluated.

As previously mentioned, two soil evaluations were performed for Site 84. The first evaluation ("before non-TCRA" scenario) included soils sampled from the perimeter of the foundation of Building 45. For surface soil, the before non-TCRA sample size ranged from 11 to 91 data points, depending on the type of analysis. For subsurface soil, the before non-TCRA sample size ranged from 8 to 37 data points, depending on the type of analysis. The second evaluation ("after non-TCRA" scenario) excludes these perimeter samples, which are to be excavated as part of the non-TCRA at Site 84 scheduled for February 2002. For surface soil, the after non-TCRA sample size ranged from 11 to 77 data points, depending on the type of analysis. For subsurface soil, the after non-TCRA sample size ranged from 1 to 24 data points, depending on the type of analysis. Therefore, all receptors evaluated in this baseline RA are evaluated under two separate scenarios: before non-TCRA and after non-TCRA.

In summary, the following potential human receptors and exposure pathways were retained for quantitative evaluation in this baseline RA.

Current Military Base Personnel

- Incidental Ingestion of Surface Soil (before and after non-TCRA), Surface Water, and Sediment
- Dermal Contact with Surface Soil (before and after non-TCRA), Surface Water, and Sediment
- Inhalation of Fugitive Dusts Emanating from Surface Soil (before and after non-TCRA)

Current Adult and Adolescent (Ages 7-16 Years) Recreational Users

- Incidental Ingestion of Surface Soil (before and after non-TCRA), Surface Water, and Sediment
- Dermal Contact with Surface Soil (before and after non-TCRA), Surface Water, and Sediment
- Inhalation of Fugitive Dusts Emanating from Surface Soil (before and after non-TCRA)

Future Adult and Child (Ages 1-6 Years) Residents

- Incidental Ingestion of Surface Soil (before and after non-TCRA), Groundwater, Surface Water, and Sediment
- Dermal Contact with Surface Soil (before and after non-TCRA), Groundwater, Surface Water, and Sediment
- Inhalation of Fugitive Dusts Emanating from Surface Soil (before and after non-TCRA)
- Inhalation of Volatiles in Groundwater while Showering (Adults only)

Future Construction Workers

- Incidental Ingestion of Surface Soil (before and after non-TCRA) and Subsurface Soil (before and after non-TCRA)
- Dermal Contact with Surface Soil (before and after non-TCRA), Subsurface Soil (before and after non-TCRA), Groundwater, Surface Water, and Sediment
- Inhalation of Fugitive Dusts from Surface Soil (before and after non-TCRA) and Subsurface Soil (before and after non-TCRA)

Future Industrial/Commercial Site Workers

- Incidental Ingestion of Surface Soil (before and after non-TCRA) and Groundwater
- Dermal Contact with Surface Soil (before and after non-TCRA) and Groundwater
- Inhalation of Fugitive Dusts Emanating from Surface Soil (before and after non-TCRA)
- Inhalation of Volatiles in Groundwater while Showering

6.3.2 Conceptual Site Model

Development of a conceptual site model of potential exposure is critical in evaluating exposures for the human receptors. The conceptual site model considers all reasonable current and future potential exposures and media of concern under a no-action scenario. Current and potential future exposure scenarios for Site 84 are summarized in the conceptual site model in Figure 6-2 of this RA. Current exposures evaluated at Site 84 are recreational users and military Base personnel. Future exposures evaluated at this site are construction workers, commercial/industrial site workers, and residents.

Potential contaminant release mechanisms from affected media include stormwater runoff, leaching to underlying groundwater and surface water above sediment, and advective transport in the direction of groundwater flow. Potentially affected media at Site 84 may include surface and subsurface soil, groundwater, surface water, and sediment.

The current/potential future land use scenarios evaluated adult exposures. In addition, a residential child, 1-6 years old, and an adolescent recreational user, 7-16 years old, were also evaluated. Exposure routes (i.e., ingestion, dermal contact, and inhalation) for each exposure scenario are summarized in Figure 6-2.

6.3.3 Quantification of Exposure

Exposure to contaminants is quantified using 1) data from the site (i.e., concentrations of contaminants) and 2) determining human exposure to the environmental media. The chemical concentrations used in the estimation of chronic daily intakes (CDIs) and dermally-absorbed doses (DADs) for each medium are considered to be representative of the types of potential exposures encountered by each receptor throughout the time of exposure. The equations used to calculate the CDIs and DADs for each receptor and exposure pathway are presented in Appendix H of this report. Groundwater and surface water are in motion, thus chemical concentrations detected in these media change frequently over time. Soil and sediment generally move more slowly through erosion and deposition. Therefore, groundwater and surface water contaminant concentrations may be best represented by the most recently collected data, while soil and sediment concentrations can include some older data, as appropriate. The manner in which environmental data are represented also depends on the number of samples and sampling locations available for a given area and a given medium. For example, exposure can occur to a portion of the site (i.e., a "hotspot") or the entire site, depending on the type of scenario considered for a given receptor.

6.3.4 Data Analysis

An individual moving randomly across Site 84 is assumed to have an equal probability of potential exposure to environmental media such as soil and sediment. Therefore, for these media, the exposure point concentration for a constituent in the intake equation can be reasonably estimated as the arithmetic average concentration of site sampling data. USEPA supplemental risk assessment guidance (USEPA, 1992c) states that the average concentration is an appropriate estimator of the exposure concentration for two reasons: 1) carcinogenic and chronic noncarcinogenic toxicity criteria are based on lifetime average exposures; and 2) the average concentration is most representative of the concentration that would be contacted over time. However, uncertainty is inherent in the estimation of the true average constituent concentration at the site.

USEPA Region IV risk assessment guidance makes an exception to the use of the UCL as the exposure point concentration for groundwater. Groundwater exposure point concentrations should be the arithmetic average of the wells in the highly concentrated area of the plume. However, as stated in Section 4.8, individual contaminant distribution is scattered, with no apparent plume. Therefore, to maintain a conservative approach in this baseline RA, the maximum detected concentrations of the COPCs retained in shallow groundwater were used as the exposure concentrations.

Maximum detected concentrations of the COPCs retained in the surface water were used as the exposure concentrations because of the mobile nature of the medium and the low number of samples in the data set.

A conservative estimate of the arithmetic average concentration recommended by the USEPA (1992c) is the 95% upper confidence limit of the arithmetic mean concentration (95% UCL). A statistical test to determine the distribution of the data set was used. The Shapiro-Wilkes distribution test was used for data sets of less than 50 samples, and the d'Agostino distribution test was used for data sets of 50 samples or greater. If the data were determined to be normally distributed (this includes those results that indicate "yes" to both normal and lognormal distributions), the 95% UCL of the arithmetic mean of the data was used (USEPA, 1992a). If the data were lognormally distributed, the 95% UCL of the arithmetic mean of the log-transformed data was used (USEPA, 1992c). In those instances where the distribution tests were unable to definitively determine the type of distribution (i.e., the results indicated "no" to both normal and

lognormal distributions), the data set was assumed to be lognormally distributed, as per USEPA Region IV risk assessment guidance (USEPA, 1995a). If the 95% UCL of the arithmetic mean exceeds the maximum detected concentration in a given data set, the maximum detected concentration will be used to represent the concentration term for that COPC. The maximum detected concentration (total, in the case of metals) is used to represent the exposure point concentration in groundwater. This conservative estimate is used at sites where the plume cannot be accurately determined.

The 95% UCL for a normal distribution was calculated using the following equation (USEPA, 1992c):

$$95\%UCL = \bar{x} + t(s / \sqrt{n})$$

Where:

$\bar{x}$	=	mean
s	=	standard deviation
t	=	Student t statistic (Gilbert, 1987)
n	=	number of samples

The 95 percent UCL of the lognormal distribution was calculated using the following equation (USEPA, 1992c):

$$\text{Lognormal } 95\% \text{ UCL} = e^{(\bar{x} + 0.5s^2 \cdot tH \cdot \sqrt{n-1})}$$

where:

UCL	=	upper confidence limit
e	=	constant (base of the natural log, equal to 2.718)
$\bar{x}$	=	$\bar{x}$ mean of the transformed data
s	=	standard deviation of the transformed data
H	=	H-statistic (Gilbert, 1987)
n	=	number of samples

Frequency of detection as well as maximum detected values are presented in Appendix G. 95% UCL values, mean values, and results of the W-test derived for COPCs in all media at Site 84 are also presented in Appendix G. The equations for estimating intakes due to direct exposures to site-related chemicals for the various identified pathways are presented on the risk calculation spreadsheets found in Appendix H.

For results reported as "nondetect" (i.e., results flagged with the following validation qualifiers: U and UJ), a value of one half of the sample-specific detection limit was used to calculate the 95% UCL; the actual value could be between zero and a value just below the detection limit. 95% UCLs were calculated only for the constituents detected in at least one sample collected from the environmental medium of interest.

Estimated concentrations also were used to calculate the 95% UCL, such as "J" qualified (estimated) data. Reported concentrations qualified with an "R" (rejected) were not used in the statistical evaluation.

As previously mentioned, duplicate sample data were averaged with corresponding environmental sample data and re-included into the data set for these risk evaluations. In instances where the original and duplicate sample result were either both detected or both non-detected, the values were averaged for the risk assessment. In instances when the original and duplicate sample result contained one detection and one non-detection, the detected value was averaged with one-half of the detection limit of the non-detected value and the averaged sample result was considered a detection.

Statistical data summary tables for COPCs in each medium sampled (i.e. surface soil, subsurface soil, groundwater, surface water, and sediment) are found in the Statistical Summaries presented in Appendix G. These tables provide the arithmetic mean, the standard deviation, and the upper 95 percent confidence limit value for both normally and lognormally distributed data (as determined by Shapiro-Wilkes and d'Agostino distribution tests).

6.3.5 Exposure Input Parameters

Table 6-12 presents the exposure factors used in the estimation of potential CDIs for COPCs retained for each receptor identified below. USEPA promulgated exposure factors are used in conjunction with USEPA standard default exposure factors. When USEPA exposure factors are

not available, best professional judgment and site-specific information are used to derive a conservative and defensible value. The following paragraphs present the rationale for the selection of exposure factors for each receptor group evaluated in the baseline RA.

6.3.5.1 Current Military Personnel

This scenario assumes that current adult Base military personnel could come into contact with surface soil, surface water, and sediment at Site 84. Therefore, this receptor was evaluated for potential exposure to surface soil, surface water, and sediment via incidental ingestion and dermal contact, and surface soil via inhalation of fugitive dust. A summary of the exposure parameters is discussed in the following paragraphs and presented on Table 6-12.

The IR for military personnel exposed to surface soil and sediment was assumed to be 100 mg/day (USEPA, 1989), and the fraction ingested was assumed to be 100 percent. The IR for exposure to surface water was assumed to be 0.01L/hour (USEPA, 1995), over an exposure time (ET) of 2.6 hours/day (USEPA, 1989). An exposure frequency (EF) of 250 days per year (USEPA, 1991) was used in conjunction with an exposure duration of 4 years (standard military tour of duty). A respiration rate of 0.83 m³/hr for the adult (USEPA, 1991b) was also used in relationship to inhalation of fugitive dusts from surface soil. An averaging time (AT) of 70 years or 25,550 days was used for exposure to potentially carcinogenic compounds while an averaging time of 1,460 days was used for noncarcinogenic exposures.

There is a potential for base personnel to absorb COPCs by dermal contact. A skin surface area of 3,300 cm² for an adult (USEPA 1997a) assumed to wear a short-sleeved shirt, long pants, and shoes, was used to evaluate dermal contact with soil, sediment, and surface water. The soil to skin adherence factor (SAF) of 0.2 mg/cm² was used and is based on the 50th percentile weighted SAF for utility workers, which is the activity determined by USEPA to represent a reasonable, high-end contact activity (USEPA, 1997a). Dermal absorption values provided in USEPA RAGS Part E (USEPA, 2000) or Region IV default dermal absorption values of 0.01 for organics, and 0.001 for inorganics (USEPA, 1995) were also used to estimate soil exposures.

6.3.5.2 Current Adult and Adolescent (7 - 16 years) Recreational Users

This scenario assumes that current adult and adolescent (7 - 16 years) recreational users could come into contact with surface soil, surface water, and sediment. Therefore, these receptors were evaluated for potential exposure to surface soil, surface water, and sediment via incidental ingestion and dermal contact, and surface soil via inhalation of fugitive dust. A summary of the exposure parameters is discussed in the following paragraphs and presented on Table 6-12.

A 70 kg adult and a 45 kg adolescent were assumed to have exposure durations of 24 years and 9 years, respectively (USEPA, 1989a). The exposure time in relationship to inhalation of fugitive dusts was estimated to be 8 hours per day (professional judgement). The ingestion rate of surface soil and sediment was assumed to be 100 mg/day for both the adolescent and the adult (USEPA, 1991), with a 100% fraction ingested from the source (professional judgement). The IR for exposure to surface water for both the adult and adolescent recreational users was assumed to be 0.01L/hour (USEPA, 1995), over an exposure time (ET) of 2.6 hours/day (USEPA, 1989). The exposure frequency was assumed to be 48 events/year, based on anticipated exposures of two days/week (i.e., a weekend) for 6 months (professional judgement). A respiration rate of 0.83 m³/hr for the adult and adolescent (USEPA, 1991) was also used in relationship to inhalation of fugitive dusts from surface soil. Averaging times of 8,760 days for adults and 3,285 days for adolescents for noncarcinogens, and 25,550 days for carcinogens were also used (USEPA, 1989a).

The USEPA recommended weighted SAF of 0.07 mg/cm² for the residential adult was used for the adult recreational user (USEPA, 1997a). This is based on the 50th percentile weighted SAF for gardeners, which is the activity determined to represent a reasonable, high-end contact activity. The USEPA recommended weighted 0.2 mg/cm² SAF for the young child was conservatively used for the adolescent recreational user and is based on the 95th percentile weighted SAF for children playing at a day care center or in wet soil (USEPA, 1997a). Dermal absorption values provided in USEPA RAGS Part E (USEPA, 2000) or Region IV default dermal absorption values of 0.01 for organics, and 0.001 for inorganics (USEPA, 1995) were also used to estimate soil exposures. Skin surface areas of 5,300 cm² for the adolescent (representing 50th percentile body-part SAF [average of male/female] for the head, forearms, hands, lower legs and feet of a <7 to <18 year old) and 5,700 cm² for the adult (USEPA 1997a) were assumed for the surface soil, surface water, and sediment scenarios.

6.3.5.3 Future Adult and Young Child Residents

This scenario assumes that future adult and young child (1-6 years) residents could come into contact with surface soil at Site 84. It is also conservatively assumed that the groundwater will be potable. Therefore, these receptors could come into contact with contaminants detected in the groundwater under a drinking water scenario in the future in addition to contact with surface soil, surface water, and sediment. These receptors were evaluated for potential exposure to surface soil, surface water, and sediment via accidental ingestion and dermal contact, and surface soil via inhalation of fugitive dust. Future residents were also evaluated for potential exposure to groundwater via ingestion, dermal contact and inhalation of VOCs while showering (adult only). A summary of the exposure parameters is discussed in the following paragraphs and presented on Table 6-12. Unless otherwise noted, the Central Tendency (CT) exposure parameters are the same as for Reasonable Maximum Exposure (RME).

Future adult and young child residents could contact surface soil, surface water, and sediment during outdoor recreational activities in the area immediately surrounding their homes. A 70 kg adult and a 15 kg child were assumed for exposure durations of 24 years and 6 years, respectively (USEPA, 1989a). Exposure durations of 9 years for the adult and 6 years for the child were used for CT exposure (USEPA, 1993). The exposure time was conservatively assumed to be 24 hours per day. The ingestion rate for surface soil and sediment was assumed to be 200 mg/day for the young child and 100 mg/day for the adult (USEPA, 1991b), with a 100% fraction ingested from source, over 350 days/year (USEPA, 1991b). Ingestion rates for surface soil and sediment of 100 mg/day for the young child and 50 mg/day for the adult over 234 days per year were used for CT exposure (USEPA, 1993). Respiration rates of 0.63 m³/hr for the child and 0.83 m³/hr for the adult (USEPA, 1995) were also used in relationship to inhalation of fugitive dusts. Averaging times of 8,760 days for adults and 2,190 days for children for noncarcinogens, and 25,550 days for carcinogens were also used (USEPA, 1989a).

The USEPA recommended weighted SAF of 0.07 mg/cm² was used for the residential adult (USEPA, 1997a). This is based on the 50th percentile weighted SAF for gardeners, which is the activity determined to represent a reasonable, high-end contact activity. The USEPA recommended weighted 0.2 mg/cm² SAF for the young child was used and is based on the 95th percentile weighted SAF for children playing at a day care center or in wet soil (USEPA, 1997a). Dermal absorption values provided in USEPA RAGS Part E (USEPA, 2000) or Region IV default dermal absorption values of 0.01 for organics, and 0.001 for inorganics (USEPA, 1995) were also used to estimate soil exposures. Skin surface areas of 2,800 cm² for the young child

and 5,700 cm² for the adult (USEPA 1997a) were assumed for the surface soil, surface water, and sediment scenario. These are the SA values currently recommended by the USEPA for exposure to contaminated soil and are the averages of the 50th percentiles for males and females greater than 18 years of age (adults) and from <1 to <6 years old (young children). Skin surface areas of 2,000 cm² for the young child and 5,000 cm² for the adult (USEPA 1997a) were assumed for the CT exposure scenario.

Potential exposures to groundwater COPCs may occur under a drinking water scenario. Exposure to total concentrations of groundwater inorganic COPCs were evaluated as per USEPA Region IV guidance. Exposure pathways evaluated for future residents include accidental ingestion and dermal contact. Inhalation of VOCs while showering was evaluated for adult residents using the Foster and Chrostowski shower model (Foster and Chrostowski, 1986). As per USEPA Region IV guidance, inhalation of VOCs in groundwater was evaluated as the equivalent of ingesting two liters of water per day. It is assumed in this risk assessment that young children typically do not shower. Groundwater ingestion rates of 2 L/day and 1 L/day, respectively, were also assumed for the adult and young child residents. Exposure frequency of 350 days per year was also assumed for groundwater. Groundwater ingestion rates of 1.4 L/day and 1 L/day over 234 days per year were used for CT exposure (USEPA, 1993). Total body surface areas of 6,600 cm² and 18,000 cm² (50th percentile values for male and female young children or adults) (USEPA, 1997a) were assumed for the groundwater scenario for the young child and adult, respectively. All other exposure parameters were the same as the soil exposure parameters.

6.3.5.4 Future Adult Construction Workers

Potential exposures to soil COPCs may occur to construction workers while performing soil excavation and construction activities at Site 86. Exposure pathways evaluated include accidental ingestion, dermal contact, and inhalation of fugitive dust of surface and shallow subsurface soil. Dermal contact with groundwater, surface water, and sediment were also evaluated as potential exposure pathways. A summary of the exposure parameters is discussed in the following paragraphs and presented on Table 6-12. Exposure was assumed to occur for 8 hours per day (USEPA, 1991b), 250 days per year (USEPA, 1991b), for a construction period of 1 year (professional judgement). A USEPA default value for the soil ingestion rate of 480 mg/day, a 100% fraction ingested from source, and a respiration rate of 0.83 m³/hour (USEPA, 1991b) were also assumed for a 70 kg construction worker (USEPA, 1989a). A skin surface area of 3,300 cm² for an adult (USEPA 1997a) assumed to wear a short-sleeved shirt, long pants, and shoes, was used to evaluate dermal contact with soil, groundwater, surface water, and sediment. The soil to

skin adherence factor of 0.2 mg/cm² (USEPA, 1997a) was used. Dermal absorption values provided in USEPA RAGS Part E (USEPA, 2000) or Region IV default dermal absorption values of 0.01 for organics, and 0.001 for inorganics (USEPA, 1995) were also used to estimate soil exposures. The averaging time of 365 for noncarcinogens and 25,550 days for carcinogens, respectively, were also used (USEPA, 1989a).

6.3.5.5 Future Industrial/Commercial Site Workers

Potential exposures to soil COPCs may occur to industrial/commercial site workers while working on-site. Exposure pathways evaluated include accidental ingestion, dermal contact, and inhalation of fugitive dust of surface soil. Future industrial/commercial workers were also evaluated for potential exposure to groundwater via ingestion, dermal contact and inhalation of VOCs while showering. A summary of the exposure parameters is discussed in the following paragraphs and presented on Table 6-12. Exposure was assumed to occur for 8 hours per day (USEPA, 1991b), 250 days per year (USEPA, 1991b), for an exposure duration of 25 years (USEPA, 1991b). A soil ingestion rate of 50 mg/day (USEPA, 1995), a 100% fraction ingested from source, and a respiration rate of 0.83 m³/hour (USEPA, 1995) were also assumed for a 70 kg adult (USEPA, 1989a). A skin surface area of 3,300 cm² for an adult (USEPA 1997a) assumed to wear a short-sleeved shirt, long pants, and shoes, was used to evaluate dermal contact with soil. The soil to skin adherence factor of 0.2 mg/cm² (USEPA, 1997a) was used. Dermal absorption values provided in USEPA RAGS Part E (USEPA, 2000) or Region IV default dermal absorption values of 0.01 for organics, and 0.001 for inorganics (USEPA, 1995) were also used to estimate soil exposures. The averaging time of 9,125 for noncarcinogens and 25,550 days for carcinogens, respectively, were also used (USEPA, 1989a).

Potential exposures to groundwater COPCs may occur under a drinking water scenario. Exposure to total concentrations of groundwater inorganic COPCs were evaluated as per USEPA Region IV guidance. Exposure pathways evaluated for future industrial/commercial site workers include accidental ingestion and dermal contact. Inhalation of VOCs while showering was also evaluated for this receptor using the Foster and Chrostowski shower model (Foster and Chrostowski, 1986). A groundwater ingestion rate of 2 L/day was assumed for the adult. Exposure frequency of 250 days per year for an exposure duration of 25 years was also assumed for groundwater. A total body surface area of 18,000 cm² (50th percentile values for male and female adults) (USEPA, 1997a) were assumed for the groundwater scenario for the adult. All other exposure parameters were the same as the soil exposure parameters.

6.4 Toxicity Assessment

Section 6.4 presents potential exposure pathways and receptors for this baseline RA. This section will review the available toxicological information for COPCs retained for quantitative evaluation.

An important component of the RA process is the relationship between the dose of a compound (amount to which an individual or population is potentially exposed) and the potential for adverse health effects resulting from exposure to that dose. Dose-response relationships provide a means by which potential public health impacts may be evaluated. Standard reference doses (RfDs) and/or carcinogenic slope factors (CSFs) have been developed for many of the COPCs. This section provides a brief description of these parameters.

6.4.1 Reference Doses

The RfDs and Reference Concentrations (RfCs for inhalation) are developed for chronic and/or subchronic human exposure to chemicals, and are based solely on the noncarcinogenic effects of chemical substances. These values are defined as an estimate of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of adverse effects during a lifetime. The RfD is expressed as dose (mg) per unit body weight (kg) per unit time (day). The RfC is expressed as dose (mg) per cubic meter of air (m^3).

6.4.2 Carcinogenic Slope Factors

CSFs are used to estimate an upper bound lifetime probability of an individual developing cancer as a result of exposure to a particular level of a potential carcinogen (USEPA, 1989a). This factor is reported in units of proportion (of a population) affected per mg/kg/day and is derived through an assumed low-dosage, linear multistage model and an extrapolation from high to low dose-responses determined from animal studies. The slope factor represents the upper 95th percent confidence limit on the increased cancer risk from a lifetime exposure to an agent. CSFs can also be derived from USEPA promulgated unit risk values for air and/or water. CSFs derived from unit risks cannot, however, be applied to environmental media other than the medium considered in the unit risk estimate.

Slope factors are also accompanied by weight-of-evidence classifications which designate the strength of the evidence that the COPC is a potential human carcinogen.

Quantitative indices of toxicity and USEPA weight-of-evidence classifications are presented in Table 6-6 for the identified COPCs. The hierarchy (USEPA, 1989a) for choosing these values was:

- Integrated Risk Information System (IRIS)
- Health Effects Assessment Summary Table (HEAST)
- National Center for Environmental Assessment (NCEA)

The IRIS database is updated a few times each year and contains verified RfDs, RfCs and CSFs. The USEPA has formed an RfD work group to review existing data used to derive RfDs and RfCs. Once this task has been completed, the verified RfD appears in IRIS. Like the RfD Work Group, the USEPA has also formed the Carcinogen Risk Assessment Verification Endeavor (CRAVE) Work Group to review and validate toxicity values used in developing CSFs. Once the slope factors have been verified via extensive peer review, they also appear in the IRIS database. HEAST and NCEA, on the other hand, provide provisional (unverified) RfDs, RfCs and CSFs.

6.4.3 Dermal Absorption Efficiency

Many of the RfDs and CSFs are derived from oral toxicological studies based on administered dose, and do not account for the amount of a substance that can penetrate exchange boundaries after contact (e.g., absorbed dose). As a result, there is very little information available regarding dermal toxicity criteria. Therefore, in order to account for a difference in toxicity between an administered dose and an absorbed dose, the RfDs and CSFs (that were based on an administered dose) were adjusted, as described by Appendix A of RAGS A (USEPA, 1989a), using experimentally-derived oral absorption efficiencies obtained from information compiled by Oak Ridge National Laboratory (as recommended by North Carolina Department of Environment and Natural Resources). The adjustment for the oral RfD that would correspond to a dermally absorbed dose is represented by multiplying the RfD by an oral-to-dermal extrapolation value. The adjustment for the oral CSF that would correspond to the dermally-absorbed dose is represented by dividing the CSF by an oral-to-dermal extrapolation value. The oral-to-dermal extrapolation values were obtained from sources such as the NCEA, IRIS, Agency for Toxic Substance and Disease Registry (ATSDR) toxicological profiles, toxicology publications,

toxicology references, and USEPA Regional Offices. Only oral-to-dermal extrapolation values that had reference documents available were used in this risk assessment. For other chemicals, the default values of 80% for VOCs, 50% for SVOCs, and 20% for inorganics recommended in Region IV supplemental guidance were used. The oral-to-dermal extrapolation values used in this baseline RA for Site 84 are presented in Table 6-6. The table of oral absorption efficiencies compiled by Oak Ridge National Laboratory, which includes detailed references, is provided as a subsection of Appendix H.

6.5 Risk Characterization

The risk characterization combines the selected COPCs, the exposure assessment, and the toxicity assessment to produce a quantitative estimate of current and future potential human health risks associated with Site 84. Sections 6.5.1 and 6.5.2 discuss the USEPA methodologies used for quantifying and characterizing carcinogenic and noncarcinogenic human health risks. Increased Cancer Risks (ILCRs) and Hazard Indices (HIs) are calculated to characterize potential human health effects. These terms are defined in the sections that follow. ILCRs and HIs are estimated for current and future receptors exposure scenarios that were identified for Site 84 in Section 6.3, and are discussed in Section 6.5.3.

Two soil evaluations were performed for Site 84. The first evaluation ("before TCRA" scenario) included surface and subsurface soil sampled from the perimeter of the foundation of Building 45. For surface soil, the before non-TCRA sample size ranged from 11 to 91 data points, depending on the type of analysis. For subsurface soil, the before non-TCRA sample size ranged from 8 to 37 data points, depending on the type of analysis. The second evaluation ("after non-TCRA" scenario) excluded these perimeter samples, which are to be excavated as part of the non-TCRA at Site 84 scheduled for February 2002. For surface soil, the after non-TCRA sample size ranged from 11 to 77 data points, depending on the type of analysis. For subsurface soil, the after non-TCRA sample size ranged from 1 to 24 data points, depending on the type of analysis. Figure 6-1 indicates the planned area of excavation. Please note that for further details the reader is referred to the Draft non-TCRA (Baker, 2001b).

6.5.1 Quantification and Characterization of Carcinogenic Risks

Quantitative risk calculations for potentially carcinogenic compounds estimate inferentially (versus probabilistically) the potential ILCR for an individual in a specified population. This unit of risk refers to a potential cancer risk that is above the background cancer risk in unexposed individuals. For example, an ILCR of 1×10^{-6} indicates that an exposed individual has an increased probability of one in one million of developing cancer subsequent to exposure, over the course of their lifetime.

The potential lifetime ILCR for an individual was estimated from the following relationship:

$$ICR = \sum_{i=1}^n (CDI_i \text{ or } DAD_i) \times CSF_i$$

where the CSF_i is expressed as $(\text{mg/kg/day})^{-1}$ for compound i , and the chronic daily intake (CDI_i) and dermally absorbed dose (DAD_i) is expressed as mg/kg/day for compound i . Since the units of CSF are $(\text{mg chemical/kg body weight-day})^{-1}$ and the units of intake or dose are $\text{mg chemical/kg body weight-day}$, the ILCR value is dimensionless. The aforementioned equation was derived assuming that cancer is a nonthreshold process and that the potential excess risk level is proportional to the cumulative intake over a lifetime.

For quantitative estimation of risk, it is assumed that cancer risks from various exposure routes are additive. Estimated ILCR values will be compared to 1×10^{-6} to 1×10^{-4} , which represents the target risk range of ILCR values considered by the USEPA to represent an acceptable (i.e., de minimis) risk (USEPA, 1990).

6.5.2 Quantification and Characterization of Noncarcinogenic Risks

Noncarcinogenic compounds assume that a threshold toxicological effect exists. Therefore, the potential for noncarcinogenic effects are calculated by comparing (i.e., dividing) CDI_i and DAD_i levels with $RfDs$ for each COPC.

Noncarcinogenic effects are estimated by calculating the HQ for individual chemicals and the hazard index (HI) for overall chemicals and pathways by the following equation:

$$HI = \sum_{i=1}^n HQ_i$$

$$\text{where: } HQ_i = \frac{(CDI_i \text{ or } DAD_i)}{RfD_i \text{ or } RfC_i}$$

An HQ is the ratio of the daily intake or absorbed dose to the reference dose (or reference concentration for inhalation exposure). CDI_i is the chronic daily intake (mg/kg/day) of contaminant i ; DAD_i is the dermally absorbed dose (mg/kg/day) of contaminant i , and RfD_i is the reference dose (mg/kg/day) of the contaminant i over a prolonged period of exposure. RfC_i is the reference concentration used when determining exposure due to inhalation. Since the units of RfD are mg/kg-day and the units of CDI/DAD are mg/kg-day, the HQ and HI are dimensionless. To account for the additivity of noncarcinogenic risk following exposure to numerous chemicals, the HI, which is the sum of all the HQs, will be calculated. A ratio of 1.0 is used for comparison to the HQ and HI (USEPA, 1990). Ratios less than 1.0 indicate that adverse noncarcinogenic health effects are unlikely. Ratios greater than 1.0 indicate that adverse noncarcinogenic health effects may occur at that exposure level. However, this does not mean that adverse effects will definitely occur, since the RfD incorporates safety and modifying factors to ensure that it is well below that dose for which adverse effects have been observed. This procedure assumes that the risks from exposure to multiple chemicals are additive, an assumption that is probably valid for compounds that have the same target organ or cause the same toxic effect.

6.5.3 Potential Human Health Effects

Both pathway-specific risks and total site risks have been estimated for current base personnel and recreational users, current and future industrial/commercial site workers, future construction workers and future residents at Site 84. All scenarios evaluated in this baseline RA were previously discussed in detail in Section 6.3. As previously mentioned, two separate scenarios were evaluated for all receptors: before non-TCRA and after non-TCRA. All calculation spreadsheets used for estimating potential carcinogenic and noncarcinogenic risks for receptors at Site 84 are presented in Appendix H. Shower model results are also presented in Appendix H.

The total site carcinogenic and noncarcinogenic risks estimated for all current and future receptors evaluated in this baseline RA are presented in Tables 6-8A through 6-13B. The pathway risks contributing to the potentially unacceptable total site risks are also presented in these tables.

6.5.3.1 Current Base Personnel

Tables 6-8A and 6-8B present all potential pathway-specific and total site risks estimated for current military Base personnel evaluated for ingestion and dermal exposures to site COPCs in surface soil, surface water, and sediment, and inhalation of fugitive dusts from surface soil.

Before non-TCRA

There were no unacceptable HI values calculated when evaluating the before non-TCRA scenario. There were no carcinogenic risks calculated that exceeded USEPA's acceptable criteria for the current military Base personnel for the before non-TCRA scenario.

After non-TCRA

There were no unacceptable HI values calculated when evaluating the after non-TCRA scenario. There were no carcinogenic risks calculated that exceeded USEPA's acceptable criteria for the current military Base personnel for the after non-TCRA scenario.

6.5.3.2 Current Adult and Adolescent Recreational Users

Table 6-9A and 6-9B presents all potential pathway-specific and total site risks estimated for current adult and adolescent recreational users evaluated for ingestion and dermal exposures to site COPCs in surface soil, surface water, and sediment, and inhalation of fugitive dusts from surface soil.

Before non-TCRA

Potentially unacceptable total site risk estimates included an ILCR value of 1.4×10^{-4} derived for current adult recreational users when evaluating the before non-TCRA scenario. Ingestion of and dermal contact with benzo(a)pyrene, heptachlor, and Aroclor-1260 in the surface soil contributed

primarily to the surface soil ILCR of 1.3×10^{-4} for the adult. There were no adverse noncarcinogenic health hazards calculated that exceeded USEPA's acceptable criteria for the current adult and adolescent recreational users for the before non-TCRA scenario.

After non-TCRA

There were no carcinogenic risks or adverse noncarcinogenic health hazards calculated that exceeded USEPA's acceptable criteria for the current adult and adolescent recreational users for the after non-TCRA scenario.

6.5.3.3 Future Adult and Child Residents

Before non-TCRA

Tables 6-10A (RME) and 6-11A (CT) present all potential pathway-specific and total site risks estimated for future adult and child residents evaluated for ingestion and dermal exposures to site COPCs in surface soil (before non-TCRA), groundwater, surface water, and sediment, inhalation of fugitive dusts from surface soil (before non-TCRA), and inhalation of volatiles while showering. Potentially unacceptable total site risk estimates included an ILCR value of 9.5×10^{-4} and a HI value of 17.1 derived for future adult residents, and an ILCR value of 1.3×10^{-3} and a HI value of 45.6 derived for future child residents. Potential exposure to surface soil and shallow groundwater comprised these elevated risk and hazard values. Ingestion of and dermal contact with benzo(a)pyrene, Aroclor-1260, and heptachlor in the surface soil contributed primarily to the surface soil ILCRs of 5.1×10^{-4} for the adult and 1.0×10^{-3} for the child. Ingestion of and dermal contact with heptachlor epoxide, gamma-chlordane, alpha-chlordane, and Aroclor-1254 contributed primarily to the surface soil HI values 1.1 for the adult and 9.8 for the child. As shown in Table 6-11A, ILCR and HI values were calculated that exceeded USEPA's acceptable criteria under the CT exposure scenario.

Ingestion of arsenic was the main contributor to the elevated groundwater ILCR of 4.3×10^{-4} for the adult resident and 2.5×10^{-4} for the child resident. Ingestion of iron, arsenic, and MCPA were the main contributors to the groundwater HI values of 16 for the adult and 35.7 for the child. The percent contribution of iron to exposures by ingestion of groundwater was approximately 41 percent (HQ = 6.2 for adults and 14 for children). The percent contribution of arsenic to exposures by ingestion of groundwater was approximately 18 percent (HQ = 2.7 for adults and 6.4 for children). The percent contribution of MCPA to exposures by ingestion of groundwater was approximately 16 percent (HQ = 2.4 for adults and 5.6 for children).

As shown in Tables 6-10A and 6-11A, risk and hazard values calculated for surface water and sediment exposure did not contribute significantly to the total site risk or hazard levels.

Therefore, based on the exposure scenario including soil before the non-TCRA, potentially unacceptable risks for future adult and child residents may be associated with surface soil and shallow groundwater investigated at Site 84.

After non-TCRA

Tables 6-10B (RME) and 6-11B (CT) present all potential pathway-specific and total site risks estimated for future adult and child residents evaluated for ingestion and dermal exposures to site COPCs in surface soil (after non-TCRA), groundwater, surface water, and sediment, inhalation of fugitive dusts from surface soil (after non-TCRA), and inhalation of volatiles while showering. Potentially unacceptable total site risk estimates included an ILCR value of 6.2×10^{-4} and a HI value of 16 derived for future adult residents, and an ILCR value of 6.4×10^{-4} and a HI value of 36 derived for future child residents. Potential exposure to shallow groundwater and surface soil comprised the elevated risk and hazard values. As shown in Table 6-11B, ILCR and HI values for the surface soil (future young child only) and groundwater exposure pathways were calculated that exceeded USEPA's acceptable criteria under the CT exposure scenario.

Ingestion of Aroclor-1260 in the surface soil was the main contributor (greater than 80 percent) to the elevated surface soil ILCR of 1.8×10^{-4} for the adult resident and 3.7×10^{-4} for the child resident.

Ingestion of arsenic was the main contributor to the elevated groundwater ILCR of 4.3×10^{-4} for the adult resident and 2.5×10^{-4} for the child resident. Ingestion of iron, arsenic, and MCPA were the main contributors to the groundwater HI values of 16 for the adult and 35.7 for the child. The percent contribution of iron to exposures by ingestion of groundwater was approximately 41 percent (HQ = 6.2 for adults and 14 for children). The percent contribution of arsenic to exposures by ingestion of groundwater was approximately 18 percent (HQ = 2.7 for adults and 6.4 for children). The percent contribution of MCPA to exposures by ingestion of groundwater was approximately 16 percent (HQ = 2.4 for adults and 5.6 for children).

As shown in Tables 6-10B and 6-11B, risk and hazard values calculated for surface water and sediment exposure did not contribute significantly to the total site risk or hazard levels.

Therefore, based on the exposure scenario including soil after the non-TCRA, potentially unacceptable risks for future adult and child residents may be associated with surface soil and shallow groundwater investigated at Site 84.

6.5.3.4 Future Construction Workers

Before non-TCRA

Table 6-12A presents all potential pathway-specific and total site risks estimated for future construction workers evaluated for ingestion and dermal exposures to site COPCs in surface soil and subsurface soil (before non-TCRA); dermal exposures to groundwater, surface water and sediment; and inhalation of fugitive dusts from surface and subsurface soil (before non-TCRA). The potentially unacceptable total site hazard estimate for this receptor was the HI value of 5.0. The elevated HI value resulted primarily from accidental ingestion of surface soil and dermal contact with shallow groundwater. Ingestion of and dermal contact with heptachlor epoxide, alpha-chlordane, gamma-chlordane, and aroclor-1254 were the primary contributors to the surface soil HI value of 3.4. Antimony, MCPA, iron, manganese, and thallium contributed to the groundwater HI value of 1.35. However, the HQ values for the aforementioned inorganics and MCPA in groundwater did not exceed 1.0.

Subsurface soil, surface water, and sediment exposure did not contribute significantly to the total site risk or hazard levels.

Therefore, based on the exposure scenario including soil before the non-TCRA, potentially unacceptable risks for future construction worker may be associated with surface soil and shallow groundwater investigated at Site 84.

After non-TCRA

Table 6-12B presents all potential pathway-specific and total site risks estimated for future construction workers evaluated for ingestion and dermal exposures to site COPCs in surface soil and subsurface soil (after non-TCRA); dermal exposures to groundwater, surface water and sediment; and inhalation of fugitive dusts from surface and subsurface soil (after non-TCRA). The potentially unacceptable total site hazard estimate for this receptor was the HI value of 1.6. The elevated HI value resulted primarily from dermal contact with shallow groundwater.

Antimony, MCPA, iron, manganese, and thallium contributed to the groundwater HI value of 1.35. However, the HQ values for the aforementioned inorganics and MCPA in groundwater did not exceed 1.0.

Surface soil, subsurface soil, surface water, and sediment exposure did not contribute significantly to the total site risk or hazard levels.

Therefore, based on the exposure scenario including soil after the non-TCRA, potentially unacceptable risks for future construction worker may be associated with shallow groundwater investigated at Site 84.

6.5.3.5 Future Industrial/Commercial Site Workers

Before non-TCRA

Table 6-13A presents all potential pathway-specific and total site risks estimated for future industrial/commercial site workers evaluated for ingestion and dermal exposures to site COPCs in surface soil (before non-TCRA) and groundwater, and inhalation of fugitive dusts from surface soil (before non-TCRA) and volatiles in groundwater. Potentially unacceptable total site risk estimates for Site 84 included an ILCR value of 7.0×10^{-4} and a HI value of 12. Potential exposure to surface soil and shallow groundwater comprised these elevated risk and hazard values. Ingestion of and dermal contact with benzo(a)pyrene, heptachlor, and Aroclor-1260 in the surface soil contributed primarily to the surface soil ILCR of 3.8×10^{-4} .

Ingestion of arsenic was the main contributor to the elevated groundwater ILCR of 3.2×10^{-4} . Ingestion of iron, arsenic, MCPA, and thallium were the main contributors to the groundwater HI value of 12. The percent contribution of iron to exposures by ingestion of groundwater was approximately 41 percent (HQ = 4.4). The percent contribution of arsenic to exposures by ingestion of groundwater was approximately 18 percent (HQ = 2). The percent contribution of MCPA to exposures by ingestion of groundwater was approximately 16 percent (HQ = 1.7). The percent contribution of thallium to exposures by ingestion of groundwater was approximately 16 percent (HQ = 1.7).

Therefore, based on the exposure scenario including soil before the non-TCRA, potentially unacceptable risks for future industrial/commercial site worker may be associated with surface soil and shallow groundwater investigated at Site 84.

After non-TCRA

Table 6-13B presents all potential pathway-specific and total site risks estimated for future industrial/commercial site workers evaluated for ingestion and dermal exposures to site COPCs in surface soil (after non-TCRA) and groundwater, and inhalation of fugitive dusts from surface soil (after non-TCRA) and volatiles in groundwater. Potentially unacceptable total site risk estimates for Site 84 included an ILCR value of 4.5×10^{-4} and a HI value of 11.5. Potential exposure to surface soil and shallow groundwater was the primary contributor these elevated risk and hazard values. Ingestion of and dermal contact with Aroclor-1260 in the surface soil contributed primarily to the surface soil ILCR of 1.3×10^{-4} .

Ingestion of arsenic was the main contributor to the elevated groundwater ILCR of 3.2×10^{-4} . Ingestion of iron, arsenic, MCPA, and thallium were the main contributors to the groundwater HI value of 12. The percent contribution of iron to exposures by ingestion of groundwater was approximately 41 percent (HQ = 4.4). The percent contribution of arsenic to exposures by ingestion of groundwater was approximately 18 percent (HQ = 2). The percent contribution of MCPA to exposures by ingestion of groundwater was approximately 16 percent (HQ = 1.7). The percent contribution of thallium to exposures by ingestion of groundwater was approximately 16 percent (HQ = 1.7).

Therefore, based on the exposure scenario including soil after the non-TCRA, potentially unacceptable risks for future industrial/commercial site worker may be associated with shallow groundwater investigated at Site 84.

6.6 Sources of Uncertainty

Uncertainties are encountered throughout the risk assessment process. This section discusses the sources of uncertainty inherent in the following elements of the human health evaluation performed for Site 84:

- Sampling and analysis
- Selection of COPCs
- Exposure assessment
- Toxicological assessment
- Iron
- Human risk characterization
- Chemicals not quantitatively evaluated

Uncertainties associated with this risk assessment are discussed in the following paragraphs.

Table 6-14 summarizes the potential effects of certain uncertainties on the estimation of human health risks.

6.6.1 Sampling and Analysis

The development of a risk assessment depends on the reliability of, and uncertainties associated with, the analytical data available to the risk assessor. These, in turn, are dependent on the operating procedures and techniques applied to the collection of environmental samples in the field and their subsequent analyses in the laboratory. To minimize the uncertainties associated with sampling and analysis at Site 84, USEPA-approved sampling and analytical methods were employed. Data was generated following USEPA's Statement of Work for Contract Laboratory Program (CLP). Samples were analyzed for TCL organics (plus nitramine compounds), TAL inorganics, and cyanide. Samples were taken from locations specified in the approved Work Plan along with the necessary QA/QC samples.

Analytical data are limited by the precision and accuracy of the methods of analysis which are reflected by the Relative Percent Difference (RPD) of duplicate analyses and the percent recovery of spikes, respectively. In addition, the statistical methods used to compile and analyze the data (mean concentrations, detection frequencies) are subject to the overall uncertainty in data measurement. Furthermore, chemical concentrations in environmental media fluctuate over time and with respect to sampling location. Analytical data must be sufficient to consider the temporal and spatial characteristics of contamination at the site with respect to exposure.

Uncertainty exists also in the fact that contamination may or may not be fully delineated. And so, having a complete data set impacts the representativeness of exposure concentrations derived from the data.

6.6.2 Selection of COPCs

Soil, sediment, and groundwater water COPCs were selected based on comparisons of the maximum detected concentration with USEPA Region IX PRGs for residential soil (soil) and tap water (groundwater). Surface water COPCs were selected if their concentration exceeded the AWQC.

PRGs were derived using conservative, USEPA-promulgated default values, and the most recent toxicological criteria available. All non-carcinogenic PRGs were divided by 10 to account for potential additive effects. This adjustment corresponds to assuming an HQ of 0.1, rather than 1.0. This adds additional conservatism to the COPC selection process.

Reference Doses (RfDs) and Cancer Slope Factors (CSFs) have been combined with “standard” exposure scenarios to calculate the PRGs. Actual exposure scenarios and parameters may differ from those used to calculate the PRG.

Currently, no Station closures are planned for MCB Camp Lejeune; therefore future residential development is unlikely. The application of the residential PRG values to soil and groundwater COPC selections would, therefore, tend to result in a list of COPCs that could be considered conservative for a military base. Conservative COPC selections in the baseline RA protects public health because the results of the baseline RA determine remedial alternatives and remedial action objectives in the FS.

Guidance contained within RAGS Volume I, Part A discusses the evaluation of quantitation limits in relationship to whether or not chemicals should be eliminated from a baseline RA because they were not detected. In other words, just because a chemical was not detected does not mean it should be deleted from consideration. In the baseline RA performed for Site 84, only those chemicals that were positively detected were retained for quantitative evaluation in the risk assessment. There is some uncertainty associated with chemicals that may not have been detected, but the sample quantitation limits were greater than corresponding standards and/or criteria. This situation could result in undetected risk. However, given the other conservative

aspects of this baseline RA, it is anticipated that the contribution to the uncertainty of this risk assessment is low. Furthermore, for chemicals detected just once in a given medium, one half of all detection limits of that chemical (considered as non-detects) are used as proxy calculations in calculating the concentration term. Only those chemicals in a medium that are not positively detected in each sample collected and analyzed are eliminated from further consideration.

6.6.3 Exposure Assessment

In performing exposure assessments, uncertainties arise from two main sources. First, uncertainties arise in estimating the fate of a compound in the environment, including estimating release and transport in a particular environmental medium. Second, uncertainties arise in the estimation of chemical intakes resulting from contact by a receptor with a particular medium.

To estimate an intake, certain assumptions must be made about exposure events, exposure durations, and the corresponding assimilation of constituents by the receptor. Exposure factors have been generated by the scientific community and have been reviewed by the USEPA. The USEPA has published an Exposure Factors Handbook (USEPA, 1997) which contains the best and latest values. These exposure factors have been derived from a range of values generated by studies of limited numbers of individuals. It is assumed that all potential receptors remain on or near the site throughout the exposure periods and that their exposures to chemicals from the site are all uniform. In all instances, values used in this risk assessment, scientific judgments, and conservative assumptions agree with those of the USEPA.

- The use of a RME approach, designed to avoid underestimating daily intakes, was employed throughout this risk assessment. The use of 95% UCL estimates of the arithmetic mean versus maximum values as the concentration term in estimating the CDI or DAD for soil, groundwater, surface water and sediment exposure scenarios reduces the potential for underestimating exposure at Site 84.

As stated in Section 6.3.4, the maximum detected concentrations of the COPCs retained in shallow ground water were used as the exposure concentrations. This was because in the groundwater data individual contaminant distribution is scattered, with no apparent plume. The uncertainty lies in the fact that a plume may exist, but not be fully delineated. In the case of an existing plume, the exposure concentrations used in the evaluation of risks would be the 95% UCL of the wells in the highly concentrated area of the plume. Therefore, the groundwater exposure concentrations may be under- or over-estimated at Site 84 by assuming there is no plume.

As noted in Section 6.3.1, Northeast Creek is a large creek that runs into the New River and is used for recreational purposes such as swimming and boating. There is also a certain population that fish and crab out of this creek. Therefore, fish/crab ingestion is a potential source of risk to those individuals. Currently, fish/crab tissue samples are not available with which to quantitatively evaluate a fish/crab ingestion exposure scenario. Surface water and sediment samples were collected from Northeast Creek and analyzed for PCBs only (refer to Section 6.2.4). However, there were no PCBs detected in the surface water and sediment. Therefore, while PCBs are known to bioaccumulate in fish tissue, the data collected from Northeast Creek indicated that PCBs were not present. The absence of fish/crab tissue data, as well as the lack of analysis of other parameters (e.g., inorganics) for the surface water/sediment samples, could potentially underestimate the risk of exposure to Site 84 environmental media. However, given the other conservative aspects of this baseline RA, it is anticipated that the contribution to the overall uncertainty of this risk assessment is low.

6.6.4 Toxicological Assessment

In making quantitative estimates of the toxicity of varying dosages of compounds to human receptors, uncertainties arise from two sources. First, data on human exposure and the subsequent effects are usually insufficient, if they are at all available. Human exposure data usually lack adequate concentration estimations and suffer from inherent temporal variability. Therefore, animal studies are often used and new uncertainties arise from the process of extrapolating animal results to humans. Second, to obtain observable effects with a manageable number of experimental subjects, high doses of a compound are often used. In this situation, a high dose means that high exposures are used in the experiment with respect to most environmental exposures. Therefore, when applying the results of the animal experiment to human exposures, the effects at the high doses must be extrapolated to approximate effects at lower doses.

In extrapolating effects from high doses in animals to low doses in humans, scientific judgment and conservative assumptions are employed. In selecting animal studies for use in dose-response calculations, the following factors are considered:

- Studies are preferred where the animal closely mimics human pharmacokinetics.

- Studies are preferred where dose intake most closely mimics the intake route and duration for humans.
- Studies are preferred which demonstrate the most sensitive response to the compound in question.

For compounds believed to cause threshold effects (i.e., noncarcinogens), safety factors are employed in the extrapolation of effects from animals to humans and from high doses to low doses. In deriving carcinogenic potency factors, the 95% UCL value is promulgated by the USEPA to prevent underestimation of potential risk.

All potential toxic endpoints for human receptors have been addressed to the extent allowed by the data evaluated from the most recent toxicological/epidemiological studies used to derive the cancer slope factors and reference doses. Therefore, any uncertainties associated with toxic endpoints are directly correlated to the information obtained from, and reliability of those studies.

Further conservatism in the baseline RA is also introduced through the use of experimentally-derived oral absorption efficiencies to account for a difference in the degree of toxicity between an administered dose and an absorbed dose. Equating the absorption efficiency of the dermal bi-phasic barrier to the absorption efficiency of the gastrointestinal lining is a very conservative approach that tends to overestimate the potential risk to human health.

6.6.5 Iron

The element iron has been given a PRG value and toxicity values with which to evaluate potential human health risks. The studies that prompted the addition of a RBC value for iron are provisional only and have not undergone formal review by the USEPA. A provisional RfD has been derived for iron by the Superfund Technical Support Center (STSC) division of the Environmental Criteria and Affects Office. The provisional RfD is based on a "no observed adverse effect level" (NOAEL). Developing an RfD for iron is problematic because the dose-response curve for iron is "U-shaped". That is, health effects such as anemia occur at low doses due to deficiency (occurring in the U.S. in approximately 3.3 million women of childbearing age and 240,000 children aged 1-2 years), and high doses can produce toxic effects such as hemosiderosis and liver cirrhosis, while doses in between are beneficial for most of the population. The NOAEL is based on a study that compared the average intake of iron in the

American population with biochemical indices of iron in blood (Looker et al., 1988) to demonstrate that the average intake was sufficient to prevent iron deficiency and insufficient to cause toxic effects of iron overload. The NOAEL (0.15 to 0.27 mg/kg-day) is divided by an uncertainty factor of 1, since iron is an essential element, to produce a provisional RfD of 0.3 mg/kg-day (STSC, 1999).

Although the STSC (1999) report places a high confidence in the critical study upon which the RfD is based; they place a medium confidence in the RfD. The RfD is reported to supply adequate levels of iron to meet the lifetime nutritional requirements for adults and adolescents but may not be protective of people with inherited disorders of iron metabolism (e.g., hemochromatosis which occurs in up to one million individuals in the U.S.) (MMWR, 1998) and could be conservative if applied to exposure scenarios involving forms of iron with low bioavailability. This last point is borne out by studies of Ethiopian populations that have the highest per capita iron intake in the world (471 mg/day average daily intake) but for which adverse health effects have not been observed. This is attributed to the low bioavailability of the iron in Ethiopian food (STSC, 1999).

As applied to an incidental soil ingestion exposure scenario, it is important to note that the contribution of intake of iron from soil is expected to be minimal compared to dietary intake. For example, assuming soil with iron concentration of 15,000 mg/kg (a conservative estimate of background concentrations of iron in soil) and ingestion of 50 mg/day for adults, produces only 0.01 mg/kg-day iron from soil compared to a normal dietary level of 0.3 mg/kg-day. Furthermore, the bioavailability of iron from minerals in soil is expected to be significantly lower than the bioavailability of iron from food. (However, actual levels of bioavailability of iron from soil are not known.) For these reasons, and the fact that the primary sensitive population is those individuals with the medical condition of hemochromatosis which is caused by abnormal absorption of iron and which appears to occur irrespective of excess iron intake, the iron RfD is considered very conservative for use in risk assessment from environmental exposures and should be interpreted with considerable uncertainty.

For the three scenarios where the groundwater HI values exceeded 1, iron had relatively large HQ values. If the provisional iron RBC value were reduced, a large proportion of the risk for these sites would be eliminated. However, by evaluating iron in the risk assessment, a conservative approach is taken and potential toxic effects may be estimated.

In summary, the use of conservative assumptions results in quantitative indices of toxicity that are not expected to underestimate potential toxic effects, but may overestimate these effects by an order of magnitude or more.

6.6.6 Human Risk Characterization

The risk characterization bridges the gap between potential exposure and the possibility of systemic or carcinogenic human health effects, ultimately providing impetus for the remediation of the site or providing a basis for no remedial action.

Uncertainties associated with risk characterization include the assumption of chemical additivity and the inability to predict synergistic or antagonistic interactions between COPCs. These uncertainties are inherent in any inferential risk assessment. USEPA promulgated inputs to the quantitative risk assessment and toxicological indices are calculated to be protective of the human receptor and to err conservatively, so as to not underestimate the potential human health risks.

6.6.7 Compounds Not Quantitatively Evaluated

Three organic compounds were not evaluated in this baseline RA. There are currently no toxicity criteria with which to quantitatively evaluate the human health effects of TPH (GRO and DRO) or bis(2-chloroethoxy)methane in a USEPA baseline RA format. However, given the other conservative aspects of this baseline RA, it is anticipated that the contribution to the uncertainty of this risk assessment is low.

TPH was detected in soil and sediment. Currently there are no toxicity criteria for TPH; therefore, potential risk posed by TPH was not quantified in the baseline RA. Some toxicity data and cancer assessments are available for whole unweathered petroleum products. However, there are uncertainties associated with the use of this information because the composition of each type of petroleum product is variable depending on the crude oil from which it was refined, differences in the refining process, and differences in the formulation of the final product. Further this would apply only if one knows what petroleum product was released. In many cases, the released material is not known or more than one product may have been released and toxicity data for the whole petroleum products that are relatively heterogeneous are not necessarily applicable to the fractions to which exposures actually occur. Additionally, it is believed that the TPH present at Site 84 represents a highly weathered fraction further indicating the inapplicability of using toxicity data for whole petroleum products to quantify risk.

6.7 Summary of the Baseline RA

Current land use scenarios that were evaluated in this baseline RA for Site 84 include the adolescent and adult recreational user and military Base personnel. Future land use scenarios that were evaluated include the adult and child residents, construction worker, and industrial/commercial site worker. Two distinct exposure scenarios were evaluated in this baseline RA. One exposure scenario included the soil around the perimeter of Building 45 that will be excavated during the non-TCRA in February 2002. The second exposure scenario presented the baseline RA excluding the soil that will be excavated during the non-TCRA.

Total site ILCR values calculated in this baseline RA indicate potentially unacceptable carcinogenic risk for the current adult recreational users, future adult and child residents, and future industrial/commercial site worker. The ILCR values that exceeded the USEPA acceptable risk range of 1.0×10^{-6} to 1.0×10^{-4} were primarily from surface soil before the non-TCRA for the current receptors and surface soil before the non-TCRA and shallow groundwater for the future receptors.

Ingestion of and dermal contact with benzo(a)pyrene, heptachlor, and Aroclor-1260 in the surface soil before the non-TCRA contributed to the unacceptable ILCR values. In addition, Aroclor-1260 in soil evaluated after the non-TCRA was the primary contributor to unacceptable carcinogenic risks for the future residential adult and child receptors.

Arsenic in the shallow groundwater also contributed to unacceptable total site ILCR values for the future receptors evaluated for exposure to groundwater. However, it should be noted that it is unlikely for the shallow groundwater aquifer to be used as a source for potable water.

Total site HI values calculated in this baseline RA indicate potentially unacceptable noncarcinogenic hazard levels for the current military Base personnel, future adult and child residents, future construction worker, and the future industrial/commercial site worker. The HI values that exceeded the USEPA acceptable hazard level of 1.0 were primarily from surface soil before the non-TCRA for the current receptors and surface soil before the non-TCRA and shallow groundwater for the future receptors.

Ingestion of and dermal contact with heptachlor epoxide, gamma-chlordane, alpha-chlordane, and Aroclor-1254 in the surface soil before the non-TCRA contributed to the unacceptable HI values. Soil evaluated after the non-TCRA did not contribute significantly to unacceptable noncarcinogenic adverse health effects for these receptors.

MCPA, arsenic, iron, and thallium in the shallow groundwater also contributed to unacceptable total site HI values for the future receptors evaluated for exposure to groundwater. However, it should be noted that it is unlikely for the shallow groundwater aquifer to be used as a source for potable water.

6.8 References

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TABLES

TABLE 6-1A

**SURFACE SOIL DATA AND COPC SELECTION SUMMARY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA**

Contaminant	Criteria ⁽¹⁾		Contaminant Frequency / Range / Location		Background ⁽²⁾ 2 * Mean (1/2 nondetects)	COPC Selection		Exposure Concentration Selection	
	Region IX Residential Soil PRG Values	No. of Positive Detects / No. of Samples	Range of Positive Detections	Location of Maximum Detection		Selected as a COPC?	Rational for Selection or Deletion	95% UCL	Rational for Concentration Selection
VOLATILES (ug/kg)									
2-Butanone (MEK)	730,000 N	1/25	6.9 J	IR84-MW20-00	NA	NO	BSL	NA	NA
Acetone	160,000 N	1/25	40 J	84-MW15-00	NA	NO	BSL	NA	NA
Ethylbenzene	230,000 S	1/25	330 J	IR84-DP82-00	NA	NO	BSL	NA	NA
Xylenes, total	210,000 S	2/25	8.7 J - 120 J	IR84-DP82-00	NA	NO	BSL	NA	NA
SEMIVOLATILES (ug/kg)									
2-Methylnaphthalene	5,600 N ⁽⁶⁾	3/25	120 J - 92000	IR84-DP84-00	NA	YES	ASL	1,958	W-Lognormal (3)
Acenaphthene	370,000 N	8/25	140 J - 20000 J	IR84-DP46-00	NA	NO	BSL	NA	NA
Anthracene	2,200,000 N	8/25	210 J - 56000	IR84-DP46-00	NA	NO	BSL	NA	NA
Benzo(a)anthracene	620 C	8/25	520 - 190000	IR84-DP46-00	NA	YES	ASL	69,004	W-Lognormal (3)
Benzo(a)pyrene	62.0 C	7/25	470 - 150000	IR84-DP46-00	NA	YES	ASL	30,451	W-Lognormal (3)
Benzo(b)fluoranthene	620 C	7/25	540 - 170000	IR84-DP46-00	NA	YES	ASL	40,858	W-Lognormal (3)
Benzo(g,h,i)perylene	230,000 N ⁽⁷⁾	9/25	74 J - 55000	IR84-DP46-00	NA	NO	BSL	NA	NA
Benzo(k)fluoranthene	6,200 C	7/25	340 J - 120000	IR84-DP46-00	NA	YES	ASL	18,653	W-Lognormal (3)
Bis(2-ethylhexyl)phthalate	35,000 C	1/25	380 J	IR84-MW20-00	NA	NO	BSL	NA	NA
Carbazole	24,000 C	7/25	130 J - 38000 J	IR84-DP46-00	NA	YES	ASL	3,157	W-Lognormal (3)
Chrysene	62,000 C	8/25	560 - 180000	IR84-DP46-00	NA	YES	ASL	96,012	W-Lognormal (3)
Dibenz(a,h)anthracene	62.0 C	7/25	70 J - 17000 J	IR84-DP46-00	NA	YES	ASL	1,414	W-Lognormal (3)
Dibenzofuran	29,000 N	7/25	84 J - 8900 J	IR84-DP46-00	NA	NO	BSL	NA	NA
Fluoranthene	230,000 N	8/25	1200 - 300000	IR84-DP46-00	NA	YES	ASL	243,222	W-Lognormal (3)
Fluorene	260,000 N	9/25	130 J - 19000 J	IR84-DP46-00	NA	NO	BSL	NA	NA
Hexachlorocyclopentadiene	42,000 N	1/25	410 J	IR84-DP47-00	NA	NO	BSL	NA	NA
Indeno(1,2,3-cd)pyrene	620 C	7/25	250 J - 59000	IR84-DP46-00	NA	YES	ASL	8,791	W-Lognormal (3)
Naphthalene	5,600 N	5/25	140 J - 7500 J	IR84-DP46-00	NA	YES	ASL	525	W-Lognormal (3)
Phenanthrene	230,000 N ⁽⁷⁾	9/25	910 J - 180000	IR84-DP46-00	NA	NO	BSL	NA	NA
Pyrene	230,000 N	8/25	760 - 250000	IR84-DP46-00	NA	YES	ASL	281,987	Max (4)

TABLE 6-1A (Continued)

**SURFACE SOIL DATA AND COPC SELECTION SUMMARY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA**

Contaminant	Criteria ⁽¹⁾	Contaminant Frequency / Range / Location		Background ⁽²⁾	COPC Selection		Exposure Concentration Selection				
	Region IX Residential Soil PRG Values	No. of Positive Detects / No. of Samples	Range of Positive Detections	Location of Maximum Detection	2 * Mean (1/2 nondetects)	Selected as a COPC?	Rational for Selection or Deletion	95% UCL	Exposure Concentration	Rational for Concentration Selection	
PCBs (ug/kg)	2,400 C	7/23	3.2 J - 3000 J	IR84-DP47-00	NA	YES	ASL	4,806	3,000	Max (4)	
	1,700 C	7/23	2.9625 J - 58	IR84-DP49-00	NA	NO	BSL	NA	NA	NA	
	1,700 C	7/23	1.9 - 190	IR84-DP49-00	NA	NO	BSL	NA	NA	NA	
	90.0 C	1/23	21	IR84-DP82-00	NA	NO	BSL	NA	NA	NA	
	1,600 C ⁽⁸⁾	10/23	2 J - 48000 J	IR84-DP47-00	NA	YES	ASL	44,122,769	48,000	Max (4)	
	1,600 C ⁽⁸⁾	10/23	3.5125 J - 58000	IR84-DP47-00	NA	YES	ASL	75,346,385	58,000	Max (4)	
	30.0 C	8/23	3.5 J - 320	IR84-DP49-00	NA	YES	ASL	7,483	320	Max (4)	
	37,000 N ⁽⁹⁾	5/24	3.2 - 40 J	IR84-DP82-00	NA	NO	BSL	NA	NA	NA	
	1,800 N	1/23	3.6225 J	IR84-MW20-00	NA	NO	BSL	NA	NA	NA	
	1,800 N ⁽¹⁰⁾	7/24	4.5 J - 61 J	IR84-DP82-00	NA	NO	BSL	NA	NA	NA	
	1,800 N ⁽¹⁰⁾	5/24	1.7 J - 26 J	IR84-DP81-00	NA	NO	BSL	NA	NA	NA	
	110 C	8/23	1.5 J - 22000	IR84-DP47-00	NA	YES	ASL	1,785,115	22,000	Max (4)	
	53.0 C	6/23	4.2 J - 4500 J	IR84-DP47-00	NA	YES	ASL	47,553	4,500	Max (4)	
	31,000 N	7/24	1.9 J - 79 J	IR84-DP82-00	NA	NO	BSL	NA	NA	NA	
	220 C	4/91	56 - 160000	IR84-DP47-00	NA	YES	ASL	1,507	1,507	D-Lognormal (3)	
	220 C	1/91	51000	IR84-DP53-00	NA	YES	ASL	975	975	D-Lognormal (3)	
	220 C	64/91	18 J - 200000	IR84-SB27-01	NA	YES	ASL	54,562	54,562	D-Lognormal (3)	
	TOTAL PETROLEUM HYDROCARBONS										
	Gasoline Range Organics (ug/kg)	NE	1/11	880	IR84-DP46-00	NA	YES	NSC	207	207	W-Lognormal (3)
Diesel Range Organics (mg/kg)	NE	11/11	7 J - 470	IR84-DP46-00	ND	YES	NSC	1,794	470	Max (4)	
METALS (mg/kg)											
Aluminum	7,600 N	25/25	1270 - 5910	IR84-MW20-00	3556.3052	NO	BSL	NA	NA	NA	
Antimony	3.10 N	13/25	0.66 J - 3.3 J	IR84-DP49-00	0.3934	YES	ASL	1	1	W-Lognormal (3)	
Arsenic	0.390 C	23/25	0.33 J - 9.1	IR84-DP49-00	0.5108	YES	ASL	3	3	W-Lognormal (3)	
Barium	540 N	22/25	3 J - 65.7	IR84-DP49-00	10.6444	NO	BSL	NA	NA	NA	
Beryllium	15.0 N	5/25	0.06 J - 0.075 J	IR84-DP46-00	0.0728	NO	BSL	NA	NA	NA	
Cadmium	3.70 N	13/25	0.067 J - 0.57	IR84-DP53-00	0.0278	NO	BSL	NA	NA	NA	
Calcium	NE	25/25	109 J - 100000 J	IR84-DP50-00	1462.2764	NO	NUT	NA	NA	NA	
Chromium VI	30.0 C	25/25	1.7 - 20.2	IR84-DP49-00	ND	NO	BSL	NA	NA	NA	
Cobalt	470 N	22/25	0.18 J - 0.76 J	IR84-DP49-00	0.2302	NO	BSL	NA	NA	NA	
Copper	290 N	25/25	0.35 J - 146	IR84-DP49-00	5.2188	NO	BSL	NA	NA	NA	
Iron	2,300 N	25/25	684 - 3480	IR84-MW20-00	1737.4264	YES	ASL	2,260	2,260	W-Lognormal (3)	

TABLE 6-1A (Continued)

SURFACE SOIL DATA AND COPC SELECTION SUMMARY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Contaminant	Criteria ⁽¹⁾	Contaminant Frequency / Range / Location			Background ⁽²⁾	COPC Selection			Exposure Concentration Selection	
	Region IX Residential Soil PRG Values	No. of Positive Detects / No. of Samples	Range of Positive Detections	Location of Maximum Detection	2 * Mean (1/2 nondetects)	Selected as a COPC?	Rational for Selection or Deletion	95% UCL	Exposure Concentration	Rational for Concentration Selection
METALS (mg/kg) (Cont)										
Lead	400 N ⁽¹¹⁾	25/25	1.8 - 97.3	IR84-DP49-00	10.4738	NO	BSL	NA	NA	NA
Magnesium	NE	25/25	47.3 J - 1480	IR84-DP49-00	211.5692	NO	NUT	NA	NA	NA
Manganese	180 N	25/25	2.7 - 32.8	IR84-DP49-00	11.3294	NO	BSL	NA	NA	NA
Mercury	2.30 N	18/25	0.01 J - 0.2	IR84-DP74-00	0.0732	NO	BSL	NA	NA	NA
Nickel	160 N	25/25	0.46 J - 2.9 J	IR84-DP49-00	1.0454	NO	BSL	NA	NA	NA
Potassium	NE	16/25	70.2 J - 258 J	IR84-DP76-00	89.1538	NO	NUT	NA	NA	NA
Selenium	39.0 N	2/25	0.365 J - 0.61	IR84-DP74-00	0.3194	NO	BSL	NA	NA	NA
Sodium	NE	3/25	165 J - 235 J	IR84-DP50-00	ND	NO	NUT	NA	NA	NA
Thallium	0.520 N	1/25	0.6 J	IR84-DP45-00	ND	YES	ASL	0	0	W-Lognormal (3)
Vanadium	55.0 N	25/25	2.3 J - 10.4	IR84-DP76-00	5.9918	NO	BSL	NA	NA	NA
Zinc	2,300 N	25/25	1.3 J - 154 J	IR84-DP49-00	10.748	NO	BSL	NA	NA	NA

Notes:

NA - Not Applicable
NE - Not Established
+ - Essential Nutrient

UCL - Upper Confidence Limit
PRG - Preliminary Remediation Goal
COPC - Chemical of Potential Concern

ug/kg - microgram per kilogram
mg/kg - milligram per kilogram

Rational Codes:
(ASL) Above Screening Level
(NSC) No Screening Criteria
(BSL) Below Screening Level
(NUT) Essential Nutrient

J - Analyte present - Reported value is estimated

Shaded constituents were identified as COPCs for quantitative risk evaluation.

- (1) All non-carcinogenic criteria were divided by 10 to account for potential additive effects of chemicals. USEPA Region IX COC Screening Value (derived from USEPA Region IX PRG Table)
- (2) MCB Camp Lejeune Base Background Study, Final (Baker, 2001): 2 * Mean (1/2 nondetects)
- (3) Conservative estimate of the arithmetic average concentration (95% UCL), based on the Shapiro-Wilks (W-) or D-Augustino (D-) distribution tests
- (4) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

- (6) Screening values for naphthalene used as a surrogate
- (7) Screening value for pyrene used as a surrogate.
- (8) Screening value for chlordane used as a surrogate.
- (9) Screening value for endosulfan used as a surrogate.
- (10) Screening value for endrin used as a surrogate.
- (11) Action level for lead.

TABLE 6-1B

SURFACE SOIL DATA AND COPC SELECTION SUMMARY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Contaminant	Criteria ⁽¹⁾		Contaminant Frequency / Range / Location		Background ⁽²⁾		COPC Selection		Exposure Concentration Selection	
	Region IX Residential Soil PRG Values	No. of Positive Detects / No. of Samples	Range of Positive Detections	Location of Maximum Detection	2 * Mean (1/2 nondetects)	Selected as a COPC?	Rational for Selection or Deletion	95% UCL	Exposure Concentration	Rational for Concentration Selection
VOLATILES (ug/kg)										
2-Butanone (MEK)	730,000 N	1/13	6.9 J	IR84-MW20-00	NA	NO	BSL	NA	NA	NA
Acetone	160,000 N	1/13	40 J	84-MW15-00	NA	NO	BSL	NA	NA	NA
Ethylbenzene	230,000 S	1/13	330 J	IR84-DP82-00	NA	NO	BSL	NA	NA	NA
Xylenes, total	210,000 S	2/13	8.7 J - 120 J	IR84-DP82-00	NA	NO	BSL	NA	NA	NA
SEMIVOLATILES (ug/kg)										
2-Methylnaphthalene	5,600 N ⁽⁵⁾	2/13	350 J - 92000	IR84-DP84-00	NA	YES	ASL	57,887	57,887	W-Lognormal (3)
Acenaphthene	370,000 N	2/13	2300 - 2800 J	IR84-DP84-00	NA	NO	BSL	NA	NA	NA
Anthracene	2,200,000 N	2/13	3500 - 4100 J	IR84-DP84-00	NA	NO	BSL	NA	NA	NA
Benzo(a)anthracene	620 C	2/13	1800 J - 5900	84-MW17-00	NA	YES	ASL	4,762	4,762	W-Lognormal (3)
Benzo(a)pyrene	620 C	1/13	5800	84-MW17-00	NA	YES	ASL	2,477	2,477	W-Lognormal (3)
Benzo(b)fluoranthene	620 C	1/13	7100	84-MW17-00	NA	YES	ASL	2,807	2,807	W-Lognormal (3)
Benzo(g,h,i)perylene	230,000 N ⁽⁶⁾	2/13	1500 J - 3200	84-MW17-00	NA	NO	BSL	NA	NA	NA
Benzo(k)fluoranthene	6,200 C	1/13	3800	84-MW17-00	NA	YES	CHEM	1,780	1,780	W-Lognormal (3)
Bis(2-ethylhexyl)phthalate	35,000 C	1/13	380 J	IR84-MW20-00	NA	NO	BSL	NA	NA	NA
Carbazole	24,000 C	1/13	2100	84-MW17-00	NA	YES	CHEM	950	950	W-Lognormal (3)
Chrysene	62,000.0 C	2/13	1200 J	84-MW17-00	NA	YES	CHEM	7,113	6,700	W-Lognormal (3)
Dibenz(a,h)anthracene	62 C	1/13	1800 J	84-MW17-00	NA	NO	BSL	695	695	W-Lognormal (3)
Dibenzofuran	29,000 N	1/13	1700 J - 16000	84-MW17-00	NA	NO	BSL	NA	NA	NA
Fluoranthene	230,000 N	2/13	580 J - 9000 J	IR84-DP84-00	NA	NO	BSL	NA	NA	NA
Fluorene	260,000 N	3/13	3200	84-MW17-00	NA	YES	ASL	1,718	1,718	W-Lognormal (3)
Indeno(1,2,3-cd)pyrene	620 C	1/13	640 J	84-MW17-00	NA	NO	BSL	NA	NA	NA
Naphthalene	5,600 N	1/13	910 J - 24000	IR84-DP84-00	NA	NO	BSL	NA	NA	NA
Phenanthrene	230,000 N ⁽⁶⁾	3/13	10000 - 16000	IR84-DP84-00	NA	NO	BSL	NA	NA	NA
Pyrene	230,000 N	2/13								
PESTICIDES/PCBs (ug/kg)										
4,4'-DDD	2,400 C	4/11	3.6 J - 32 J	IR84-DP82-00	NA	NO	BSL	NA	NA	NA
4,4'-DDE	1,700 C	1/11	2,9625 J	IR84-MW20-00	NA	NO	BSL	NA	NA	NA
4,4'-DDT	1,700 C	1/11	8.2 J	IR84-DP83-00	NA	NO	BSL	NA	NA	NA
BHC, alpha-	90.0 C	1/11	21	IR84-DP82-00	NA	NO	BSL	NA	NA	NA
Chlordane, alpha-	1,600 C ⁽⁷⁾	2/11	2,4175 J - 40 J	84-MW17-00	NA	NO	BSL	NA	NA	NA
Chlordane, gamma-	1,600 C ⁽⁷⁾	2/11	3,5125 J - 43	84-MW17-00	NA	NO	BSL	NA	NA	NA
Dieldrin	30.0 C	3/11	14 J - 52	IR84-DP82-00	NA	NO	BSL	NA	NA	NA
Endosulfan Sulfate	37,000 N ⁽⁸⁾	5/12	3.2 - 40 J	IR84-DP82-00	NA	YES	ASL	87.7	52	Max (4)
Endrin	1,800 N	1/11	3,6225 J	IR84-MW20-00	NA	NO	BSL	NA	NA	NA
Endrin Aldehyde	1,800 N ⁽⁹⁾	5/12	4.5 J - 61 J	IR84-DP82-00	NA	NO	BSL	NA	NA	NA
Endrin Ketone	1,800 N ⁽⁹⁾	4/12	1.7 J - 26 J	IR84-DP81-00	NA	NO	BSL	NA	NA	NA
Methoxychlor	31,000.0 N	4/12	8.7 J - 79 J	IR84-DP82-00	NA	NO	BSL	NA	NA	NA
Aroclor-1248	220 C	1/77	56	IR84-DP20-00	NA	NO	BSL	NA	NA	NA
Aroclor-1260	220 C	58/77	18 J - 200000	IR84-SB27-01	NA	YES	ASL	95,625	95,625	D-Lognormal (3)

TABLE 6-1B (Continued)

SURFACE SOIL DATA AND COPC SELECTION SUMMARY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Contaminant	Criteria ⁽¹⁾	Contaminant Frequency / Range / Location		Background ⁽²⁾	COPC Selection		Exposure Concentration Selection		
	Region IX Residential Soil PRG Values	No. of Positive Detects / No. of Samples	Range of Positive Detections	Location of Maximum Detection	Selected as a COPC?	Rational for Selection or Deletion	95% UCL	Exposure Concentration	Rational for Concentration Selection
METALS (mg/kg)									
Aluminum	7,600 N	13/13	1390 - 5910	IR84-MW20-00	NO	BSL	NA	NA	NA
Antimony	3.10 N	5/13	0.66 J - 2 J	IR84-DP84-00	NO	BSL	NA	NA	NA
Arsenic	0.390 C	11/13	0.64 J - 6.7	84-MW17-00	YES	ASL	5.26	5.26	W-Lognormal (3)
Barium	540 N	11/13	3 J - 24.6 J	IR84-DP84-00	NO	BSL	NA	NA	NA
Cadmium	3.70 N	4/13	0.1155 J - 0.23 J	IR84-DP82-00	NO	BSL	NA	NA	NA
Calcium	NE	13/13	109 J - 17900	IR84-DP82-00	NO	NUT	NA	NA	NA
Chromium	210 C	13/13	1.7 - 7.5	IR84-DP76-00	NO	BSL	NA	NA	NA
Cobalt	470 N	11/13	0.18 J - 0.41 J	IR84-DP74-00	NO	BSL	NA	NA	NA
Copper	290 N	13/13	0.35 J - 28.4	IR84-DP84-00	NO	BSL	NA	NA	NA
Iron	2,300 N	13/13	950 - 3480	IR84-MW20-00	NO	BSL	NA	NA	NA
Lead	400 N ⁽¹⁰⁾	13/13	1.8 - 65.4	IR84-DP82-00	YES	ASL	2,347	2,347	W-Lognormal (3)
Magnesium	NE	13/13	47.3 J - 347 J	IR84-DP82-00	NO	BSL	NA	NA	NA
Manganese	180 N	13/13	2.7 - 15.9	IR84-DP83-00	NO	NUT	NA	NA	NA
Mercury	2.30 N	7/13	0.015 J - 0.2	IR84-DP74-00	NO	BSL	NA	NA	NA
Nickel	160 N	13/13	0.46 J - 2.6 J	IR84-DP84-00	NO	BSL	NA	NA	NA
Potassium	NE	7/13	70.2 J - 258 J	IR84-DP76-00	NO	BSL	NA	NA	NA
Selenium	39.0 N	2/13	0.365 J - 0.61	IR84-DP74-00	NO	NUT	NA	NA	NA
Vanadium	55.0 N	13/13	2.5 J - 10.4	IR84-DP76-00	NO	BSL	NA	NA	NA
Zinc	2,300 N	13/13	1.3 J - 40.7 J	IR84-DP82-00	NO	BSL	NA	NA	NA

Notes:

NA - Not Applicable
 NE - Not Established
 + - Essential Nutrient

UCL - Upper Confidence Limit
 PRG - Preliminary Remediation Goal
 COPC - Chemical of Potential Concern

J - Analyte present - Reported value is estimated

Shaded constituents were identified as COPCs for quantitative risk evaluation.

(1) All non-carcinogenic criteria were divided by 10 to account for potential additive effects of chemicals.

USEPA Region IX COC Screening Value (derived from USEPA Region IX PRG Table)

(2) MCB Camp Lejeune Base Background Study, Final (Baker, 2001); 2 * Mean (1/2 nondetects)

(3) Conservative estimate of the arithmetic average concentration (95% UCL), based on the Shapiro-Wilks (W-) or D-Augustino (D-) distribution tests

(4) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

(5) Screening values for naphthalene used as a surrogate

(6) Screening value for pyrene used as a surrogate.

(7) Screening value for chlorodane used as a surrogate.

(8) Screening value for endosulfan used as a surrogate.

(9) Screening value for endrin used as a surrogate.

(10) Action level for lead.

Rational Codes:

C = Carcinogenic
 N = Non-Carcinogenic
 S = Soil Saturation

(ASL) Above Screening Level
 (NSC) No Screening Criteria
 (BSL) Below Screening Level
 (NUT) Essential Nutrient

ug/kg - microgram per kilogram
 mg/kg - milligram per kilogram

TABLE 6-2A

**SUBSURFACE SOIL DATA AND COPC SELECTION SUMMARY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA**

Contaminant	Criteria ⁽¹⁾ Region IX Residential Soil PRG Values	Contaminant Frequency / Range / Location		Background ⁽²⁾ 2 * Mean (1/2 nondetects)	COPC Selection		Exposure Concentration Selection	
		No. of Positive Detects / No. of Samples	Range of Positive Detections		Selected as a COPC?	Rational for Selection or Deletion	95% UCL	Exposure Concentration
VOLATILES (ug/kg)								
1,2-Dichloroethene (total)	4,300 N ⁽⁵⁾	1/23	91 J	IR84-DP82-04	NO	BSL	NA	NA
2-Butanone (MEK)	730,000 N	1/23	3.8 J	IR84-MW21-04	NO	BSL	NA	NA
Acetone	160,000 N	2/23	14 J - 18 J	IR84-MW21-04	NO	BSL	NA	NA
Benzene	650 C	2/23	120 J - 160 J	84-MW15-04	NO	BSL	NA	NA
Chloroform	240 C	1/23	0.98 J	IR84-MW22-02	NO	BSL	NA	NA
Ethylbenzene	230,000 S	5/23	0.89 J - 1300	IR84-DP75-05	NO	BSL	NA	NA
Methylene Chloride	8,900 C	1/23	1.3 J	IR84-DP78-03	NO	BSL	NA	NA
Styrene	1,700,000 S	1/23	2.1 J	IR84-MW23-01	NO	BSL	NA	NA
Toluene	520,000 S	1/23	75 J	IR84-DP75-05	NO	BSL	NA	NA
Xylenes, total	210,000 S	4/23	4.1 J - 3100	IR84-DP75-05	NO	BSL	NA	NA
SEMIVOLATILES (ug/kg)								
2-Methylnaphthalene	5,600 N ⁽⁶⁾	3/31	1000 - 27000	84-MW15-04	YES	ASL	573	573
Acenaphthene	370,000 N	4/31	61 J - 950 J	IR84-DP15-03	NO	BSL	NA	NA
Anthracene	2,200,000 N	3/31	190 J - 830 J	IR84-DP46-02	NO	BSL	NA	NA
Benzo(a)anthracene	620 C	3/31	640 - 3000	IR84-DP46-02	YES	ASL	199	199
Benzo(a)pyrene	62.0 C	3/31	590 - 2600	IR84-DP46-02	YES	ASL	194	194
Benzo(b)fluoranthene	620 C	5/31	68 J - 2800	IR84-DP46-02	YES	ASL	217	217
Benzo(g,h,i)perylene	230,000 N ⁽⁷⁾	5/31	65 J - 1200	IR84-DP46-02	NO	BSL	NA	NA
Benzo(k)fluoranthene	6,200 C	3/31	280 J - 1700	IR84-DP46-02	YES	CHEM	137	137
Bis(2-chloroethoxy)methane	NE	1/31	54	IR84-DP81-04	YES	NSC	51.2	51.2
Bis(2-ethylhexyl)phthalate	35,000 C	7/31	91 J - 1800	IR84-MW22-02	NO	BSL	NA	NA
Carbazole	24,000 C	3/31	110 J - 480 J	IR84-DP46-02	YES	CHEM	84.5	84.5
Chrysene	62,000 C	5/31	57 J - 3100	IR84-DP46-02	YES	CHEM	209	209
Dibenz(a,h)anthracene	62 C	3/31	98 J - 430 J	IR84-DP46-02	YES	ASL	75.8	75.8
Dibenzofuran	29,000 N	3/31	160 J - 1300 J	IR84-DP15-03	NO	BSL	NA	NA
Fluoranthene	230,000 N	5/31	74 J - 4800	IR84-DP46-02	NO	BSL	NA	NA
Fluorene	260,000 N	5/31	61 J - 1500 J	IR84-DP15-03	NO	BSL	NA	NA
Hexachlorocyclopentadiene	42,000 N	1/31	94 J	IR84-DP47-01	NO	BSL	NA	NA
Indeno(1,2,3-cd)pyrene	620 C	3/31	340 J - 1200	IR84-DP46-02	YES	ASL	145	145
Naphthalene	5,600 N	4/31	55 J - 8500	84-MW15-04	YES	ASL	226	226
Phenanthrene	230,000 N ⁽⁷⁾	6/31	150 J - 3400 J	84-MW15-04, IR84-DP15-03	NO	BSL	NA	NA
Phthalic anhydride	100,000,000 M	2/2	120 NJ - 170 NJ	IR84-SB04-02	NO	BSL	NA	NA
Pyrene	230,000 N	5/31	69 J - 4100	IR84-DP46-02	NO	BSL	NA	NA

TABLE 6-2A (Continued)

**SUBSURFACE SOIL DATA AND COPC SELECTION SUMMARY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA**

Criteria ⁽¹⁾		Contaminant Frequency / Range / Location			Background ⁽²⁾	COPC Selection			Exposure Concentration Selection	
Contaminant	Region IX Residential Soil PRG Values	No. of Positive Detects / No. of Samples	Range of Positive Detections	Location of Maximum Detection	2 * Mean (1/2 nondetects)	Selected as a COPC?	Rational for Selection or Deletion	95% UCL	Exposure Concentration	Rational for Concentration Selection
PESTICIDES / PCBs (ug/kg)										
4,4'-DDD	2,400 C	7/31	1.1675 J - 46 J	IR84-DP45-03	NA	NO	BSL	NA	NA	NA
4,4'-DDE	1,700 C	5/31	1.155 J - 16	IR84-DP52-01	NA	NO	BSL	NA	NA	NA
4,4'-DDT	1,700 C	5/31	2.5 - 120 J	IR84-DP52-01	NA	NO	BSL	NA	NA	NA
BHC, beta-	320 C	1/31	1.7 J	84-MW17-07	NA	NO	BSL	NA	NA	NA
Chlordane, alpha-	1,600 C ⁽⁸⁾	7/31	5.9 J - 14000 J	IR84-DP47-01	NA	YES	ASL	1,215	1,215	W-Lognormal (3)
Chlordane, gamma-	1,600 C ⁽⁸⁾	7/31	6.3 - 18000	IR84-DP47-01	NA	YES	ASL	1,648	1,648	W-Lognormal (3)
Dieldrin	30.0 C	3/31	1.4 J - 2.4	IR84-SB01-02	NA	NO	BSL	NA	NA	NA
Endrin Aldehyde	1,800 N ⁽⁹⁾	1/31	10 J	IR84-DP15-03	NA	NO	BSL	NA	NA	NA
Heptachlor	110 C	6/31	1.6 J - 6900	IR84-DP47-01	NA	YES	ASL	155	155	W-Lognormal (3)
Heptachlor Epoxide	53.0 C	2/31	63 J - 200 J	IR84-DP46-02	NA	YES	ASL	16.1	16.1	W-Lognormal (3)
Methoxychlor	31,000 N	3/31	2.9 J - 24 J	IR84-DP15-03	NA	NO	BSL	NA	NA	NA
Aroclor-1248	220 C	1/37	47000	IR84-DP47-01	NA	YES	ASL	318	318	W-Lognormal (3)
Aroclor-1254	220 C	1/37	5000	IR84-DP46-02	NA	YES	ASL	333	333	W-Lognormal (3)
Aroclor-1260	220 C	11/37	13 J - 45000	IR84-DP18-02	NA	YES	ASL	5,608	5,608	W-Lognormal (3)
TOTAL PETROLEUM HYDROCARBONS										
Gasoline Range Organics (ug/kg)	NE	2/8	220 - 580000	IR84-DP15-03	NA	YES	NSC	4.84E+12	580,000	Max (4)
Diesel Range Organics (mg/kg)	NE	8/8	15 - 5500	IR84-DP15-03	ND	YES	NSC	32,931	5,500	Max (4)
METALS (mg/kg)										
Aluminum	7,600 N	31/31	589 - 7210	IR84-DP77-03	7216.4828	NO	BSL	NA	NA	NA
Antimony	3.10 N	7/31	0.6 J - 1.3 B	IR84-DP15-03	0.3762	NO	BSL	NA	NA	NA
Arsenic	0.390 C	27/31	0.33 J - 2	IR84-DP15-03	0.4976	YES	ASL	1.11	1.11	W-Lognormal (3)
Barium	540 N	20/31	0.92 J - 24.3	IR84-DP49-01	11.3358	NO	BSL	NA	NA	NA
Beryllium	15.0 N	5/31	0.051 J - 0.13 B	IR84-DP15-03	0.0686	NO	BSL	NA	NA	NA
Cadmium	3.70 N	7/31	0.03675 J - 0.18 J	IR84-DP49-01	ND	NO	BSL	NA	NA	NA
Calcium	NE	31/31	71.4 J - 66800 J	IR84-SB03-02	116.3862	NO	NUT	NA	NA	NA
Chromium VI	30.0 C	31/31	1.2 - 9.9	IR84-DP45-03	ND	NO	BSL	NA	NA	NA
Cobalt	470 N	25/31	0.16 J - 0.69 J	IR84-DP52-01	0.3964	NO	BSL	NA	NA	NA
Copper	290 N	27/31	0.34 J - 25.5	IR84-DP50-01	1.5224	NO	BSL	NA	NA	NA
Iron	2,300 N	31/31	155 - 6140	IR84-DP15-03	2423.8344	NO	BSL	NA	NA	NA
Lead	400 N ⁽¹⁰⁾	31/31	0.87 - 52.7	IR84-DP49-01	5.7656	YES	ASL	2,754	2,754	W-Lognormal (3)
Magnesium	NE	31/31	16.4 J - 943	IR84-SB03-02	187.6828	NO	BSL	NA	NA	NA
Manganese	180 N	31/31	0.48 J - 50.5	IR84-SB03-02	5.3896	NO	NUT	NA	NA	NA
Mercury	2.30 N	22/31	0.01 J - 0.055 J	IR84-DP46-02	0.0626	NO	BSL	NA	NA	NA
Nickel	160 N	30/31	0.42 J - 3.5 J	IR84-DP50-01	1.5576	NO	BSL	NA	NA	NA

TABLE 6-2A (Continued)

**SUBSURFACE SOIL DATA AND COPC SELECTION SUMMARY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA**

Contaminant	Criteria ⁽¹⁾		Contaminant Frequency / Range / Location		Background ⁽²⁾ 2 * Mean (1/2 nondetects)	COPC Selection		Exposure Concentration Selection		
	Region IX Residential Soil PRG Values	No. of Positive Detects / No. of Samples	Range of Positive Detections	Location of Maximum Detection		Selected as a COPC?	Rational for Selection or Deletion	95% UCL	Exposure Concentration	Rational for Concentration Selection
METALS (mg/kg) (Cont)										
Potassium	+	NE	26/31	21.3 J - 195 J	IR84-DP77-03	162.6276	NO	NUT	NA	NA
Selenium		39.0 N	8/31	0.295 J - 0.73	IR84-SB03-02	0.4128	NO	BSL	NA	NA
Sodium	+	NE	1/31	89.7 J	IR84-SB03-02	ND	NO	NUT	NA	NA
Thallium		0.520 N	5/31	0.64 J - 0.9 J	IR84-SB03-02	ND	YES	ASL	0.405	W-Lognormal (3)
Vanadium		55.0 N	31/31	1.1 J - 11.2	IR84-DP15-03	9.831	NO	BSL	NA	NA
Zinc		2,300 N	27/31	1.4 J - 42.6 J	IR84-DP49-01	3.0842	NO	BSL	NA	NA

Notes:

NA - Not Applicable
NE - Not Established
+ - Essential Nutrient

UCL - Upper Confidence Limit

PRG - Preliminary Remediation Goal

COPC - Chemical of Potential Concern

J - Analyte present - Reported value is estimated

NJ - Presumptive evidence for the presence of the material at an estimated value

B - Constituent was detected in a blank

ug/kg - microgram per kilogram
mg/kg - milligram per kilogram

C = Carcinogenic

N = Non-Carcinogenic

S = Soil Saturation

M = Max, Ceiling Limit

Rational Codes:

(ASL) Above Screening Level

(CHEM) Same Chemical Class

(NSC) No Screening Criteria

(BSL) Below Screening Level

(NUT) Essential Nutrient

Shaded constituents were identified as COPCs for quantitative risk evaluation.

* These compounds were retained because one or more of its related carcinogenic PAHs were retained, and these compounds are known to exist together in mixtures

(1) All non-carcinogenic criteria were divided by 10 to account for potential additive effects of chemicals.

USEPA Region IX COC Screening Value (derived from USEPA Region IX PRG Table)

(2) MCB Camp Lejeune Base Background Study, Final (Baker, 2001): 2 * Mean (1/2 nondetects)

(3) Conservative estimate of the arithmetic average concentration (95% UCL), based on the Shapiro-Wilks (W-) or D-Augustino (D-) distribution tests

(4) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

(5) Screening value for 1,2-dichloroethene (cis) used as a surrogate.

(6) Screening values for naphthalene used as a surrogate

(7) Screening value for pyrene used as a surrogate.

(8) Screening value for chlordane used as a surrogate.

(9) Screening value for endrin used as a surrogate.

(10) Action level for lead.

TABLE 6-2B

SUBSURFACE SOIL DATA AND COPC SELECTION SUMMARY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Contaminant	Criteria ⁽¹⁾	Contaminant Frequency / Range / Location			Background ⁽²⁾	COPC Selection		Exposure Concentration Selection		
	Region IX Residential Soil PRG Values	No. of Positive Detects / No. of Samples	Range of Positive Detections	Location of Maximum Detection	2 * Mean (1/2 nondetects)	Selected as a COPC?	Rational for Selection or Deletion	95% UCL	Exposure Concentration	Rational for Concentration Selection
VOLATILES (ug/kg)										
1,2-Dichloroethene (total)	4,300 N ⁽⁵⁾	1/14	91 J	IR84-DP82-04	NA	NO	BSL	NA	NA	NA
2-Butanone (MEK)	730,000 N	1/14	3.8 J	IR84-MW21-04	NA	NO	BSL	NA	NA	NA
Acetone	160,000 N	2/14	14 J - 18 J	IR84-MW21-04	NA	NO	BSL	NA	NA	NA
Benzene	650 C	1/14	160 J	84-MW15-04	NA	NO	BSL	NA	NA	NA
Ethylbenzene	230,000 S	4/14	0.89 J - 1000	84-MW15-04	NA	NO	BSL	NA	NA	NA
Methylene Chloride	8,900 C	1/14	1.3 J	IR84-DP78-03	NA	NO	BSL	NA	NA	NA
Styrene	1,700,000 S	1/14	2.1 J	IR84-MW23-01	NA	NO	BSL	NA	NA	NA
Xylenes, total	210,000 S	3/14	4.1 J - 2800	84-MW15-04	NA	NO	BSL	NA	NA	NA
SEMIVOLATILES (ug/kg)										
2-Methylnaphthalene	5,600 N ⁽⁶⁾	2/18	9100 - 27000	84-MW15-04	NA	YES	ASL	6,380	6,380	W-Lognormal (3)
Acenaphthene	370,000 N	1/18	950 J	IR84-DP15-03	NA	NO	BSL	NA	NA	NA
Benzo(b)fluoranthene	620 C	1/18	68 J	IR84-SB01-02	NA	NO	BSL	NA	NA	NA
Bis(2-chloroethoxy)methane	NE	1/18	54	IR84-DP81-04	NA	YES	NSC	78.5	54	Max (4)
Bis(2-ethylhexyl)phthalate	35,000 C	4/18	91 J - 380.75 J	IR84-DP79-02	NA	NO	BSL	NA	NA	NA
Chrysene	62,000 C	1/18	59 J	IR84-SB03-02	NA	NO	BSL	NA	NA	NA
Dibenzofuran	29,000 N	1/18	1300 J	IR84-DP15-03	NA	NO	BSL	NA	NA	NA
Fluoranthene	230,000 N	1/18	82 J	IR84-SB03-02	NA	NO	BSL	NA	NA	NA
Fluorene	260,000 N	1/18	1500 J	IR84-DP15-03	NA	NO	BSL	NA	NA	NA
Naphthalene	5,600 N	2/18	2000 J - 8500	84-MW15-04	NA	YES	ASL	862	862	W-Lognormal (3)
Phenanthrene	230,000 N ⁽⁷⁾	2/18	3400 J - 3400 J	84-MW15-04,IR84-DP15-03	NA	NO	BSL	NA	NA	NA
Phthalic anhydride	100,000,000 M	2/2	120 NJ - 170 NJ	IR84-SB04-02	NA	NO	BSL	NA	NA	NA
Pyrene	230,000 N	1/18	91 J	IR84-SB03-02	NA	NO	BSL	NA	NA	NA
PESTICIDES/PCBs (ug/kg)										
4,4'-DDD	2,400 C	3/18	2.4 - 9.1 J	IR84-DP15-03	NA	NO	BSL	NA	NA	NA
4,4'-DDE	1,700 C	2/18	2.2 - 4.4	IR84-SB03-02	NA	NO	BSL	NA	NA	NA
4,4'-DDT	1,700 C	2/18	2.5 - 8.7	IR84-SB03-02	NA	NO	BSL	NA	NA	NA
BHC, beta-	320 C	1/18	1.7 J	84-MW17-07	NA	NO	BSL	NA	NA	NA
Chlordane, alpha-	1,600 C ⁽⁸⁾	1/18	5.9 J	IR84-SB03-02	NA	NO	BSL	NA	NA	NA
Chlordane, gamma-	1,600 C ⁽⁸⁾	1/18	6.3	IR84-SB03-02	NA	NO	BSL	NA	NA	NA
Dieldrin	30.0 C	1/18	2.4	IR84-SB01-02	NA	NO	BSL	NA	NA	NA
Endrin Aldehyde	1,800 N ⁽⁹⁾	1/18	10 J	IR84-DP15-03	NA	NO	BSL	NA	NA	NA
Methoxychlor	31,000 N	2/18	2.9 J - 24 J	IR84-DP15-03	NA	NO	BSL	NA	NA	NA
Aroclor-1260	220 C	8/24	13 J - 45000	IR84-DP18-02	NA	YES	ASL	27,035	27,035	W-Lognormal (3)
TOTAL PETROLEUM HYDROCARBONS										
Gasoline Range Organics (ug/kg)	NE	1/1	580000	IR84-DP15-03	NA	YES	NSC	ND	580,000	Max (5)
Diesel Range Organics (mg/kg)	NE	1/1	5500	IR84-DP15-03	ND	YES	NSC	ND	5,500	Max (5)

TABLE 6-2B (Continued)
SUBSURFACE SOIL DATA AND COPC SELECTION SUMMARY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Contaminant	Criteria ⁽¹⁾ Region IX Residential Soil PRG Values	Contaminant Frequency / Range / Location		Background ⁽²⁾ 2 * Mean (1/2 nondetects)	COPC Selection Selected as a COPC?	Rational for Selection or Deletion	Exposure Concentration Selection		Rational for Concentration Selection
		No. of Positive Detects / No. of Samples	Range of Positive Detects				95% UCL	Exposure Concentration	
METALS (mg/kg)									
Aluminum	7,600 N	18/18	589 - 7210	IR84-DP77-03	NO	BSL	NA	NA	NA
Antimony	3.10 N	1/18	1.3 B	IR84-DP15-03	NO	BSL	NA	NA	NA
Arsenic	0.390 C	15/18	0.33 J - 2	IR84-DP15-03	YES	ASL	1.50	1.50	W-Lognormal (3)
Barium	540 N	11/18	0.92 J - 21.6 B	IR84-MW23-01	NO	BSL	NA	NA	NA
Beryllium	15.0 N	2/18	0.1 B - 0.13 B	IR84-DP15-03	NO	BSL	NA	NA	NA
Cadmium	3.70 N	2/18	0.097 J - 0.12 J	IR84-SB03-02	NO	BSL	NA	NA	NA
Calcium	NE	18/18	71.4 J - 66800 J	IR84-SB03-02	NO	NUT	NA	NA	NA
Chromium	210 C	18/18	1.2 - 9.7	IR84-DP15-03	NO	BSL	NA	NA	NA
Cobalt	470 N	14/18	0.16 J - 0.68 J	IR84-DP15-03	NO	BSL	NA	NA	NA
Copper	290 N	14/18	0.34 J - 5.1	IR84-DP15-03	NO	BSL	NA	NA	NA
Iron	2,300 N	18/18	475 - 6140	IR84-DP15-03	NO	BSL	NA	NA	NA
Lead	400 N ⁽¹⁰⁾	18/18	0.87 - 11.4	IR84-DP15-03	YES	ASL	3,007	3,007	W-Lognormal (3)
Magnesium	NE	18/18	16.4 J - 943	IR84-SB03-02	NO	NUT	NA	NA	NA
Manganese	180 N	18/18	0.48 J - 50.5	IR84-SB03-02	NO	BSL	NA	NA	NA
Mercury	2.30 N	10/18	0.0116 J - 0.037 J	IR84-MW21-04	NO	BSL	NA	NA	NA
Nickel	160 N	17/18	0.42 J - 2.3 J	IR84-DP15-03	NO	BSL	NA	NA	NA
Potassium	NE	14/18	21.3 J - 195 J	IR84-DP77-03	NO	NUT	NA	NA	NA
Selenium	39.0 N	5/18	0.39 J - 0.73	IR84-SB03-02	NO	BSL	NA	NA	NA
Sodium	NE	1/18	89.7 J	IR84-SB03-02	NO	NUT	NA	NA	NA
Thallium	0.520 N	4/18	0.65 J - 0.9 J	IR84-SB03-02	YES	ASL	0.488	0.488	W-Lognormal (3)
Vanadium	55.0 N	18/18	1.1 J - 11.2	IR84-DP15-03	NO	BSL	NA	NA	NA
Zinc	2,300 N	15/18	1.4 J - 33.2	IR84-SB03-02	NO	BSL	NA	NA	NA

Notes:

NA - Not Applicable
 NE - Not Established
 + - Essential Nutrient

UCL - Upper Confidence Limit
 PRG - Preliminary Remediation Goal
 COPC - Chemical of Potential Concern

ug/kg - microgram per kilogram
 mg/kg - milligram per kilogram

Rational Codes:

C = Carcinogenic
 N = Non-Carcinogenic
 S = Soil Saturation
 M = Max, Ceiling Limit
 (ASL) Above Screening Level
 (NSC) No Screening Criteria
 (BSL) Below Screening Level
 (NUT) Essential Nutrient

J - Analyte present - Reported value is estimated

NJ - Presumptive evidence for the presence of the material at an estimated value

B - Constituent was detected in a blank

Shaded constituents were identified as COPCs for quantitative risk evaluation.

(1) All non-carcinogenic criteria were divided by 10 to account for potential additive effects of chemicals.

USEPA Region IX COC Screening Value (derived from USEPA Region IX PRG Table)

(2) MCB Camp Lejeune Base Background Study, Final (Baker, 2001): 2 * Mean (1/2 nondetects)

(3) Conservative estimate of the arithmetic average concentration (95% UCL), based on the Shapiro-Wilks (W-) or D-Augustino (D-) distribution tests

(4) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

(5) Screening value for 1,2-dichloroethene (cis) used as a surrogate.

(6) Screening values for naphthalene used as a surrogate

(7) Screening value for pyrene used as a surrogate.

(8) Screening value for chlordane used as a surrogate.

(9) Screening value for endrin used as a surrogate.

(10) Action level for lead.

TABLE 6-3

GROUNDWATER DATA AND COPC SELECTION SUMMARY
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Contaminant	Criteria ⁽¹⁾		Contaminant Frequency / Range / Location		COPC Selection		Exposure Concentration Selection		
	Region IX Tap Water PRG Values	No. of Positive Detects / No. of Samples	Range of Positive Detections	Location of Maximum Detection	Selected as a COPC?	Rational for Selection or Deletion	95% UCL	Exposure Concentration	Rational for Concentration Selection
VOLATILES (ug/L)									
2-Butanone (MEK)	190 N	2/19	0.53 J - 0.69 J	IR84-MW22-01C	NO	BSL	NA	NA	NA
Benzene	0.350 C	2/19	1.5 J - 3.4 J	AST781-GW03-98B	YES	ASL	10.0	3.4	Max (2)
Carbon Disulfide	100 N	1/19	0.49 J	IR84-MW18-01C	NO	BSL	NA	NA	NA
Chloroform	0.160 C	2/19	16 - 16	AST781-GW11-98B, AST781-GW12-98B	YES	ASL	96.1	16	Max (2)
Chloromethane	1.50 C	2/19	0.17 J - 0.62 J	IR84-MW18-01C	NO	BSL	NA	NA	NA
Ethylbenzene	130 N	4/19	0.61 J - 6.7 J	AST781-GW04-98B	NO	BSL	NA	NA	NA
Methyl Tert-Butyl Ether (MTBE)	20.0 N/C	1/19	0.52 J	IR84-MW16-01C	NO	BSL	NA	NA	NA
Methylene Chloride	4.30 C	3/19	0.37 J - 0.7 J	IR84-MW22-01C	NO	BSL	NA	NA	NA
Trichloroethene (TCE)	1.60 C	1/19	0.19 J	IR84-MW17-01C	NO	BSL	NA	NA	NA
Xylenes, total	140 N	1/19	1.8	IR84-MW17-01C	NO	BSL	NA	NA	NA
SEMIVOLATILES (ug/L)									
2-Methylnaphthalene	0.620 N ⁽³⁾	1/13	1.05 J	IR84-MW20-01C	YES	ASL	0.448	1.05	Max (2)
Naphthalene	0.620 N	1/13	2.2 J	IR84-MW22-01C	YES	ASL	0.654	2.2	Max (2)
PESTICIDES / PCBs (ug/L)									
4,4'-DDD	0.280 C	3/13	0.0285 J - 0.044 J	IR84-MW18-01C	NO	BSL	NA	NA	NA
4,4'-DDE	0.200 C	1/13	0.025 J	IR84-MW20-01C	NO	BSL	NA	NA	NA
4,4'-DDT	0.200 C	3/13	0.029 J - 0.046 J	IR84-MW21-01C	NO	BSL	NA	NA	NA
BHC, beta-	0.0370 C	4/13	0.01405 J - 0.029 J	IR84-MW21-01C	NO	BSL	NA	NA	NA
Chlordane, gamma-	0.190 C ⁽⁴⁾	1/13	0.04 J	IR84-MW18-01C	NO	BSL	NA	NA	NA
Endosulfan I	22.0 N ⁽⁵⁾	1/13	0.023 J	IR84-MW18-01C	NO	BSL	NA	NA	NA
Heptachlor Epoxide	0.00740 C	1/13	0.0167 J	IR84-MW20-01C	YES	ASL	0.0186	0.0167	Max (2)
HERBICIDES (ug/L)									
Dinoseb	3.60 N	4/13	0.015 J - 1.5 J	IR84-MW17-01C	NO	BSL	NA	NA	NA
MCPA	1.80 N	1/13	44 J	IR84-MW18-01C	YES	ASL	18.4	44	Max (2)
METALS (mg/L)									
Aluminum	3.60 N	9/13	0.44 - 0.73	IR84-MW17-01C	NO	BSL	NA	NA	NA
Antimony	0.00150 N	3/13	0.0022 J - 0.011 J	IR84-MW17-01C	YES	ASL	0.00330	0.011	Max (2)
Arsenic	0.0000450 C	3/13	0.0074 J - 0.03	IR84-MW08-01C	YES	ASL	0.00940	0.03	Max (2)
Barium	0.260 N	13/13	0.0036 J - 0.12 J	IR84-MW18-01C	NO	BSL	NA	NA	NA
Beryllium	0.00730 N	13/13	0.00057 J - 0.0011 J	IR84-MW10-01C, IR84-MW10-01C	NO	BSL	NA	NA	NA
Cadmium	0.00180 N	2/13	0.00056 J - 0.00061 J	IR84-MW23-01C	NO	BSL	NA	NA	NA
Calcium	NE	13/13	1.4 J - 106	IR84-MW07-01C	NO	NUT	NA	NA	NA
Chromium VI	0.0110 N	3/13	0.0011 J - 0.0022 J	IR84-MW19-01C	NO	BSL	NA	NA	NA
Cobalt	0.220 N	3/13	0.0022 J - 0.0057 J	IR84-MW18-01C	NO	BSL	NA	NA	NA

TABLE 6-3 (Continued)
GROUNDWATER DATA AND COPC SELECTION SUMMARY
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Contaminant	Criteria ⁽¹⁾ Region IX Tap Water PRG Values	Contaminant Frequency / Range / Location			COPC Selection		Exposure Concentration Selection	
		No. of Positive Detects / No. of Samples	Range of Positive Detections	Location of Maximum Detection	Selected as a COPC?	Rational for Selection or Deletion	95% UCL	Exposure Concentration
METALS (mg/L) (Cont)								
Iron	1.10 N	11/13	0.18 - 67.7	IR84-MW08-01C	YES	ASL	5,897	67.7
Magnesium	NE	13/13	0.34 J - 11.3	IR84-MW18-01C	NO	NUT	NA	NA
Manganese	0.0880 N	13/13	0.004 J - 0.45	IR84-MW07-01C	YES	ASL	0.876	0.45
Mercury	0.00110 N	1/13	0.000072 J	IR84-MW17-01C	NO	BSL	NA	NA
Nickel	0.0730 N	2/13	0.0027 J - 0.011 J	IR84-MW18-01C	NO	BSL	NA	NA
Potassium	NE	10/13	0.86 J - 11	IR84-MW21-01C	NO	NUT	NA	NA
Sodium	NE	13/13	2.1 J - 22	IR84-MW19-01C	NO	NUT	NA	NA
Thallium	0.000240 N	2/13	0.0054 J - 0.0057 J	IR84-MW08-01C	YES	ASL	0.00350	0.0057
Vanadium	0.0260 N	9/13	0.00084 J - 0.0037 J	IR84-MW21-01C	NO	BSL	NA	NA
Zinc	1.10 N	3/13	0.013 J - 0.31	IR84-MW18-01C	NO	BSL	NA	NA

Notes:

NA - Not Applicable
NE - Not Established
+ - Essential Nutrient

C = Carcinogenic
N = Non-Carcinogenic

ug/kg - microgram per kilogram
mg/kg - milligram per kilogram

J - Analyte present - Reported value is estimated

Rational Codes:

(ASL) Above Screening Level
(BSL) Below Screening Level
(NUT) Essential Nutrient

Shaded constituents were identified as COPCs for quantitative risk evaluation.

(1) All non-carcinogenic criteria were divided by 10 to account for potential additive effects of chemicals.

USEPA Region IX COC Screening Value (derived from USEPA Region IX PRG Table)

(2) Conservative estimate using the maximum concentration.

(3) Screening values for naphthalene used as a surrogate

(4) Screening value for chlordane used as a surrogate.

(5) Screening value for endosulfan used as a surrogate.

(6) Screening values for chromium (total) used.

TABLE 6-4

SURFACE WATER DATA AND COPC SELECTION SUMMARY
 SITE 84 (BUILDING 45 AREA)
 MCB CAMP LEJEUNE
 JACKSONVILLE, NORTH CAROLINA

Contaminant	Criteria ⁽¹⁾ US EPA Ambient Water Quality Criteria	Contaminant Frequency / Range / Location		COPC Selection Selected as a COPC?	Rational for Selection or Deletion	Exposure Concentration Selection	
		No. of Positive Detects / No. of Samples	Range of Positive Detections			95% UCL	Rational for Concentration Selection
VOLATILES (ug/L)							
Acetone	NE	1/1	5.6 J	YES	NSC	ND	Max (3)
Benzene	1.20	1/1	1.2 J	NO	BSL	NA	NA
Toluene	6,800	1/1	2.7 J	NO	BSL	NA	NA
Xylenes, total	NE	1/1	3.5 J	YES	NSC	ND	Max (3)

Notes:

NA - Not Applicable
 NE - Not Established
 + - Essential Nutrient

UCL - Upper Confidence Limit

PRG - Preliminary Remediation Goal

COPC - Chemical of Potential Concern

J - Analyte present - Reported value is estimated

Rational Codes:

(NSC) No Screening Criteria
 (BSL) Below Screening Level

ug/kg - microgram per kilogram
 mg/kg - milligram per kilogram

C = Carcinogenic

N = Non-Carcinogenic

Shaded constituents were identified as COPCs for quantitative risk evaluation.

(1) EPA Ambient Water Quality Criteria: Consumption of water and organisms

(2) Data set contains fewer than five samples. Therefore, maximum concentration used for EPC.

TABLE 6-4 (Continued)

SURFACE WATER DATA AND COPC SELECTION SUMMARY

SITE 84 (BUILDING 45 AREA)

MCB CAMP LEJEUNE

JACKSONVILLE, NORTH CAROLINA

Contaminant	Criteria ⁽¹⁾ North Carolina Surface Water Quality Standards	Contaminant Frequency / Range / Location		COPC Selection		Exposure Concentration Selection	
		No. of Positive Detects / No. of Samples	Range of Positive Detections	Location of Maximum Detection	Selected as a COPC?	Rational for Selection or Deletion	Rational for Concentration Selection
VOLATILES (ug/L)							
Acetone	NE	1/1	5.6 J	IR84-SW07-98B	YES	NSC	Max (3)
Benzene	71.4	1/1	1.2 J	IR84-SW07-98B	NO	BSL	NA
Toluene	NE	1/1	2.7 J	IR84-SW07-98B	YES	NSC	Max (3)
Xylenes, total	NE	1/1	3.5 J	IR84-SW07-98B	YES	NSC	Max (3)

Notes:

NA - Not Applicable
NE - Not Established
+ - Essential Nutrient

J - Analyte present - Reported value is estimated

UCL - Upper Confidence Limit
PRG - Preliminary Remediation Goal
COPC - Chemical of Potential Concern

ug/kg - microgram per kilogram
mg/kg - milligram per kilogram

C = Carcinogenic
N = Non-Carcinogenic

Rational Codes:

(NSC) No Screening Criteria
(BSL) Below Screening Level

Shaded constituents were identified as COPCs for quantitative risk evaluation.

- (1) North Carolina Surface Water Quality Standards (human health consumption of fish)
(2) Data set contains fewer than five samples. Therefore, maximum concentration used for EPC.

TABLE 6-5

SEDIMENT DATA AND COPC SELECTION SUMMARY
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Contaminant	Criteria ⁽¹⁾ Region IX Residential Soil PRG Values	No. of Positive Detects / No. of Samples	Contaminant Frequency / Range / Location Range of Positive Detections	Location of Maximum Detection	COPC Selection Selected as a COPC?	Rational for Selection or Deletion	Exposure Concentration Selection	
							95% UCL	Rational for Concentration Selection
VOLATILES (ug/kg)								
Xylenes, total	210,000 S	1/1	910 J	IR84-SD07-98B	NO	BSL	NA	NA
SEMIVOLATILES (ug/kg)								
2-Methylnaphthalene	5,600 N ⁽⁴⁾	1/1	10000	IR84-SD07-98B	YES	ASL	ND	10,000
Bis(2-ethylhexyl)phthalate	35,000 C	1/1	2400 J	IR84-SD07-98B	NO	BSL	NA	NA
Naphthalene	5,600 N	1/1	2000	IR84-SD07-98B	NO	BSL	NA	NA
Phenanthrene	230,000 N ⁽⁵⁾	1/1	2500	IR84-SD07-98B	NO	BSL	NA	NA
PCBs (ug/kg)								
Aroclor-1248	220 C	1/7	2800	84-SD05-01	YES	ASL	61,973	2,800
Aroclor-1260	220 C	7/7	3700 - 40000	IR84-SD01-98B	YES	ASL	51,224	40,000
TOTAL PETROLEUM HYDROCARBONS								
Diesel Range Organics (mg/kg)	NE	3/3	3500 - 11600	IR84-SD01-98B	YES	NSC	427,412	11,600

Notes:

NA - Not Applicable
 NE - Not Established
 + - Essential Nutrient

J - Analyte present - Reported value is estimated

UCL - Upper Confidence Limit

PRG - Preliminary Remediation Goal

COPC - Chemical of Potential Concern

Rational Codes:

(ASL) Above Screening Level
 (NSC) No Screening Criteria
 (BSL) Below Screening Level

ug/kg - microgram per kilogram
 mg/kg - milligram per kilogram

C = Carcinogenic

N = Non-Carcinogenic

S = Soil Saturation

Shaded constituents were identified as COPCs for quantitative risk evaluation.

- (1) All non-carcinogenic criteria were divided by 10 to account for potential additive effects of chemicals. USEPA Region IX COC Screening Value (derived from USEPA Region IX PRG Table)
- (2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.
- (3) Data set contains fewer than five samples. Therefore, maximum concentration used for EPC.
- (4) Screening values for naphthalene used as a surrogate
- (5) Screening value for pyrene used as a surrogate.

TABLE 6-6

SUMMARY OF EXPOSURE PARAMETERS
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Parameter	Units	Current Adult Military Base Personnel		Current Adult Recreational Users		Current Adolescent Recreational Users		Current and Future Adult Residents		Current and Future Young Child Residents		Future Adult Construction Workers		Future Adult Industrial/Commercial Workers	
		RME		RME		RME		RME	CT	RME	CT	RME		RME	
Soil															
Ingestion Rate of Soil / Sediment (IR-S)	mg/day	100 USEPA, 1989		100 USEPA, 1989		100 USEPA, 1989		100 USEPA, 1989	50 USEPA, 1993	200 USEPA, 1989	100 USEPA, 1993	480 USEPA, 1997		50 USEPA, 1995	
Fraction Ingested from Source (FI)	NA	1 USEPA, 1995		1 USEPA, 1995		1 USEPA, 1995		1 USEPA, 1995	Prof Judge	1 USEPA, 1995	1 USEPA, 1995	1 USEPA, 1995		1 USEPA, 1995	
Exposure Frequency (EF)	days/year	250 USEPA, 1995		48 Prof Judge		48 Prof Judge		350 USEPA, 1991	234 USEPA, 1993	350 USEPA, 1991	234 USEPA, 1993	250 USEPA, 1991		250 USEPA, 1991	
Exposure Duration (ED)	years	4 Std Tour of Duty		24 USEPA, 1989		9 USEPA, 1989		24 USEPA, 1989	9 USEPA, 1993	6 USEPA, 1989	6 USEPA, 1989	1 Prof Judge		25 USEPA, 1991	
Exposure Time (ET)	hours/day	8 Prof Judge		8 USEPA, 1991		8 USEPA, 1991		24 Prof Judge	24 USEPA, 1993	24 Prof Judge	24 USEPA, 1991	8 Prof Judge		8 USEPA, 1991	
Surface Area Available for Contact (SA)	cm ² /day	3,300 USEPA, 1997		5,700 USEPA, 1997		5,300 USEPA, 1997		5,700 USEPA, 1997	5,000 USEPA, 1992	2,800 USEPA, 1997	2,000 USEPA, 1992	3,300 USEPA, 1997		3,300 USEPA, 1997	
Respiration Rate (RR)	m ³ /hour	0.83 USEPA, 1995		0.83 USEPA, 1991		0.83 USEPA, 1991		0.83 USEPA, 1995	0.8 USEPA, 1995	0.625 USEPA, 1995	0.625 USEPA, 1995	0.83 USEPA, 1995		0.83 USEPA, 1995	
Conversion Factor (CF)	kg/mg	1.00E-06 USEPA, 1989		1.00E-06 USEPA, 1989		1.00E-06 USEPA, 1989		1.00E-06 USEPA, 1989	1.00E-06 USEPA, 1989	1.00E-06 USEPA, 1989	1.00E-06 USEPA, 1989	1.00E-06 USEPA, 1989		1.00E-06 USEPA, 1989	
Averaging Time (Non-Cancer) (AT-N)	days	1,460 USEPA, 1989		8,760 USEPA, 1989		3,285 USEPA, 1989		8,760 USEPA, 1989	3,285 USEPA, 1993	2,190 USEPA, 1989	2,190 USEPA, 1989	365 USEPA, 1989		9,125 USEPA, 1989	
Groundwater															
Ingestion Rate of Water (IR-W)	L/hour	--		--		--		2 USEPA, 1995	1.4 USEPA, 1993	1 USEPA, 1989	1 USEPA, 1995	NA USEPA, 1989		2 USEPA, 1995	
Exposure Frequency (EF)	days/year	--		--		--		350 Prof Judge	234 USEPA, 1993	350 USEPA, 1991	234 USEPA, 1993	250 USEPA, 1991		250 USEPA, 1991	
Exposure Duration (ED)	years	--		--		--		24 USEPA, 1989	9 USEPA, 1993	6 USEPA, 1989	6 USEPA, 1989	1 Prof Judge		25 USEPA, 1991	
Exposure Time (ET)	hours/day	--		--		--		0.25 USEPA, 1989	0.25 USEPA, 1993	0.25 USEPA, 1989	0.25 USEPA, 1992	8 USEPA, 1989		0.25 USEPA, 1989	
Surface Area Available for Contact (SA)	cm ²	--		--		--		18,000 USEPA, 1997	20,000 USEPA, 1992	6,600 USEPA, 1997	7,930 USEPA, 1992	3,300 USEPA, 1997		18,000 USEPA, 1997	
Respiration Rate (RR)	m ³ /hour	--		--		--		0.83 USEPA, 1995	0.83 USEPA, 1995	0.625 USEPA, 1995	0.625 USEPA, 1995	--		0.83 USEPA, 1995	
Conversion Factor (CF)	L/cm ³	--		--		--		1.00E-03 USEPA, 1989	1.00E-03 USEPA, 1989	1.00E-03 USEPA, 1989	1.00E-03 USEPA, 1989	1.00E-03 USEPA, 1989		1.00E-03 USEPA, 1989	
Averaging Time (Non-Cancer) (AT-N)	days	--		--		--		8,760 USEPA, 1989	3,285 USEPA, 1989	2,190 USEPA, 1989	2,190 USEPA, 1989	365 USEPA, 1989		9,125 USEPA, 1989	
Surface Water															
Ingestion Rate of Water (IR-W)	L/hour	0.01 USEPA, 1995		0.01 USEPA, 1995		0.01 USEPA, 1995		0.01 USEPA, 1995	0.01 USEPA, 1995	0.05 USEPA, 1995	0.05 USEPA, 1995	NA USEPA, 1989		--	
Exposure Frequency (EF)	days/year	250 USEPA, 1995		48 Prof Judge		48 Prof Judge		48 Prof Judge	48 Prof Judge	48 Prof Judge	48 Prof Judge	250 USEPA, 1991		--	
Exposure Duration (ED)	years	4 Std Tour of Duty		24 USEPA, 1989		9 USEPA, 1989		24 USEPA, 1989	9 USEPA, 1993	6 USEPA, 1989	6 USEPA, 1989	1 Prof Judge		--	
Exposure Time (ET)	hours/day	2.6 USEPA, 1992		2.6 USEPA, 1992		2.6 USEPA, 1992		2.6 USEPA, 1992	2.6 USEPA, 1992	2.6 USEPA, 1992	2.6 USEPA, 1992	8 Prof Judge		--	
Surface Area Available for Contact (SA)	cm ²	3,300 USEPA, 1997		5,700 USEPA, 1997		5,300 USEPA, 1997		5,700 USEPA, 1997	5,000 USEPA, 1992	2,800 USEPA, 1997	2,000 USEPA, 1993	3,300 USEPA, 1997		--	
Conversion Factor (CF)	L/cm ³	1.00E-03 USEPA, 1989		1.00E-03 USEPA, 1989		1.00E-03 USEPA, 1989		1.00E-03 USEPA, 1989	1.00E-03 USEPA, 1989	1.00E-03 USEPA, 1989	1.00E-03 USEPA, 1989	1.00E-03 USEPA, 1989		--	
Averaging Time (Non-Cancer) (AT-N)	days	1,460 USEPA, 1989		8,760 USEPA, 1989		3,285 USEPA, 1989		8,760 USEPA, 1989	3,285 USEPA, 1989	2,190 USEPA, 1989	2,190 USEPA, 1989	365 USEPA, 1989		--	

TABLE 6-6

SUMMARY OF EXPOSURE PARAMETERS
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Parameter	Units	Current Adult		Current Adolescent		Current and Future Adult		Current and Future Young Child		Future Adult Construction Workers		Future Adult Industrial / Commercial Workers	
		RME	CT	RME	CT	RME	CT	RME	CT	RME	CT	RME	CT
Sediment													
Ingestion Rate of Sediment (IR-S)	mg/day	100 USEPA, 1991		100 USEPA, 1989		100 USEPA, 1989	50 USEPA, 1993	200 USEPA, 1989	100 USEPA, 1993	NA Prof Judge		--	
Fraction Ingested from Source (FI)	NA	1 Prof Judge		1 USEPA, 1995		1 Prof Judge	1 USEPA, 1989	1 USEPA, 1995	1 USEPA, 1995	1 USEPA, 1995		--	
Exposure Frequency (EF)	days/year	250 USEPA, 1991		48 Prof Judge		48 Prof Judge	48 USEPA, 1989	48 USEPA, 1995	48 USEPA, 1995	250 USEPA, 1991		--	
Exposure Duration (ED)	years	4 Std Tour of Duty		24 USEPA, 1989		24 USEPA, 1989	9 USEPA, 1993	6 USEPA, 1989	6 USEPA, 1989	1 Prof Judge		--	
Surface Area Available for Contact (SA)	cm ² /day	3,300 USEPA, 1997		5,700 USEPA, 1997		5,700 USEPA, 1997	5,000 USEPA, 1992	2,800 USEPA, 1997	1,745 USEPA, 1992	3,300 USEPA, 1997		--	
Conversion Factor (CF)	kg/mg	1.00E-06 USEPA, 1989		1.00E-06 USEPA, 1989		1.00E-06 USEPA, 1989	1.00E-06 USEPA, 1989	1.00E-06 USEPA, 1989	1.00E-06 USEPA, 1989	1.00E-06 USEPA, 1989		--	
Averaging Time (Non-Cancer) (AT-N)	days	1,460 USEPA, 1989		8,760 USEPA, 1989		8,760 USEPA, 1989	3,285 USEPA, 1989	2,190 USEPA, 1989	2,190 USEPA, 1989	365 USEPA, 1989		--	
Other Parameters													
Body Weight (BW)	kg	70 USEPA, 1989		70 USEPA, 1989		70 USEPA, 1989	70 USEPA, 1989	15 USEPA, 1991	15 USEPA, 1989	70 USEPA, 1989		70	
Soil to Skin Adherence Factor (AF)	mg/cm ²	0.2 USEPA, 1997		0.2 USEPA, 1997		0.07 USEPA, 1997	0.07 USEPA, 1997	0.2 USEPA, 1997	0.2 USEPA, 1997	0.2 USEPA, 1997		0.2	
Particulate Emission Factor (PEF)	m ³ /kg	1.32E+09 USEPA, 1996		1.32E+09 USEPA, 1996		1.32E+09 USEPA, 1996	1.32E+09 USEPA, 1996	1.32E+09 USEPA, 1996	1.32E+09 USEPA, 1996	1.32E+09 USEPA, 1996		1.32E+09	
Averaging Time (Cancer) (AT-C)	days	25,550 USEPA, 1989		25,550 USEPA, 1989		25,550 USEPA, 1989	25,550 USEPA, 1989	25,550 USEPA, 1989	25,550 USEPA, 1989	25,550 USEPA, 1989		25,550	

Notes:

RME - Reasonable Maximum Exposure

CT - Central Tendency

ABS - Absorption Factors

The following USEPA Region IV default absorbance factors will be applied to estimate dermal intake of COPCs in soil and sediment (USEPA RAGS Part E, 2001)

1.0% - Organics

0.1% - Inorganics

Prof Judge - Professional Judgement

Std Tour of Duty - Standard Tour of Duty

Cowherd et al., 1995: Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination. OHEA. EPA/600/8-85/002.

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USEPA, 1993. Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure - Draft.

USEPA, 1995. Assessing Dermal Exposure from Soil.

USEPA, 1996. Soil Screening Guidance. Technical Background Document.

USEPA, 1997. Exposure Factors Handbook. Vol. 1: General Factors. ORD. EPA/600/P-95/002Fa.

TABLE 6-7

HUMAN HEALTH RISK ASSESSMENT TOXICITY FACTORS
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Constituents	Oral CSF (mg/kg/day) ⁻¹	Inhalation CSF (mg/kg/day) ⁻¹	Oral RfD (mg/kg/day) ⁻¹	Inhalation RfD (mg/kg/day) ⁻¹	Oral Absorption Factors (1)	WOE	Target Organ (Systemic Toxicity)	Critical Effect (Systemic Toxicity)
Volatiles								
Acetone	NA	NA	0.1	0.1	0.01	D	(o) Liver / Kidney	(o) Increased liver and kidney weights and nephrotoxicity
Benzene	0.055	0.027	0.003	0.00171	0.01	A	CVS	Hematotoxicity and immunotoxicity
Chloroform	0.0061	0.0805	0.01	0.000086	0.01	B2	(o) Liver	(o) Moderate/marked fatty cyst formation in the liver and elevated SGPT
Toluene	NA	NA	0.2	0.11	0.01	D	Liver / Kidney, (i) CNS /	(o) Changes in liver and kidney weights, (i) Neurological effects;
Xylenes, total	NA	NA	2	NA	0.01	D	(o) Whole body	Degeneration of nasal epithelium
2-Methylnaphthalene	NA	NA	NA	NA	0.01	D	(o) Lookup	(o) Hyperactivity, decreased body weight and increased mortality
Semivolatiles								
Bis(2-chloroethoxy)methane	NA	NA	NA	NA	0.1	D	NA	NA
Benzo(a)anthracene	0.73	0.31	NA	NA	0.13	(o) B2, (i) D	NA	NA
Benzo(a)pyrene	7.3	3.1	NA	NA	0.13	B2	NA	NA
Benzo(b)fluoranthene	0.73	0.31	NA	NA	0.13	B2	NA	NA
Benzo(k)fluoranthene	0.073	0.031	NA	NA	0.13	(o) B2, (i) D	NA	NA
Carbazole	0.02	0.02	NA	NA	0.13	B2	NA	NA
Chrysene	0.0073	0.0031	NA	NA	0.13	(o) B2, (i) D	NA	NA
Dibenz(a,h)anthracene	7.3	3.1	NA	NA	0.13	(o) B2, (i) D	NA	NA
Fluoranthene	NA	NA	0.04	0.04	0.01	D	(o) Liver / CVS	(o) Nephropathy, increased liver weights, hematological alterations, and clinical effects
Indeno(1,2,3-cd)pyrene	0.73	0.31	NA	NA	0.13	B2	NA	NA
Naphthalene	NA	NA	0.02	0.000857	0.01	(o) D, (i) C	(o) Whole Body, (i) RfS	(o) Decreased mean terminal body weight in males, (i) Nasal effects; Hyperplasia and metaplasia in respiratory and olfactory epithelium, respectively
Pyrene	NA	NA	0.03	0.03	0.01	D	(o) Kidney	(o) Kidney effects (renal tubular pathology, decreased kidney weights)
4,4'-DDD	0.24	0.24	NA	NA	0.01	B2	NA	NA
Pesticides								
Chlordane, alpha-	0.35	0.35	0.0005	0.0002	0.04	B2	Liver	(o) Hepatic Necrosis, (i) Hepatic Effects
Chlordane, gamma-	0.35	0.35	0.0005	0.0002	0.04	B2	Liver	(o) Hepatic Necrosis, (i) Hepatic Effects
Dieldrin	16	16.1	0.00005	0.00005	0.01	B2	(o) Liver	(o) Liver lesions
Heptachlor	4.5	4.55	0.0005	0.0005	0.01	B2	(o) Liver	(o) Increase in liver weight of males
Heptachlor Epoxide	9.1	9.1	0.000013	0.000013	0.01	B2	(o) Liver	(o) Increased liver-to-body weight ratio
Aroclor-1248	2	2	NA	NA	0.14	B2	NA	NA

TABLE 6-8A
INCREMENTAL LIFETIME CANCER RISKS (ILCRs) AND HAZARD INDICES (HIs)
FOR CURRENT ADULT MILITARY BASE PERSONNEL - RME
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE - JACKSONVILLE, NORTH CAROLINA

Pathway	Current Adult Military Base Personnel	
	ILCR	HI
<u>Surface Soil</u>		
Ingestion	3.5E-05	0.68
Dermal Contact	4.3E-05	0.16
Inhalation ⁽¹⁾	1.4E-09	0.00
Subtotal	7.8E-05	0.85
<u>Surface Water</u>		
Ingestion	--	0.00002
Dermal Contact	--	0.00008
Subtotal	--	0.00010
<u>Sediment</u>		
Ingestion	4.8E-06	--
Dermal Contact	4.9E-06	--
Subtotal	9.7E-06	--
Total	8.8E-05	0.85

Notes:

Bolding indicates exceedances of USEPA acceptable target risk criteria by pathway exposures
Shading indicates exceedances of USEPA acceptable target risk criteria by subtotal and total risk value

⁽¹⁾ Inhalation of fugitive dust.

TABLE 6-8B
INCREMENTAL LIFETIME CANCER RISKS (ILCRs) AND HAZARD INDICES (HIs)
FOR CURRENT ADULT MILITARY BASE PERSONNEL - RME
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE - JACKSONVILLE, NORTH CAROLINA

Pathway	Current Adult Military Base Personnel	
	ILCR	HI
<u>Surface Soil</u>		
Ingestion	1.3E-05	0.03
Dermal Contact	1.5E-05	0.01
Inhalation ⁽¹⁾	8.0E-10	0.00
Subtotal	2.8E-05	0.03
<u>Surface Water</u>		
Ingestion	--	0.00002
Dermal Contact	--	0.00008
Subtotal	--	0.00010
<u>Sediment</u>		
Ingestion	4.8E-06	--
Dermal Contact	4.9E-06	--
Subtotal	9.7E-06	--
Total	3.7E-05	0.03

Notes:

Bolding indicates exceedances of USEPA acceptable target risk criteria by pathway exposures
Shading indicates exceedances of USEPA acceptable target risk criteria by subtotal and total risk value

⁽¹⁾ Inhalation of fugitive dust.

TABLE 6-9A
INCREMENTAL LIFETIME CANCER RISKS (ILCRs) AND HAZARD INDICES (HIs)
FOR CURRENT ADULT AND ADOLESCENT RECREATIONAL USERS - RME
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE - JACKSONVILLE, NORTH CAROLINA

Pathway	Current		Current	
	Adult Recreational Users		Adolescent Recreational Users	
	ILCR	HI	ILCR	HI
<u>Surface Soil</u>				
Ingestion	4.0E-05	0.13	2.3E-05	0.20
Dermal Contact	8.5E-05	0.05	4.6E-05	0.08
Inhalation ⁽¹⁾	1.6E-09	0.00000936	9.2E-10	0.0000146
Subtotal	1.3E-04	0.19	7.0E-05	0.28
<u>Surface Water</u>				
Ingestion	--	0.00000348	--	0.00000541
Dermal Contact	--	0.0000272	--	0.0000394
Subtotal	--	0.0000307	--	0.0000448
<u>Sediment</u>				
Ingestion	5.5E-06	--	3.2E-06	--
Dermal Contact	9.8E-06	--	5.3E-06	--
Subtotal	1.5E-05	--	8.5E-06	--
Total	1.4E-04	0.19	7.8E-05	0.28

Notes:

Bolding indicates exceedances of USEPA acceptable target risk criteria by pathway exposures

Shading indicates exceedances of USEPA acceptable target risk criteria by subtotal and total risk value

TABLE 6-9B
INCREMENTAL LIFETIME CANCER RISKS (ILCRs) AND HAZARD INDICES (HIs)
FOR CURRENT ADULT AND ADOLESCENT RECREATIONAL USERS - RME
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE - JACKSONVILLE, NORTH CAROLINA

Pathway	Current Adult Recreational Users		Current Adolescent Recreational Users	
	ILCR	HI	ILCR	HI
<u>Surface Soil</u>				
Ingestion	1.5E-05	0.00	8.6E-06	0.01
Dermal Contact	2.9E-05	0.00	1.6E-05	0.00
Inhalation ⁽¹⁾	9.2E-10	0.00000001	5.4E-10	0.00000000
Subtotal	4.4E-05	0.01	2.4E-05	0.01
<u>Surface Water</u>				
Ingestion	--	0.00000348	--	0.00000541
Dermal Contact	--	0.0000272	--	0.0000394
Subtotal	--	0.0000307	--	0.0000448
<u>Sediment</u>				
Ingestion	5.5E-06	--	3.2E-06	--
Dermal Contact	9.8E-06	--	5.3E-06	--
Subtotal	1.5E-05	--	8.5E-06	--
Total	5.9E-05	0.01	3.3E-05	0.01

Notes:

Bolding indicates exceedances of USEPA acceptable target risk criteria by pathway exposures

Shading indicates exceedances of USEPA acceptable target risk criteria by subtotal and total risk value

TABLE 6-10A
INCREMENTAL LIFETIME CANCER RISKS (ILCRs) AND HAZARD INDICES (HIs)
FOR CURRENT AND FUTURE ADULT AND YOUNG CHILD RESIDENTS - RME
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE - JACKSONVILLE, NORTH CAROLINA

Pathway	Current and Future Adult Residents		Current and Future Young Child Residents		Total Lifetime for Residents
	ILCR	HI	ILCR	HI	ILCR
<u>Surface Soil</u>					
Ingestion	2.9E-04	0.96	6.8E-04	8.93	9.8E-04
Dermal Contact	2.2E-04	0.14	3.6E-04	0.91	5.8E-04
Inhalation ⁽¹⁾	3.5E-08	0.000205	3.0E-08	0.000719	6.5E-08
Subtotal	5.1E-04	1.10	1.0E-03	9.84	1.6E-03
<u>Groundwater</u>					
Ingestion	4.3E-04	15.08	2.5E-04	35.19	6.8E-04
Dermal Contact	2.7E-06	0.32	1.2E-06	0.55	3.9E-06
Inhalation ⁽²⁾	1.5E-06	0.60	--	--	1.5E-06
Subtotal	4.3E-04	16.01	2.5E-04	35.74	6.8E-04
<u>Surface Water</u>					
Ingestion	--	0.0000035	--	0.0000812	--
Dermal Contact	--	0.0000272	--	0.0000625	--
Subtotal	--	0.0000307	--	0.000144	--
<u>Sediment</u>					
Ingestion	5.5E-06	--	1.3E-05	--	1.8E-05
Dermal Contact	3.4E-06	--	5.6E-06	--	9.0E-06
Subtotal	8.9E-06	--	1.8E-05	--	2.7E-05
Total	9.5E-04	17.10	1.3E-03	45.58	2.3E-03

Notes:

Bolding indicates exceedances of USEPA acceptable target risk criteria by pathway exposures
Shading indicates exceedances of USEPA acceptable target risk criteria by subtotal and total risk value

⁽¹⁾ Inhalation of fugitive dust.

⁽²⁾ Inhalation of volatiles in groundwater during showering.

TABLE 6-10B
INCREMENTAL LIFETIME CANCER RISKS (ILCRs) AND HAZARD INDICES (HIs)
FOR CURRENT AND FUTURE ADULT AND YOUNG CHILD RESIDENTS - RME
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE - JACKSONVILLE, NORTH CAROLINA

Pathway	Current and Future Adult Residents		Current and Future Young Child Residents		Total Lifetime for Residents
	ILCR	HI	ILCR	HI	ILCR
<u>Surface Soil</u>					
Ingestion	1.1E-04	0.04	2.5E-04	0.34	3.6E-04
Dermal Contact	7.4E-05	0.01	1.2E-04	0.05	2.0E-04
Inhalation ⁽¹⁾	2.0E-08	0.000000	1.8E-08	0.000001	3.8E-08
Subtotal	1.8E-04	0.04	3.7E-04	0.39	5.6E-04
<u>Groundwater</u>					
Ingestion	4.3E-04	15.08	2.5E-04	35.19	6.8E-04
Dermal Contact	2.7E-06	0.32	1.2E-06	0.55	3.9E-06
Inhalation ⁽²⁾	1.5E-06	0.60	--	--	1.5E-06
Subtotal	4.3E-04	16.01	2.5E-04	35.74	6.8E-04
<u>Surface Water</u>					
Ingestion	--	0.0000035	--	0.0000812	--
Dermal Contact	--	0.0000272	--	0.0000625	--
Subtotal	--	0.0000307	--	0.000144	--
<u>Sediment</u>					
Ingestion	5.5E-06	--	1.3E-05	--	1.8E-05
Dermal Contact	3.4E-06	--	5.6E-06	--	9.0E-06
Subtotal	8.9E-06	--	1.8E-05	--	2.7E-05
Total	6.2E-04	16.05	6.4E-04	36.12	1.3E-03

Notes:

Bolding indicates exceedances of USEPA acceptable target risk criteria by pathway exposures

Shading indicates exceedances of USEPA acceptable target risk criteria by subtotal and total risk value

⁽¹⁾ Inhalation of fugitive dust.

⁽²⁾ #REF!

TABLE 6-11A
INCREMENTAL LIFETIME CANCER RISKS (ILCRs) AND HAZARD INDICES (HIs)
FOR CURRENT AND FUTURE ADULT AND YOUNG CHILD RESIDENTS - CT
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE - JACKSONVILLE, NORTH CAROLINA

Pathway	Current and Future Adult Residents		Current and Future Young Child Residents		Total Lifetime for Residents
	ILCR	HI	ILCR	HI	ILCR
<u>Surface Soil</u>					
Ingestion	3.7E-05	0.32	2.3E-04	2.99	2.7E-04
Dermal Contact	4.8E-05	0.08	1.7E-04	0.43	2.2E-04
Inhalation ⁽¹⁾	8.3E-09	0.000132	2.0E-08	0.000481	2.9E-08
Subtotal	8.5E-05	0.40	4.0E-04	3.42	4.8E-04
<u>Groundwater</u>					
Ingestion	7.5E-05	7.06	1.7E-04	23.52	2.4E-04
Dermal Contact	7.6E-07	0.24	9.4E-07	0.44	1.7E-06
Inhalation ⁽²⁾	3.9E-07	0.40	--	--	3.9E-07
Subtotal	7.6E-05	7.70	1.7E-04	23.97	2.4E-04
<u>Surface Water</u>					
Ingestion	--	0.0000035	--	0.0000812	--
Dermal Contact	--	0.0000239	--	0.0000446	--
Subtotal	--	0.0000274	--	0.000126	--
<u>Sediment</u>					
Ingestion	1.0E-06	--	6.4E-06	--	7.5E-06
Dermal Contact	1.1E-06	--	3.5E-06	--	4.6E-06
Subtotal	2.2E-06	--	9.9E-06	--	1.2E-05
Total	1.6E-04	8.10	5.8E-04	27.39	7.4E-04

Notes:

Bolding indicates exceedances of USEPA acceptable target risk criteria by pathway exposures

Shading indicates exceedances of USEPA acceptable target risk criteria by subtotal and total risk value

⁽¹⁾ Inhalation of fugitive dust.

⁽²⁾ Inhalation of volatiles in groundwater during showering.

TABLE 6-11B
INCREMENTAL LIFETIME CANCER RISKS (ILCRs) AND HAZARD INDICES (HIs)
FOR CURRENT AND FUTURE ADULT AND YOUNG CHILD RESIDENTS - CT
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE - JACKSONVILLE, NORTH CAROLINA

Pathway	Current and Future Adult Residents		Current and Future Young Child Residents		Total Lifetime for Residents
	ILCR	HI	ILCR	HI	ILCR
<u>Surface Soil</u>					
Ingestion	1.4E-05	0.01	8.4E-05	0.11	9.8E-05
Dermal Contact	1.6E-05	0.00	5.8E-05	0.02	7.5E-05
Inhalation ⁽¹⁾	4.9E-09	0.000000	1.2E-08	0.000001	1.7E-08
Subtotal	3.0E-05	0.02	1.4E-04	0.14	1.7E-04
<u>Groundwater</u>					
Ingestion	7.5E-05	7.06	1.7E-04	23.52	2.4E-04
Dermal Contact	7.6E-07	0.24	9.4E-07	0.44	1.7E-06
Inhalation ⁽²⁾	3.9E-07	0.40	--	--	3.9E-07
Subtotal	7.6E-05	7.70	1.7E-04	23.97	2.4E-04
<u>Surface Water</u>					
Ingestion	--	0.0000035	--	0.0000812	--
Dermal Contact	--	0.0000239	--	0.0000446	--
Subtotal	--	0.0000274	--	0.000126	--
<u>Sediment</u>					
Ingestion	1.0E-06	--	6.4E-06	--	7.5E-06
Dermal Contact	1.1E-06	--	3.5E-06	--	4.6E-06
Subtotal	2.2E-06	--	9.9E-06	--	1.2E-05
Total	1.1E-04	7.72	3.2E-04	24.10	4.3E-04

Notes:

Bolding indicates exceedances of USEPA acceptable target risk criteria by pathway exposures

Shading indicates exceedances of USEPA acceptable target risk criteria by subtotal and total risk value

⁽¹⁾ Inhalation of fugitive dust.

⁽²⁾ Inhalation of volatiles in groundwater during showering.

TABLE 6-12A
INCREMENTAL LIFETIME CANCER RISKS (ILCRs) AND HAZARD INDICES (HIs)
FOR FUTURE ADULT CONSTRUCTION WORKERS - RME
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE - JACKSONVILLE, NORTH CAROLINA

Pathway	Future Adult Construction Workers	
	ILCR	HI
<u>Surface Soil</u>		
Ingestion	4.2E-05	3.28
Dermal Contact	1.1E-05	0.16
Inhalation ⁽¹⁾	3.4E-10	0.0000487
Subtotal	5.3E-05	3.44
<u>Subsurface Soil</u>		
Ingestion	1.2E-06	0.20
Dermal Contact	2.7E-07	0.02
Inhalation ⁽¹⁾	2.3E-11	0.00000161
Subtotal	1.5E-06	0.22
<u>Groundwater</u>		
Dermal Contact	4.8E-07	1.35
Subtotal	4.8E-07	1.35
<u>Surface Water</u>		
Dermal Contact	--	0.000253
Subtotal	--	0.000253
<u>Sediment</u>		
Dermal Contact	1.2E-06	--
Subtotal	1.2E-06	--
Total	5.6E-05	5.02

Notes:

Bolding indicates exceedances of USEPA acceptable target risk criteria by pathway exposures
Shading indicates exceedances of USEPA acceptable target risk criteria by subtotal and total risk value

⁽¹⁾ Inhalation of fugitive dust.

TABLE 6-12B
INCREMENTAL LIFETIME CANCER RISKS (ILCRs) AND HAZARD INDICES (HIs)
FOR FUTURE ADULT CONSTRUCTION WORKERS - RME
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE - JACKSONVILLE, NORTH CAROLINA

Pathway	Future Adult Construction Workers	
	ILCR	HI
<u>Surface Soil</u>		
Ingestion	1.5E-05	0.12
Dermal Contact	3.7E-06	0.01
Inhalation ⁽¹⁾	2.0E-10	0.0000001
Subtotal	1.9E-05	0.13
<u>Subsurface Soil</u>		
Ingestion	3.8E-06	0.11
Dermal Contact	7.9E-07	0.00
Inhalation ⁽¹⁾	5.4E-11	0.00000005
Subtotal	4.6E-06	0.11
<u>Groundwater</u>		
Dermal Contact	4.8E-07	1.35
Subtotal	4.8E-07	1.35
<u>Surface Water</u>		
Dermal Contact	--	0.000253
Subtotal	--	0.000253
<u>Sediment</u>		
Dermal Contact	1.2E-06	--
Subtotal	1.2E-06	--
Total	2.5E-05	1.59

Notes:

Bolding indicates exceedances of USEPA acceptable target risk criteria by pathway exposures

Shading indicates exceedances of USEPA acceptable target risk criteria by subtotal and total risk value

⁽¹⁾ Inhalation of fugitive dust.

TABLE 6-13A
INCREMENTAL LIFETIME CANCER RISKS (ILCRs) AND HAZARD INDICES (HIs)
FOR FUTURE ADULT INDUSTRIAL / COMMERCIAL WORKERS - RME
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE - JACKSONVILLE, NORTH CAROLINA

Pathway	Future Adult Industrial / Commercial Workers	
	ILCR	HI
<u>Surface Soil</u>		
Ingestion	1.1E-04	0.34
Dermal Contact	2.7E-04	0.16
Inhalation ⁽¹⁾	8.6E-09	0.00
Subtotal	3.8E-04	0.51
<u>Groundwater</u>		
Ingestion	3.2E-04	10.77
Dermal Contact	2.0E-06	0.23
Inhalation ⁽¹⁾	1.1E-06	0.43
Subtotal	3.2E-04	11.43
Total	7.0E-04	11.94

Notes:

Bolding indicates exceedances of USEPA acceptable target risk criteria by pathway exposures
Shading indicates exceedances of USEPA acceptable target risk criteria by subtotal and total risk value

⁽¹⁾ Inhalation of fugitive dust.

TABLE 6-13B
INCREMENTAL LIFETIME CANCER RISKS (ILCRs) AND HAZARD INDICES (HIs)
FOR FUTURE ADULT INDUSTRIAL / COMMERCIAL WORKERS - RME
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE - JACKSONVILLE, NORTH CAROLINA

Pathway	Future Adult Industrial / Commercial Workers	
	ILCR	HI
<u>Surface Soil</u>		
Ingestion	4.0E-05	0.01
Dermal Contact	9.2E-05	0.01
Inhalation ⁽¹⁾	5.0E-09	0.00
Subtotal	1.3E-04	0.02
<u>Groundwater</u>		
Ingestion	3.2E-04	10.77
Dermal Contact	2.0E-06	0.23
Inhalation ⁽¹⁾	1.1E-06	0.43
Subtotal	3.2E-04	11.43
Total	4.5E-04	11.45

Notes:

Bolding indicates exceedances of USEPA acceptable target risk criteria by pathway exposures

Shading indicates exceedances of USEPA acceptable target risk criteria by subtotal and total risk value

⁽¹⁾ Inhalation of fugitive dust.

TABLE 6-14

**SUMMARY OF UNCERTAINTIES IN THE RESULTS OF THE
BASELINE RISK ASSESSMENT
SITE 84 – BUILDING 45 AREA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA**

	Potential Magnitude for Over-Estimation of Risks	Potential Magnitude for Under- Estimation of Risks	Potential Magnitude for Over or Under- Estimation of Risks
<u>Environmental Sampling and Analysis</u>			
Sufficient samples may not have been taken to characterize the media being evaluated.			Moderate
Systematic or random errors in the chemical analysis may yield erroneous data.			Low
<u>Selection of COPCs</u>			
The use of site-specific background and USEPA Region IX PRGs in selecting COPCs in all media of concern.		Low	
<u>Exposure Assessment</u>			
The standard assumptions regarding body weight, exposure period, life expectancy, population characteristics, and lifestyle may not be representative of the actual exposure situations.			Moderate
The use of the 95th percentile upper confidence level data of the lognormal distribution based on results of distribution test in the estimation of the RME.			Low
The use of the 95th percentile upper confidence level data of the normal distribution based on results of distribution test in the estimation of the RME.			Low
The amount of media intake is assumed to be constant and representative of any actual exposure.			Low
<u>Toxicological Assessment</u>			
Toxicological indices derived from high dose animal studies, extrapolated to low dose human exposure.	Moderate		
<u>Iron</u>			
Evaluation of iron based on existing provisional toxicity values.	Moderate		
<u>Risk Characterization</u>			
Assumption of additivity in the quantitation of cancer risks without consideration of synergism, antagonism, promotion and initiation.			Moderate

TABLE 6-14.(Continued)

**SUMMARY OF UNCERTAINTIES IN THE RESULTS OF THE
BASELINE RISK ASSESSMENT
SITE 84 – BUILDING 45 AREA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA**

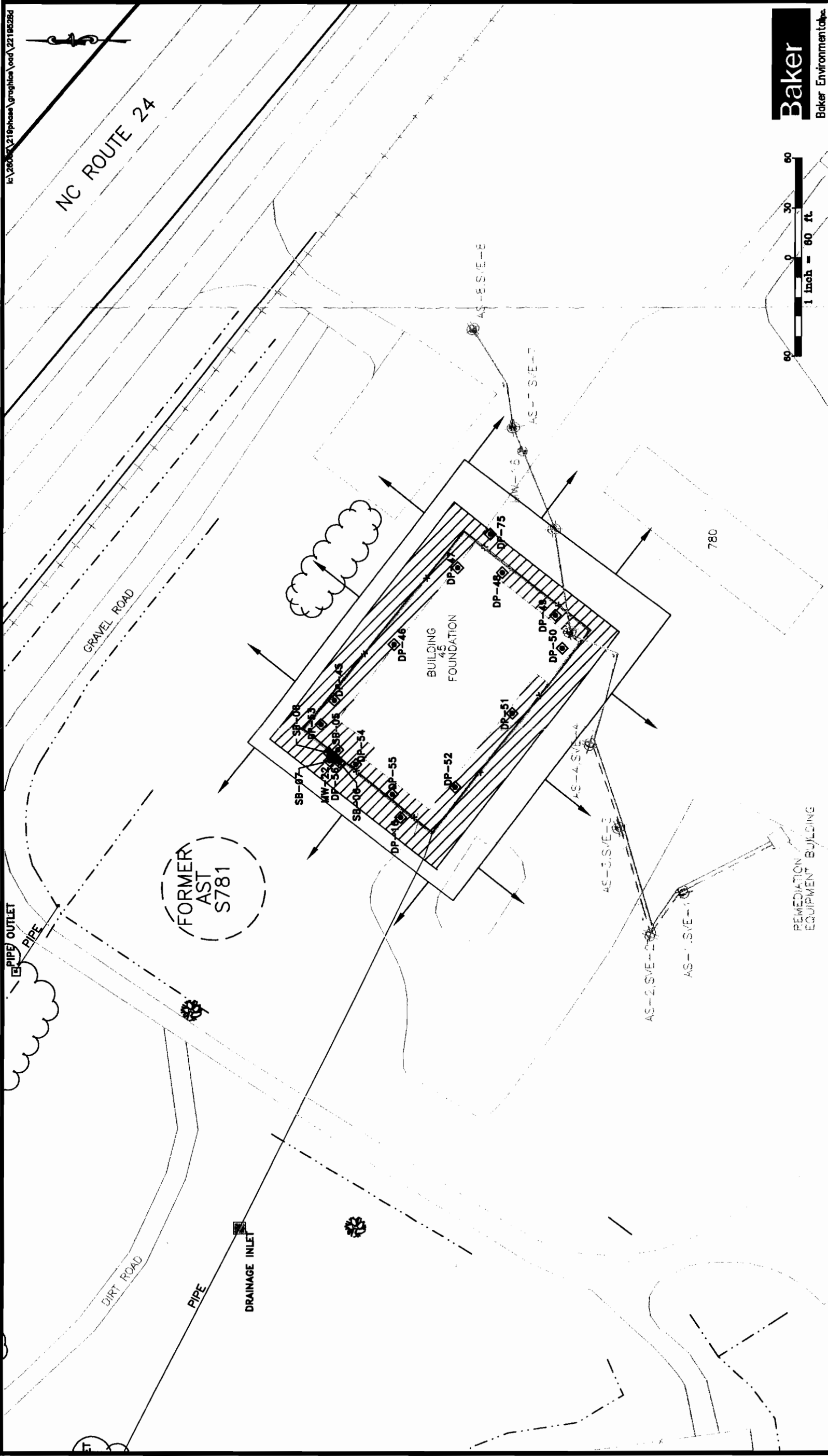
	Potential Magnitude for Over-Estimation of Risks	Potential Magnitude for Under- Estimation of Risks	Potential Magnitude for Over or Under- Estimation of Risks
Assumption of additivity in the estimation of systemic health effects without consideration of synergism, antagonism, etc.			Moderate
Additivity of risks by individual exposure pathways (dermal and ingestion and inhalation).			Low
Compounds not quantitatively evaluated.		Low	

Notes:

Low Assumptions categorized as "low" may effect risk estimates by less than one order of magnitude.
Moderate Assumptions categorized as "moderate" may effect estimates of risk by between one and two orders of magnitude.
High Assumptions categorized as "high" may effect estimates of risk by more than two orders of magnitude.

Source: Risk Assessment Guidance for Superfund, Volume 1, Part A: Human Health Evaluation Manual.
USEPA, 1989.

FIGURES



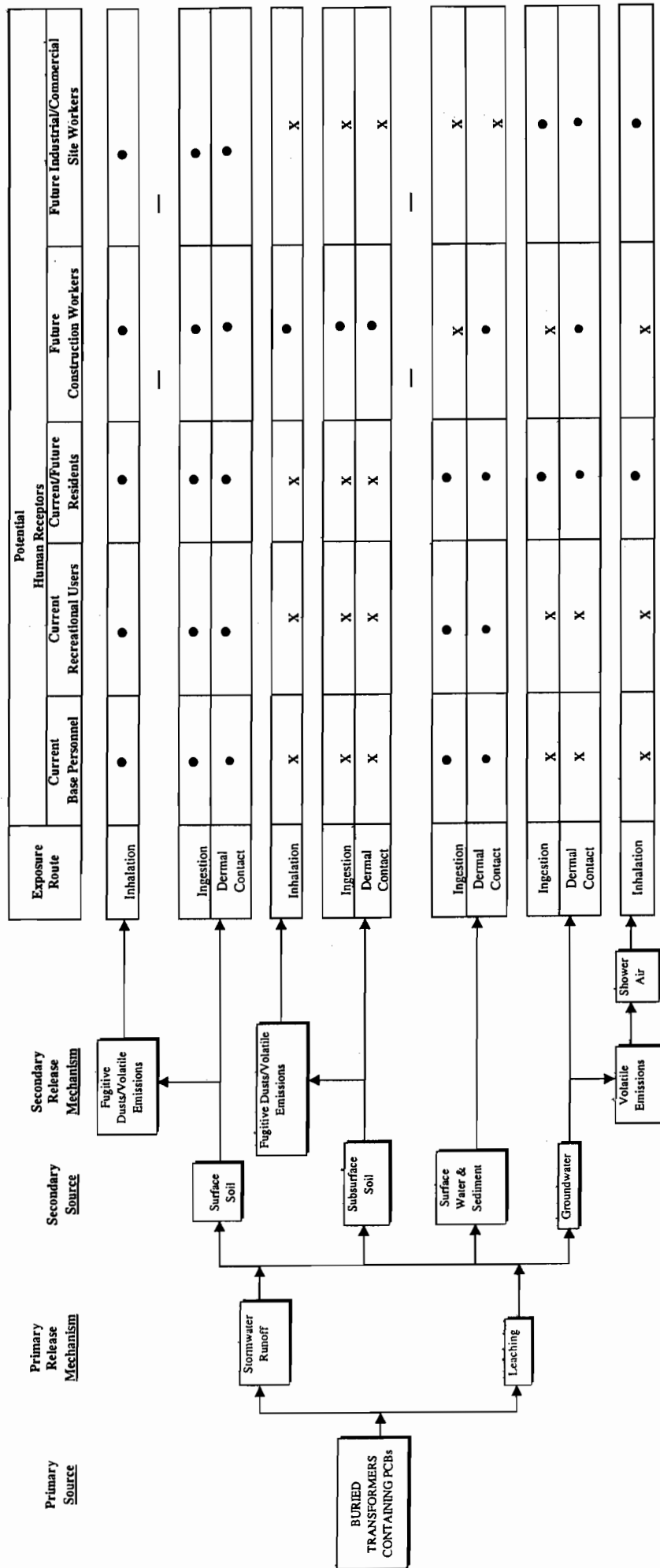
Baker
Baker Environmental

FIGURE 6-1
SOIL EXCAVATION AREA
SITE 84
REMEDIAL INVESTIGATION
CTO - 0219
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

LEGEND

- MINIMUM EXCAVATION AREA REQUIRED FOR SAFE FOUNDATION REMOVAL TO BE ESTABLISHED BY RAC (COULD VARY BETWEEN 1:1 AND 2:1)
- FENCE TO BE REMOVED
- LIMITS OF EXCAVATION (NO EXCAVATION TO BE DONE BEYOND THIS LIMIT)
- DIRECT PUNCH SOIL BORING (2001)

FIGURE 6-2
CONCEPTUAL SITE MODEL
SITE 84/BUILDING 45 AREA
MCB, CAMP LEJEUNE NORTH CAROLINA



Legend

• = Complete exposure pathway. Will be quantitatively evaluated.

X = Incomplete exposure pathway. Will not be quantitatively evaluated.

- =

7.0 SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT AND STEP 3A – REFINEMENT

This section of the Remedial Investigation (RI) presents a Screening-Level Ecological Risk Assessment (SERA) and Step 3a - Refinement addressing potential risks to ecological receptors at Site 84/ Building 45 Area at Marine Corps Base (MCB) Camp Lejeune. This assessment was conducted in accordance with the United States Environmental Protection Agency (USEPA) Ecological Risk Assessment Guidance for Superfund (RAGS) (USEPA 1997) and the Chief of Naval Operations (CNO) document entitled Navy Policy for Conducting Ecological Risk Assessments (CNO 1999). USEPA Region IV Amended Guidance on Ecological Risk Assessment at Military Bases (USEPA Region IV, 2000) was also consulted during the risk assessment process to ensure that the process used to evaluate ecological risks at the site would be in agreement with Region IV's interpretation of RAGS (USEPA 1997).

The Navy Ecological Risk Assessment (ERA) process consists of eight steps organized into three tiers and represents a clarification and interpretation of the eight-step ERA process outlined in the USEPA ERA guidance for the Superfund program (USEPA 1997). Tier 1 of the Navy ERA process represents the SERA:

- Screening-level problem formulation and ecological effects evaluation (Step 1).
- Screening-level exposure estimate and risk calculation (Step 2).

Under Navy policy, if the results of Step 1 and Step 2 (Tier 1 screening-level ERA) indicate that, based on a set of conservative exposure assumptions, there are chemicals present in environmental media that may present a risk to receptor species/communities, the ERA process proceeds to the baseline ERA. According to Superfund guidance (EPA 1997), Step 3 represents the problem formulation phase of the baseline ERA. Under Navy policy, the baseline ERA is defined as Tier 2, and the first activity under Tier 2 is Step 3a. Step 3a precedes the baseline risk assessment problem formulation (Step 3b). In Step 3a, the conservative exposure assumptions applied in Tier 1 are refined and risk estimates are recalculated using the same conceptual site model. The evaluation of risks in Step 3a may also include consideration of background data, chemical bioavailability, and the frequency of detection. If the re-evaluation of the conservative exposure assumptions does not support an acceptable risk determination, and in the absence of remediation based upon risk estimates from the preliminary risk evaluation, the site continues in the baseline ERA process (Step 3b baseline ERA problem formulation).



Community, and includes a mix of pines and hardwoods with a dense canopy but a limited herbaceous layer. Although a formal wetland delineation has not been performed at the site, the National Wetlands Inventory (NWI) review indicates that wetlands exist within portions of the wooded habitat (indicated on Figure 3-3). Based on observations made during the site visit, it is likely that these wetlands extend in to the open field along the railroad tracks.

An open field is present southeast of the woodland boundary and extends to the area surrounding former Building 45. The field in the area of the woodland and railroad tracks is un-maintained and is in a depressed area in terms of surface water flow. There is no evidence that this area has ever been covered with gravel. Conversely, the field southwest and northeast of former Building 45 appears to consist of herbaceous vegetation that is growing over areas formerly covered with gravel. To the northeast of the building the field is a manicured lawn.

A bowl-shaped lagoon, approximately 50 feet in diameter is located within the woodland southwest of the road leading to Northeast Creek. The lagoon is not connected to the groundwater table, but is filled by rainwater, surface runoff, and, historically, by drainage from former Building 45. The depth of the lagoon has decreased over time. At the time of the 2001 RI field investigation water levels were approximated to be 2 to 3 feet deep at the center, which was approximately five feet below the highest point of the banks. The banks of the lagoon are relatively steep, and would make access by terrestrial mammals for drinking purposes difficult. A narrow area on the southeast edge of the lagoon has been cleared of vegetation as a result of trenching activities to locate a buried pipe (see Section 2).

Northeast Creek forms the northwest border of the site. Approximately 400 feet of the creek are in contact with the Site 84 area. The creek is a large tributary to the New River, approximately 1000 feet in width in the area of Site 84. The depth of the creek in this area is unknown. The creek is a saltwater body, with a salinity as measured on November 2001 of 22.3 parts per thousand (ppt) adjacent to the site. This salinity exceeds the approximate toxic threshold for wildlife receptors (15 ppt, Humphreys 1988); therefore, the creek is unlikely to be used as a drinking water source for terrestrial receptors. Fish, mussels, avian piscivores, and other aquatic species are present in the creek habitat.



7.1.1.3 Contaminant Fate and Transport

Fate and transport properties of contaminants are discussed in Section 5.0.

7.1.1.4 Mechanisms of Ecotoxicity and Potential Receptors

Mechanisms of toxicity (if available) for the ECOCs selected based on the SERA are discussed in the chemical profiles provided as Appendix J. This appendix includes information regarding the receptors that are sensitive to select ECOCs.

7.1.1.5 Transport Pathways

A transport pathway describes the mechanisms whereby chemicals may be transported from a source of contamination to ecologically relevant media. Transport pathways for Site 84 are illustrated in the preliminary ecological conceptual model (see Figure 7-1). Only complete, potentially significant pathways were evaluated in this risk assessment. Complete and potentially significant pathways are shown as solid lines. As depicted in the preliminary ecological conceptual model, the primary mechanisms for contaminant transport from Site 84 source areas are listed below.

- Overland transport of chemicals from surface soil via surface runoff to downgradient surface soil and surface water (Northeast Creek and lagoon).
- Leaching of chemicals from surface soil, subsurface soil, and/or lagoon sediment by infiltrating precipitation and transport to surface water via groundwater.
- Uptake by biota from soil, sediment, and surface water and trophic transfer to upper trophic level receptors.
- Volatile emissions from surface soils and erosion releasing fugitive dusts to the atmosphere.



Creek. The lagoon is also downgradient of Building 45. Ecological receptors residing in the creek or lagoon or using these areas as a source of food and/or drinking water may be exposed to chemicals migrating with groundwater. An evaluation of potential exposures resulting from the migration of chemicals with groundwater to these surface water bodies is addressed in the evaluation of the surface water and sediment exposure pathway below.

Surface Water and Sediment Exposure Pathway. Potential release sources for the surface water and sediment exposure pathway are surface soil and groundwater. Chemicals may potentially migrate to Northeast Creek and associated wetland or to the lagoon with surface soil and groundwater.

Surface run-off from the terrestrial portion of the site is likely to flow to the wetland adjacent to Northeast Creek. Therefore, horizontal contaminant migration with surface runoff to surface water and sediment of Northeast Creek and the associated wetland is possible. Horizontal migration with fugitive dust from wind erosion is also a potentially complete transport pathway to Northeast Creek. However, given the vegetative cover in the majority of the open area of the site and the dense vegetative cover between the open area and the creek, this transport pathway is likely to be insignificant. Migration of fugitive dusts to the lagoon is also considered to be insignificant due to the dense vegetative cover surrounding the lagoon. Even so, surface water and sediment data will reflect any contamination contributed by fugitive dusts.

Aquatic life (e.g., fish and invertebrates) may be exposed to chemicals that have potentially migrated to Northeast Creek or the lagoon through incidental ingestion, direct contact, and ingestion of plant and/or animal tissues for chemicals that have entered the food web (i.e., food chain transfer). Aquatic vegetation within the creek or lagoon may be exposed to chemicals directly from the water (direct contact) or through root uptake from the substrate. Mammals and birds using the creek or lagoon as a potential food and/or drinking water source may be exposed to chemicals in surface water and sediment through ingestion, direct contact, and food chain transfer.

Other receptors that may forage within the creek or lagoon include reptiles and amphibians. The potential exposure routes for reptiles and amphibians are ingestion of surface water and sediment, direct contact with surface water and sediment, and food chain transfer. It is noted that for all potential receptors, exposures from food chain transfer will be limited to those chemicals that bioaccumulate in lower trophic level organisms or biomagnify through successive trophic levels.



Surface soil is considered a complete exposure pathway for terrestrial receptors. The surface soil exposure pathway was evaluated by comparing contaminant concentrations in the surface soil to the USEPA Region IV recommended Soil Screening Values.

Air Exposure Pathway. Contaminated surface soil may serve as a release source for the air exposure pathway (fugitive dust emissions from wind erosion). In addition to this release mechanism, volatilization of contaminants from surface soil, groundwater and surface water may also occur. Terrestrial mammals, birds, and reptiles may be exposed to chemicals in fugitive dust emissions and volatilization through inhalation. As discussed above, much of the site is covered with a dense vegetative cover that minimizes fugitive dust emissions to ambient air and would also limit the area over which volatilization of contaminants could potentially occur. Burrowing mammals may be exposed to volatile emissions in subterranean passageways; however, because VOCs were detected infrequently and at low concentrations in surface soils and in the rest of environmental media, volatilization of contaminants will be minimal and insignificant relative to ingestion exposures to these compounds. For these reasons, the inhalation exposure pathway is considered insignificant for terrestrial receptors. It is noted that this pathway is not indicated in the ecological conceptual model.

7.1.1.7 Preliminary Endpoints

The conclusion of the screening-level problem formulation includes the selection of preliminary ecological endpoints, which are based on the preliminary conceptual model. It is noted that preliminary endpoints identified for the screening-level risk evaluation are designed to be relatively generic in nature as compared to assessment and measurement endpoints that may be selected for a Baseline Ecological Risk Assessment (BERA) during Step 3b and 4.

Endpoints define ecological attributes that are to be protected and a measurable characteristic of those attributes that can be used to gauge the degree of impact that has or may occur. Table 7-1 summarizes the preliminary endpoints to be evaluated for the SERA at Site 84 and the method of evaluation. The basis for the selection of these endpoints is presented below. The population traits of interest for each of the preliminary endpoints (survival, growth, and reproduction) represent components of a healthy population. Failure or impairment of survival, growth, or reproduction will adversely affect the ability of the population to be healthy and viable and fill its appropriate role in an ecosystem.



Survival, Growth, and Reproduction of Amphibian Communities. Amphibians (e.g., frogs and salamanders) provide a link in nutrient and energy transfer, serving as prey for semi-aquatic mammals and birds. They are often reflective of aquatic ecosystem health and many are valued by society for their visual and vocal traits.

7.1.2 Ecological Effects Evaluation

Step 1 of the ERA process includes Screening-Level Problem Formulation, discussed in Section 7.1.1, and Screening-Level Ecological Effects Evaluation, which is the topic of this section. The sections that follow describe the various criteria and toxicological benchmarks used as screening values (toxicological thresholds) for chemicals analyzed in groundwater, surface water, sediment, and surface soil. The USEPA Region IV's recommended chemical-specific surface water, sediment, and surface soil screening values are summarized in Table 7-2. The screening values represent conservative exposure thresholds above which adverse ecological effects may occur. Although analyzed in groundwater, surface water, sediment, and surface soil, calcium, magnesium, potassium, and sodium were not evaluated in this SERA because they are essential macronutrients (Robbins 1983) with very low toxicity (USEPA 1989). As such these compounds are not considered to be ECOCs in any media.

7.1.2.1 Surface Water Screening Values

Surface water screening values used in this evaluation were obtained from the USEPA Region IV Ecological Risk Assessment Bulletins - Supplement to RAGS. Freshwater screening values were used to screen surface water from the lagoon while saltwater screening values were used to screen surface water from Northeast Creek.

The Region IV recommended chronic freshwater surface water screening values for cadmium, copper, lead, nickel, and zinc, as well as the chronic value for trivalent chromium are expressed as a function of water hardness. Because metals concentrations were not measured for the freshwater lagoon and Northeast Creek is a saltwater body, there was no need to adjust screening values for these compounds at Site 84.

The surface water screening value selected for pentachlorophenol is expressed as a function of pH. A default pH value of 7.8 S.U. was used to adjust the chronic criterion for this organic chemical (USEPA 2001).



$$\text{Hazard Quotient} = \frac{\text{Maximum Exposure Concentration}}{\text{Screening Value or Benchmark Value}}$$

Chemicals with HQs greater than or equal to 1.0 are considered ECOCs in this ecological screening evaluation. HQs equal to or exceeding 1.0 indicate the potential for risk since the chemical concentration or dose (exposure) exceeds the screening value (effect). However, screening values and exposure estimates are derived using intentionally conservative assumptions such that HQs greater than or equal to one do not necessarily indicate that risks are present or impacts are occurring. Rather, it identifies chemical-pathway-receptor combinations requiring further evaluation. Following the same reasoning, HQs that are less than one indicate that risks are very unlikely, enabling a conclusion of no unacceptable risk to be reached with high confidence.

The following conservative methodology was used when selecting ECOCs for abiotic media:

- The maximum detected chemical concentration in each media (surface soil, sediment, surface water, and groundwater) was used to calculate HQs
- Chemicals without medium-specific screening values for a particular chemical were retained as ECOCs for that medium
- The maximum detection limit for non-detected chemicals in each media was used to calculate HQ's

The resulting HQ's from the screening level risk calculations are presented in the media specific screening Tables, 7-3 through 7-8. ECOCs are identified and discussed in the sections that follow.

7.2.4.1 Surface Soil

The surface soil evaluation is presented in two parts, first including soils located along the perimeter of the foundation of Building 45, and second, excluding those soils, which are to be removed as part of the non-TCRA for Site 84.



retained as ECOCs. The pesticides endosulfan sulfate, endrin aldehyde, endrin ketone, heptachlor, heptachlor epoxide, methoxychlor, alpha-chlordane, and gamma-chlordane were detected but did not have surface soil screening criteria available for comparison. As a result these pesticides were retained as ECOCs. No herbicides were detected in surface soils at Site 84.

Twenty-two of the 23 metals analyzed in soils were detected. Aluminum, chromium, copper, iron, lead, mercury, vanadium, and zinc were detected at concentrations exceeding surface soil screening values and were retained as ECOCs. The remaining detected metals were detected at concentrations less than screening criteria, or are essential nutrients with low toxicities, and were not retained as ECOCs.

Both diesel and gasoline range TPH were detected in surface soils. These analyses reflect the presence of select groups of compounds in surface soils. No soil screening criteria have been established with which to evaluate potential risks that may be contributed by these groups of compounds; therefore, it is not possible to say with certainty that they do not contribute unacceptable risks to ecological receptors. For this reason, diesel and gasoline range TPH were retained as ECOCs.

Several of the non-detected VOCs, SVOCs, and pesticides/PCBs either did not have USEPA Region IV surface soil screening values or the method detection limit exceeded the surface soil screening values. No non-detected compounds were retained as ECOCs. Table 7-3a summarizes the frequency and range of surface soil data (before the non-TCRA) compared to the surface soil screening values. Table 7-9a provides a summary of the ecological chemicals of concern in the surface soil at Site 84 based on conditions before the non-TCRA.

Surface Soil - Conditions After the non-TCRA

After the non-TCRA, soils currently present along the perimeter of the Building 45 foundation will no longer be present on the site; therefore, they will no longer contribute potential risks to ecological receptors. The following paragraphs address changes in risk estimates that result from the exclusion of these samples from the data set.



Table 7-3b summarizes the frequency and range of surface soil data for conditions after the non-TCRA compared to the surface soil screening values. Table 7-9b provides a summary of the ecological chemicals of concern in the surface soil at Site 84 based on conditions after the non-TCRA.

7.2.4.2 Sediment - Lagoon

Sediment samples collected from the lagoon at Site 84 were analyzed for TCL organics, PCBs and Diesel Range Organics (DRO). VOCs, SVOCs, PCBs, and DRO were detected in the lagoon sediment. The VOC xylene was detected and was retained as an ECOC due to a lack of sediment screening criteria. The SVOCs 2-methylnaphthalene, naphthalene, phenanthrene, and bis(2-ethylhexyl)phthalate, and the PCBs Aroclor-1248 and Aroclor-1260 were retained as ECOCs because detected concentrations exceeded screening criteria. Of these compounds 2-methylnaphthalene, naphthalene, and phenanthrene are PAHs. It is noted that the sediment screening value for total PAHs is 312 µg/kg. This value is exceeded by each of the three detected PAHs individually. No other PAHs were detected in lagoon sediments; therefore, no additional PAHs are retained as ECOCs by association (as fluorene was in surface soils). Like TPH in surface soils, the detection of DRO in sediments indicates that some individual members of this group of compounds were present in lagoon sediments. Because no screening value has been established with which to evaluate potential risks from DRO as a group, DRO was retained as an ECOC.

Several of the non-detected VOCs, SVOCs, and PCBs either did not have USEPA Region IV sediment screening values or the method detection limit exceeded the sediment screening values. In either case, non-detected compounds were not retained as ECOCs. Table 7-4 summarizes the frequency and range of lagoon sediment analytical data compared to sediment screening criteria. Table 7-10 provides a summary of the ecological chemicals of concern in the lagoon sediment at Site 84.

7.2.4.3 Surface Water - Lagoon

Surface water samples collected from the lagoon were analyzed for TCL organics and PCBs. Three VOCs were detected in the surface water. Acetone and xylenes were retained as ECOCs due to a lack of surface water screening criteria. Benzene was detected but was not retained as an ECOC because the maximum detected concentration was below the surface water screening



criteria and also were retained as ECOCs. The maximum detected concentrations of benzene, chloroform, and methylene chloride were below the surface water screening values and consequently were not retained as ECOCs.

The detected SVOC 2-methylnaphthalene did not have a surface water screening criteria and was retained as an ECOC. Maximum detected concentrations of naphthalene were below surface water screening criteria; however, naphthalene is retained as an ECOC due to its molecular similarity to 2-methylnaphthalene (both are PAHs). The pesticides 4,4'-DDD, 4,4'-DDT, endosulfan I, heptachlor epoxide, and gamma-chlordane were retained as ECOCs because maximum detected concentrations exceeded screening criteria. Beta-BHC did not have a surface water screening value for comparison and was retained as an ECOC. Maximum detected concentrations of 4,4-DDE were below screening criteria. No PCBs were detected in groundwater. The herbicides dinoseb and 2-Methyl-4-chlorophenoxyacetic Acid (MCPA) were detected and retained as ECOCs due to a lack of screening criteria.

The metals aluminum, antimony, barium, beryllium, cobalt, iron, manganese, and vanadium were detected and retained as ECOCs due to a lack of screening criteria. Maximum detected concentrations of arsenic, cadmium, chromium, mercury, nickel, thallium, and zinc were less than screening criteria. Calcium, magnesium, potassium, and sodium were detected but were not retained as ECOCs because they are essential nutrients with low toxicities.

Several of the non-detected VOCs, SVOCs, PCBs, pesticides, and herbicides either did not have USEPA Region IV surface water screening values or the method detection limit exceeded the surface water screening values. However, no non-detected compounds were retained as ECOCs. Table 7-12 provides a summary of the ecological chemicals of concern in the groundwater at Site 84.

7.3 Step 3a - Refinement of the List of Ecological Contaminants of Concern

The SERA for Site 84 indicated that, based on a set of conservative exposure assumptions, there are multiple chemicals that may present a risk to ecological receptors at the site (terrestrial invertebrates and plants, benthic invertebrates, and aquatic plants). Therefore, Site 84 was carried in to Step 3a of the Ecological Risk Assessment process.



Results of the refinement of exposure assumptions are summarized, by media, on Tables 7-14 Through 7-17. In surface soils for conditions before the non-TCRA, refined HQs for ethylbenzene, xylenes, acenaphthene, methoxychlor, copper, lead, mercury, and zinc were less than one and these compounds were removed from the list of surface soil ECOCs. In surface soils for conditions after the non-TCRA, refined HQs for ethylbenzene, xylenes, fluorene, 4,4'-DDE, 4,4'-DDT, methoxychlor, alpha-BHC, alpha-chlordane, lead, and mercury were less than one and these compounds were removed from the list of surface soil ECOCs. It is noted that acenaphthene, copper, and zinc were not retained as surface soil ECOCs after Steps 1 and 2 of the "after non-TCRA" scenario. In lagoon sediment none of the refined HQs were less than one. In lagoon surface water refined HQs for acetone and xylenes were less than one and these compounds were removed from the list of surface water ECOCs. In groundwater, refined HQs for carbon disulfide, ethylbenzene, trichloroethene, xylenes, 2-methylnaphthalene, naphthalene, 4,4'-DDD, 4,4'-DDE, beta-BHC, antimony, barium, and vanadium were less than one and these compounds were removed from the list of groundwater ECOCs.

7.3.2 Comparison to Background Data

Inorganics in surface soils that were selected as ECOCs based on the SERA were compared to background data provided in the Background Study Report for MCB Camp Lejeune (Baker 2001). Background data were collected from locations away from identified sites in relatively undisturbed areas not near any known sources of contamination. As discussed in Section 4, base background soil analytical data was divided into five categories based on soil type and depth of sample interval. These categories include surface soil fine sands, surface soil loams, subsurface soil sand, subsurface soil silt, and subsurface soil clay. Different soil types can exhibit different concentrations of inorganic compounds. The purpose of these divisions was to compare data sets of similar soil types. Surface soil samples from Site 84 were fine sands; therefore, they were compared to the fine sand data set. Maximum site concentrations were compared to two times the base background mean (USEPA Region IV, 2000b). The comparison is useful for determining whether or not the presence of contaminants at the site should be considered site related or may be considered naturally occurring. Inorganics with background concentrations (two times the mean) that exceed maximum site concentrations are removed from the list of ECOCs. Organic compounds, unlike inorganic analytes, are not ubiquitous in nature and were not analyzed as part of the Background Study.



upon low detection frequencies under this scenario. It is noted that 2-butanone, acetone, and bis(2-ethylhexyl)phthalate are common laboratory contaminants, and detections are unlikely to be related to site activities. The refined HQ of endrin for the after non-TCRA removal action is low (1.08).

Sample sizes in lagoon surface water, lagoon sediment, and groundwater were less than 20; therefore, frequency of detection was not used as a criterion to remove compounds from the list of ECOCs for these media.

7.3.4 Evaluation of Risks to Upper Trophic Level Receptors

ECOCs that are likely to bioaccumulate in the food chain were evaluated for their likelihood to adversely impact upper trophic level receptors. This evaluation was not used to remove compounds from the list of ECOCs but to provide a more complete picture of potential ecological risks at the site. For non-bioaccumulative chemicals, if no risk is posed to lower trophic level receptors then it is highly unlikely that unacceptable risks will be posed to receptors higher up the food chain. USEPA Region IV directs that food chain modeling should be limited to those chemicals that are bioaccumulative (USEPA Region IV, 2000); therefore, only those ECOCs identified as "important bioaccumulative compounds" by the USEPA (USEPA, 2000) were evaluated for potential risks to upper trophic level receptors.

Upper trophic level receptor exposure to contaminants was evaluated using a HQ method similar to that used for screening potential ecological risks in the SERA. Estimates of daily contaminant doses were compared to levels at which no adverse ecological effects have been observed in toxicological studies (No Observed Adverse Effects Levels [NOAELs]). Both a conservative and less conservative risk evaluation were conducted. The methods used to evaluate potential risks to upper trophic level receptors are described in detail in Appendix K.

Figure 7-1 identifies complete exposure pathways for upper trophic level receptors. Specific upper trophic level receptors selected for evaluation as Site 84 are listed below. Each of these receptors was identified in the Work Plan for Site 84 as likely to be appropriate for evaluation at this site with the exception of the red-tailed hawk. A Baker ecologist confirmed the appropriateness of the selected species and included the red-tailed hawk to the list based on the observation of hawks near the site and the fact that the site habitat is suitable for this species.



(benzo(a)anthracene risk to the meadow vole) to 4817.64 (Aroclor-1260 risk to the short-tailed shrew). Aroclor-1248, Aroclor-1254, Aroclor-1260, and heptachlor posed unacceptable risk to one or more upper trophic level aquatic receptors in the before non-TCRA scenario (Table 7-19a). HQ values ranged from 1.24 (heptachlor risk to the mink) to 229.51 (Aroclor-1260 risk to the mink). It is noted that mink are known for their sensitivity to PCBs. After the non-TCRA, risks to upper trophic level terrestrial receptors are reduced and only chromium, lead, mercury, zinc, Aroclor-1260, and dieldrin are estimated to pose unacceptable upper trophic level risks (Table 7-18b). Aroclor-1248 and Aroclor-1260 posed unacceptable risks to one or more upper trophic level aquatic receptors for the lagoon habitat in the after non-TCRA scenario (Table 7-19b).

Under more realistic exposure assumptions and comparison to NOAELs, Aroclor-1248, Aroclor-1254, Aroclor-1260, dieldrin, heptachlor, and heptachlor epoxide were found to pose unacceptable risks to one or more terrestrial receptors assuming conditions before the non-TCRA (Table 7-20a). Refined HQs for terrestrial receptors ranged from 1.14 to 26.78. Assuming conditions after the non-TCRA, Aroclor-1260 is the only compound that poses unacceptable risk to upper trophic level terrestrial receptors (Table 7-20b). In both before non-TCRA and after non-TCRA scenarios, Aroclor-1248 and Aroclor-1260 were found to pose unacceptable risks to one or more aquatic receptors (Tables 7-21a and 7-21b), with refined HQs ranging from 1.59 to 29.94.

7.3.5 Revised List of Ecological Contaminants of Concern

The removal of compounds from the initial list of ECOCs as indicated in the preceding sections, resulted in a revised list of ECOCs, which is presented as Table 7-22. This table presents all compounds selected as ECOCs at Site 84 and indicates the media in which these chemicals were estimated to pose unacceptable risks. Unacceptable risks to upper trophic level receptors (as determined by less conservative exposure estimates and a comparison to NOAELs) are also indicated. It is noted that the table distinguishes between compounds retained as ECOCs due to estimates of unacceptable ecological risks versus those retained due to a lack of screening values with which to evaluate potential risks. The table also provides separate evaluations assuming site conditions both before and after the non-TCRA.



to pose low to moderate risks to terrestrial flora and fauna, with refined HQs of 1.92, 17.98, and 1.08, respectively. Detections of these seven pesticides were limited to six sampling locations: 84-MW-17, 84-DP81, and 84-DP82, located near the former AST; 84-MW-20, located at the south west end of the field that is between former Building 45 and the wetland area; and 84-DP77 and 84-DP79, located in or near the drainage inlet along the pipe connecting former Building 45 with the lagoon. There were no unacceptable risks posed to upper trophic level receptors from pesticides at the site.

The PCB Aroclor-1260 was the greatest risk-driver in surface soils. This compound was estimated to pose high risk to terrestrial flora and fauna, with a refined HQ of 299. It was also estimated to pose low to moderate risk to upper trophic level receptors including the short-tailed shrew, white-footed mouse, American robin, and eastern screech owl (refined HQs = 30.80, 4.44, 7.16, and 4.82, respectively). Aroclor-1260 was widespread across the site (detected in 58 of 77 surface soil samples).

Three inorganics (chromium, iron, and vanadium) were estimated to pose unacceptable risks to terrestrial flora and fauna. These compounds were not found to pose unacceptable risks to upper trophic level receptors. These inorganics were ubiquitous at the site and were detected at concentrations exceeding base background comparison concentrations. It is noted that aluminum was also found to pose unacceptable risk to terrestrial flora and fauna at the site; however, aluminum levels at the site were within base background levels (see Section 7.3.2).

7.4.2 Lagoon Sediment and Surface Water

Eight compounds were identified as ECOCs in lagoon sediment (Table 7-22). The VOC xylene, SVOCs 2-methylnaphthalene, bis(2-ethylhexyl)phthalate, naphthalene, and phenanthrene, and PCBs Aroclor-1248 and Aroclor-1260 pose moderate to high risks to benthic invertebrates. The greatest risk drivers in lagoon sediment were 2-methylnaphthalene (refined HQ = 494.32) and Aroclor-1260 (refined HQ = 654.76). Diesel Range Organics were identified as an ECOC due to a lack of screening values for the class of compounds. No ECOCs were identified in surface water of the lagoon.



Potential adverse impacts to terrestrial flora and fauna were evaluated by comparing the detected compound concentrations to surface soil screening values. Screening values may not take into account soil type, which may have a great influence on the toxicity of the contaminants. For example, soil with high organic carbon content will tend to absorb many of the organic compounds, thus making them less bioavailable to terrestrial receptors. Some screening values can be developed based on both field and growth chamber studies; therefore, the reported toxic concentrations are not always equivalent to actual field conditions. In addition, some screening values may be calculated based on a low number of studies or may have only examined toxicities to a limited diversity of invertebrate species.

In the case of chromium, to be conservative, screening levels were estimated from the chromium VI form of the element. Chromium III, which is orders of magnitude less toxic than chromium VI, is most likely to be the predominant form in the environment.

In the case of mercury, screening values were estimated assuming the methylated form of the element, which is the more toxic form. It is unlikely that mercury detected at the site is 100 percent methylated; therefore, risk estimates for this compound are likely to err on the side of being overly-conservative.

Some compounds detected in environmental media are known to be common laboratory contaminants. These include acetone, 2-butanone, methylene chloride, toluene, and the phthalate esters (USEPA 1989). While validation of the data removes uncertainty involving laboratory contamination, there is the possibility that detections of such compounds in site media reflect laboratory conditions and not site conditions. At site 84, 2-butanone was retained as an ECOC in groundwater and bis(2-ethylhexyl)phthalate was retained as an ECOC in surface soils although both compounds are common laboratory contaminants.

There is uncertainty in the ecological endpoint comparison. The surface water screening levels are established to be protective of *most* of the potential ecological receptors. However, some species will not be protected by the values because of their increased sensitivity to the chemicals. For example, the Ambient Water Quality Criteria developed by the United States Environmental Protection Agency, in theory, only protect 95 percent of the exposed species. Therefore, there may be some sensitive species present that may not be protected with these criteria. In addition, most of the values are established using laboratory tests, where the concentrations of certain water quality parameters (pH, total organic carbon) that may influence toxicity are most likely at different concentrations than in the site water.



aimed at preventing the elimination of compounds that could have harmful impacts on the environment from the list of ECOCs. Those chemicals that were detected in site media that did not have screening criteria available are indicated in Tables 7- 9 through 7-12.

Finally, the toxicity of chemical mixtures is not well understood. All the toxicity information used in this screening for evaluating risk to the ecological receptors is for individual chemicals. Chemical mixtures can affect the organisms very differently than the individual chemicals due to synergistic or antagonistic effects. In addition, the species used to develop the toxicity data may not be present at the site, or have the potential to exist at the site. Depending on the sensitivity of the tested species to the species at the site, use of the toxicity values may overestimate or underestimate risk.

7.6 Conclusions

ECOCs identified at Site 84 are presented on Table 7-22 and discussed in the Risk Characterization section of this report (Section 7.4). The main risk drivers at the site (those with refined HQs exceeding 10.0) are noted here. Risk drivers in surface soils include fluoranthene, phenanthrene, pyrene, dieldrin, and Aroclor-1260. Risk drivers in lagoon sediment include xylene, 2-methylnaphthalene, bis(2-ethylhexyl)phthalate, naphthalene, phenanthrene, Aroclor-1248, and Aroclor-1260. Accounting for dilution, no ECOCs in groundwater had refined HQs exceeding 10.0. No ECOCs were identified in lagoon surface water, or surface water or sediment from Northeast Creek.

Based upon the results of the Screening Level ERA and Refinement, it is recommended that, in the absence of a remedial action at the site addressing unacceptable ecological risks as indicated by the preliminary assessment, the risk assessment should proceed to Step 3b and beyond.

7.7 References

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TABLES

TABLE 7-1
PRELIMINARY ENDPOINTS AND METHODS OF EVALUATION
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Preliminary Endpoint	Method of Evaluation
Terrestrial Habitat	
Survival, growth, and reproduction of soil invertebrate communities.	Comparison of chemical concentrations in surface soils to surface soil screening values.
Survival, growth, and reproduction of terrestrial plant communities.	Comparison of chemical concentrations in surface soil to surface soil screening values.
Aquatic Habitat	
Survival, growth, and reproduction of lagoon and Northeast Creek benthic invertebrate communities.	Comparison of chemical concentrations in lagoon and Northeast Creek surface water/sediment and groundwater to surface water or sediment screening values.
Survival, growth, and reproduction of lagoon and Northeast Creek aquatic plant communities.	Comparison of chemical concentrations in lagoon and Northeast Creek surface water and groundwater to surface water screening values.
Survival, growth, and reproduction of lagoon and Northeast Creek amphibian communities.	Comparison of chemical concentrations in lagoon and Northeast Creek surface water/sediment and groundwater to surface water or sediment screening values.

TABLE 7-2
MEDIA-SPECIFIC SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIATION INVESTIGATION, CTO-0219
MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds	USEPA Region IV Recommended Surface			USEPA Region IV Recommended			USEPA Region IV Recommended		
	(ug/kg) ⁽¹⁾	Reference	Comment	(ug/L) ⁽²⁾	Reference	Comment	(ug/kg) ⁽³⁾	Reference	Comment
Volatile Organics:									
1,1,1-Trichloroethane	NE	--		528	USEPA Region IV		NE	--	
1,1,1,2-Tetrachloroethane	NE	--		240	USEPA Region IV		NE	--	
1,1,2,2-Tetrachloroethane	NE	--		940	USEPA Region IV		NE	--	
1,1,2-Trichloroethane	NE	--		NE	--		NE	--	
1,1-Dichloroethane	NE	--		303	USEPA Region IV		NE	--	
1,1-Dichloroethene	NE	--		NE	--		NE	--	
1,2-Dibromoethane	NE	--		2000	USEPA Region IV		NE	--	
1,2-Dichloroethane	400	MHSPE 1994		NE	--		NE	--	
1,2-Dichloroethene (Total)	NE	--		NE	--		NE	--	
1,2-Dichloroethene (cis)	NE	--		NE	--		NE	--	
1,2-Dichloroethene (trans)	NE	--		1350	USEPA Region IV		NE	--	
1,2-Dichloropropane	700,000	Efroymson et. al. 1997		525	USEPA Region IV		NE	--	
2-Butanone	NE	--		NE	--		NE	--	
2-Hexanone	NE	--		NE	--		NE	--	
4-Methyl-2-Pentanone	NE	--		NE	--		NE	--	
Acetone	NE	--		NE	--		NE	--	
Benzene	50	MHSPE 1994		53	USEPA Region IV		NE	--	
Bromodichloromethane	NE	--		NE	--		NE	--	
Bromoform	NE	--		293	USEPA Region IV		NE	--	
Bromomethane	NE	--		NE	--		NE	--	
Carbon Disulfide	NE	--		NE	--		NE	--	
Carbon Tetrachloride	1,000,000	Efroymson et. al. 1997		352	USEPA Region IV		NE	--	
Chlorobenzene	50	Beyer 1990		195	USEPA Region IV		NE	--	
Chloroethane	NE	--		NE	--		NE	--	
Chloroform	1	MHSPE 1994		289	USEPA Region IV		NE	--	
Chloromethane	NE	--		NE	--		NE	--	
cis-1,2-Dichloroethene	NE	--		NE	--		NE	--	
cis-1,3-Dichloropropene	NE	--		24.4	USEPA Region IV		NE	--	
Dibromochloromethane	NE	--		NE	--		NE	--	
Ethylbenzene	50	Beyer 1990 and MHSPE 1994		453	USEPA Region IV		NE	--	
Isopropyl ether	NE	--		NE	--		NE	--	
Methyl tert-butyl ether	NE	--		NE	--		NE	--	
Methylene Chloride	NE	--		1930	USEPA Region IV		NE	--	

TABLE 7-2 (continued)
 MEDIA-SPECIFIC SCREENING VALUES
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds Volatile Organics (Cont):	USEPA Region IV Recommended Surface Soil Screening Values			USEPA Region IV Recommended Freshwater Screening Values			USEPA Region IV Recommended Sediment Screening Values		
	(ug/kg) ⁽¹⁾	Reference	Comment	(ug/L) ⁽²⁾	Reference	Comment	(ug/kg) ⁽³⁾	Reference	Comment
Styrene	100	Beyer 1990 and MHSPE 1994		NE	--		NE	--	
Tetrachloroethene	10	MHSPE 1994		84	USEPA Region IV		NE	--	
Toluene	50	Beyer 1990 and MHSPE 1994		175	USEPA Region IV		NE	--	
trans-1,2-Dichloroethene	NE	--		1350	USEPA Region IV		NE	--	
trans-1,3-Dichloropropene	NE	--		24.4	USEPA Region IV	Cis and Trans isomers	NE	--	
Trichloroethene (TCE)	1	MHSPE 1994		NE	--		NE	--	
Vinyl Chloride	10	MHSPE 1994		NE	--		NE	--	
Xylene (Total)	50	Beyer 1990 and MHSPE 1994		NE	--		NE	--	
Semivolatile Organics:									
1,2,4-Trichlorobenzene	NE	--		44.9	USEPA Region IV		NE	--	
1,2-Dichlorobenzene	NE	--		15.8	USEPA Region IV		NE	--	
1,3-Dichlorobenzene	NE	--		50.2	USEPA Region IV		NE	--	
1,4-Dichlorobenzene	NE	--		11.2	USEPA Region IV		NE	--	
2,2'-Oxybis (1-Chloropropane)	NE	--		NE	--		NE	--	
2,4,5-Trichlorophenol	4,000	Efroymsen et. al. 1997		NE	--		NE	--	
2,4,6-Trichlorophenol	10,000	Efroymsen et. al. 1997		3.2	USEPA Region IV		NE	--	
2,4-Dichlorophenol	NE	--		36.5	USEPA Region IV		NE	--	
2,4-Dinitrophenol	20,000	Efroymsen et. al. 1997		6.2	USEPA Region IV		NE	--	
2,4-Dinitrotoluene	NE	--		310	USEPA Region IV		NE	--	
2,4-Dimethylphenol	NE	--		21.2	USEPA Region IV		NE	--	
2,6-Dinitrotoluene	NE	--		NE	--		NE	--	
2-Chloronaphthalene	NE	--		NE	--		NE	--	
2-Chlorophenol	NE	--		43.8	USEPA Region IV		NE	--	
2-Methylnaphthalene	NE	--		NE	--		20.23	USEPA 2001	
2-Methylphenol	NE	--		NE	--		NE	--	
2-Nitroaniline	NE	--		NE	--		NE	--	
2-Nitrophenol	NE	--		3500	USEPA Region IV		NE	--	
3,3'-Dichlorobenzidine	NE	--		NE	--		NE	--	
3-Nitroaniline	NE	--		NE	--		NE	--	

TABLE 7-2 (continued)
 MEDIA-SPECIFIC SCREENING VALUES
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds	USEPA Region IV Recommended Surface			USEPA Region IV Recommended			USEPA Region IV Recommended		
	($\mu\text{g}/\text{kg}$) ⁽¹⁾	Reference	Comment	($\mu\text{g}/\text{L}$) ⁽²⁾	Reference	Comment	($\mu\text{g}/\text{kg}$) ⁽³⁾	Reference	Comment
Semivolatile Organics (Cont):									
4,6-Dinitro-2-Methylphenol	NE	--		2.3	USEPA Region IV		NE	--	
4-Bromophenyl-Phenylether	NE	--		NE	--		NE	--	
4-Chloro-3-Methylphenol	NE	--		0.3	USEPA Region IV		NE	--	
4-Chloroaniline	NE	--		NE	--		NE	--	
4-Chlorophenyl-Phenylether	NE	--		NE	--		NE	--	
4-Methylphenol	NE	--		NE	--		NE	--	
4-Nitroaniline	NE	--		NE	--		NE	--	
4-Nitrophenol	7,000	Efroymson et. al. 1997		82.8	USEPA Region IV		NE	--	
Acenaphthene	20,000	Efroymson et. al. 1997		17	USEPA Region IV		6.71	MacDonald 1994	
Acenaphthylene	NE	--		NE	--		5.87	MacDonald 1994	
Anthracene	100	Beyer 1990		NE	--		46.9	MacDonald 1994	
Benzo(a)anthracene	NE	--		NE	--		74.8	MacDonald 1994	
Benzo(a)pyrene	100	Beyer 1990		NE	--		88.8	MacDonald 1994	
Benzo(b)fluoranthene	NE	--		NE	--		NE	--	
Benzo(g,h,i)perylene	NE	--		NE	--		NE	--	
Benzo(k)fluoranthene	NE	--		NE	--		NE	--	
bis(2-Chloroethoxy)ether	NE	--		NE	--		NE	--	
bis(2-Chloroethoxy)methane	NE	--		NE	--		NE	--	
bis(2-Ethylhexyl)phthalate	NE	--		0.299	USEPA Region IV		182	MacDonald 1994	
Butylbenzylphthalate	NE	--		22	USEPA Region IV		NE	--	
Carbazole	NE	--		NE	--		NE	--	
Chrysene	NE	--		NE	--		108	MacDonald 1994	
Dibenzo(a,h)anthracene	NE	--		NE	--		6.22	MacDonald 1994	
Dibenzofuran	NE	--		NE	--		NE	--	
Diethylphthalate	100,000	Efroymson et. al. 1997		521	USEPA Region IV		NE	--	
Dimethylphthalate	200,000	Efroymson et. al. 1997		330	USEPA Region IV		NE	--	
Di-n-butylphthalate	200,000	Efroymson et. al. 1997		9.4	USEPA Region IV		NE	--	
Di-n-octylphthalate	NE	--		NE	--		NE	--	
Fluoranthene	100	Beyer 1990		39.8	USEPA Region IV		113	MacDonald 1994	

TABLE 7-2 (continued)
MEDIA-SPECIFIC SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCI Compounds Semivolatile Organics (Cont):	USEPA Region IV Recommended Surface Soil Screening Values			USEPA Region IV Recommended Freshwater Screening Values			USEPA Region IV Recommended Sediment Screening Values		
	(ug/kg) ⁽¹⁾	Reference	Comment	(ug/L) ⁽²⁾	Reference	Comment	(ug/kg) ⁽³⁾	Reference	Comment
Fluorene	30,000	Efroymsen et. al. 1997		NE	--		21.2	MacDonald 1994	
Hexachlorobenzene	2.5	MHSPE 1994		NE	--		NE	--	
Hexachlorobutadiene	NE	--		0.93	USEPA Region IV		NE	--	
Hexachlorocyclopentadiene	10,000	Efroymsen et. al. 1997		0.07	USEPA Region IV		NE	--	
Hexachloroethane	NE	--		9.8	USEPA Region IV		NE	--	
Indeno(1,2,3-cd)pyrene	NE	--		NE	--		NE	--	
Isophorone	NE	--		1170	USEPA Region IV		NE	--	
Naphthalene	100	Beyer 1990		62	USEPA Region IV		34.6	MacDonald 1994	
Nitrobenzene	40,000	Efroymsen et. al. 1997		270	USEPA Region IV		NE	--	
n-Nitroso-di-n-propylamine	NE	--		NE	--		NE	--	
n-Nitrosodiphenylamine	20,000	Efroymsen et. al. 1997		58.5	USEPA Region IV		NE	--	
Pentachlorophenol	2	MHSPE 1994		12.8	USEPA Region IV	pH = 7.8 S.U.	NE	--	
Phenanthrene	100	Beyer 1990		NE	--		86.7	MacDonald 1994	
Phenol	50	MHSPE 1994		256	USEPA Region IV		NE	--	
Pyrene	100	Beyer 1990		NE	--		153	MacDonald 1994	
PAHs (total)	1000	Beyer 1990, MHSPE 1994		NE	--				value for low molecular weight PAHs
PCBs/Pesticides:									
Aldrin	2.5	MHSPE 1994		0.3	USEPA Region IV		NE	--	
alpha-Chlordane	NE	--		0.0043	USEPA Region IV	Total Chlordane	0.5	Long et. al. 1991	Total Chlordane
beta-Chlordane	NE	--		0.0043	USEPA Region IV	Total Chlordane	0.5	Long et. al. 1991	Total Chlordane
gamma-Chlordane	NE	--		0.0043	USEPA Region IV	Total Chlordane	0.5	Long et. al. 1991	Total Chlordane
4,4'-DDT	2.5	MHSPE 1994	Total DDT, DDE, and DDD	0.001	USEPA Region IV		1.19	MacDonald 1994	
4,4'-DDE	2.5	MHSPE 1994	Total DDT, DDE, and DDD	10.5	USEPA Region IV		2.07	MacDonald 1994	

TABLE 7-2 (continued)
 MEDIA-SPECIFIC SCREENING VALUES
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds PCBs/Pesticides (cont.):	USEPA Region IV Recommended Surface Soil Screening Values		USEPA Region IV Recommended Freshwater Screening Values		USEPA Region IV Recommended Sediment Screening Values	
	(ug/kg) ⁽¹⁾	Reference	Comment	(ug/L) ⁽²⁾	Reference	Comment
4,4'-DDD	2.5	MHSPE 1994	Total DDT, DDE, and DDD	0.0064	USEPA Region IV	
Dieldrin	0.5	MHSPE 1994		0.0019	USEPA Region IV	MacDonald 1994
Endrin	1	MHSPE 1994		0.0023	USEPA Region IV	Long et. al. 1991
Endrin aldehyde	NE	--		NE	--	Long et. al. 1991
Endrin ketone	NE	--		NE	--	NE
alpha-BHC	2.5	MHSPE 1994		500	USEPA Region IV	NE
beta-BHC	1	MHSPE 1994		5,000	USEPA Region IV	NE
delta-BHC	NE	--		NE	--	NE
gamma-BHC (lindane)	0.05	MHSPE 1994		0.08	USEPA Region IV	MacDonald 1994
Heptachlor	NE	--		0.0038	USEPA Region IV	NE
Heptachlor epoxide	NE	--		0.0038	USEPA Region IV	NE
Endosulfan I	NE	--		0.056	USEPA Region IV	NE
Endosulfan II	NE	--		0.056	USEPA Region IV	NE
Endosulfan sulfate	NE	--		NE	--	NE
Methoxychlor	NE	--		NE	--	NE
Toxaphene	NE	--		NE	--	NE
Aroclor 1016	20	MHSPE 1994	Total PCBs	0.0002	USEPA Region IV	NE
Aroclor 1221	20	MHSPE 1994	Total PCBs	0.014	USEPA Region IV	MacDonald 1994
Aroclor 1232	20	MHSPE 1994	Total PCBs	0.014	USEPA Region IV	MacDonald 1994
Aroclor 1242	20	MHSPE 1994	Total PCBs	0.014	USEPA Region IV	MacDonald 1994
Aroclor 1248	20	MHSPE 1994	Total PCBs	0.014	USEPA Region IV	MacDonald 1994
Aroclor 1254	20	MHSPE 1994	Total PCBs	0.014	USEPA Region IV	MacDonald 1994
Aroclor 1260	20	MHSPE 1994	Total PCBs	0.014	USEPA Region IV	MacDonald 1994
PCBs (total)	20	MHSPE 1994	Total PCBs	NE	--	MacDonald 1994
Herbicides						
2,4,5-T	NE	--		NE	--	NE
2,4-D	NE	--		NE	--	NE
2,4-DB	NE	--		NE	--	NE
Dalapon	NE	--		NE	--	NE
Dicamba	NE	--		NE	--	NE
Dichlorprop	NE	--		NE	--	NE
Dinoseb	NE	--		NE	--	NE
MCPA	NE	--		NE	--	NE
MCPP	NE	--		NE	--	NE
Silvex	NE	--		NE	--	NE

TABLE 7-2 (continued)
 MEDIA-SPECIFIC SCREENING VALUES
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

	USEPA Region IV Recommended Surface Soil Screening Values			USEPA Region IV Recommended Freshwater Screening Values			USEPA Region IV Recommended Sediment Screening Values		
	(ug/kg) ⁽¹⁾	Reference	Comment	(ug/L) ⁽²⁾	Reference	Comment	(ug/kg) ⁽³⁾	Reference	Comment
TAL/TCL Compounds	NE	--		NE	--		NE	--	
Diesel Range Organics (mg/kg)									
Aluminum	50	Efroymson et al. 1997 Crommentuijn et. al.		87	USEPA Region IV		NE	--	
Antimony	3.5	1997		160	USEPA Region IV		2	Long et. al. 1991	
Arsenic	10	Efroymson et al. 1997 Crommentuijn et. al.		190	USEPA Region IV	Trivalent (+3) form	7.24	MacDonald 1994	
Barium	165	1997		NE	--		NE	--	
Beryllium	1.1	Crommentuijn et. al.		0.53	USEPA Region IV		NE	--	
Cadmium	1.6	Crommentuijn et. al.		1.41	USEPA Region IV	Hardness dependent	0.676	MacDonald 1994	
Calcium	NE	--		NE	--		NE	--	
Chromium (Total)	0.4	Efroymson et al. 1997 and CCME 1997		NE	--		52.3	MacDonald 1994	
Chromium III	NE	--		264.17	USEPA Region IV	Hardness dependent	NE	--	
Chromium VI	NE	--		11	--		NE	--	
Cobalt	20	Beyer 1990, Efroymson et al. 1997, and MHSPE 1994		NE	--		NE	--	
Copper	40	Crommentuijn et. al.		15.25	USEPA Region IV	Hardness dependent	18.7	MacDonald 1994	
Iron	200	Efroymson et al. 1997 Beyer 1990 and Efroymson et. al. 1997		1000	USEPA Region IV		NE	--	
Lead	50	Efroymson et. al. 1997		4.65	USEPA Region IV	Hardness dependent	30.2	MacDonald 1994	
Magnesium	NE	--		NE	--		NE	--	
Manganese	100	Efroymson et. al. 1997		NE	--		NE	--	
Mercury	0.1	Efroymson et. al. 1997		0.012	USEPA Region IV		0.13	MacDonald 1994	

TABLE 7-2 (continued)
 MEDIA-SPECIFIC SCREENING VALUES
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds (Inorganics (mg/kg or ug/L)/(Cont):)	USEPA Region IV Recommended Surface Soil Screening Values			USEPA Region IV Recommended Freshwater Screening Values			USEPA Region IV Recommended Sediment Screening Values		
	(ug/kg) ⁽¹⁾	Reference	Comment	(ug/L) ⁽²⁾	Reference	Comment	(ug/kg) ⁽³⁾	Reference	Comment
Inorganics (mg/kg or ug/L)/(Cont):									
Nickel	30	Efroymson et. al. 1997		202.85	USEPA Region IV	Hardness dependent	15.9	Long et. al. 1995	
Potassium	NE	--		NE	--		NE	--	
Selenium	0.81	Crommentuijn et. al. 1997		5	USEPA Region IV		NE	--	
Silver	2	Efroymson et. al. 1997		0.012	USEPA Region IV		0.733	MacDonald 1994	
Sodium	NE	--		NE	--		NE	--	
Thallium	1	Efroymson et. al. 1997		4	USEPA Region IV		NE	--	
Vanadium	2	Efroymson et. al. 1997		NE	--		NE	--	
Zinc	50	Efroymson et. al. 1997		136.42	USEPA Region IV	Hardness dependent	124	MacDonald 1994	
Cyanide (Total)	0.9	CCME 1997		5.2	USEPA Region IV		NE	--	
Total Petroleum Hydrocarbons									
TPH (as Diesel) (mg/kg)	NE	--		NE	--		NE	--	
TPH (as Gasoline) (ug/kg)	NE	--		NE	--		NE	--	

Notes:

TAL = Target Analyte List
 TCL = Target Compound List
 ug/L = microgram per liter
 mg/kg = milligram per kilogram
 NE = Not Established
 USEPA = United States Environmental Protection Agency

- (1) Soil screening values are in microgram per kilogram (ug/kg) for volatile and semivolatile organic compounds and in milligram per kilogram (mg/kg) for inorganic compounds.
- (2) Surface water screening values are in microgram per liter (ug/L) for all listed compounds.
- (3) Sediment screening values are in microgram per kilogram (ug/kg) for volatile and semivolatile organic compounds and in milligram per kilogram (mg/kg) for inorganic compounds.

TABLE 7-2 (continued)
 MEDIA-SPECIFIC SCREENING VALUES
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds	USEPA Region IV Recommended Salt Water Screening Values		
	(ug/l) ⁽²⁾	Reference	Comment
Volatile Organics:			
1,1,1-Trichloroethane	312	USEPA Region IV	
1,1,2,2-Tetrachloroethane	90.2	USEPA Region IV	
1,1,2-Trichloroethane	NE	--	
1,1-Dichloroethane	NE	--	
1,1-Dichloroethene	2240	USEPA Region IV	
1,2-Dibromoethane	NE	--	
1,2-Dichloroethane	1130	USEPA Region IV	
1,2-Dichloroethene (Total)	NE	--	
1,2-Dichloroethene (cis)	NE	--	
1,2-Dichloroethene (trans)	NE	--	
1,2-Dichloropropane	2400	USEPA Region IV	
2-Butanone	NE	--	
2-Hexanone	NE	--	
4-Methyl-2-Pentanone	NE	--	
Acetone	NE	--	
Benzene	109	USEPA Region IV	
Bromodichloromethane	NE	--	
Bromoform	640	USEPA Region IV	
Bromomethane	NE	--	
Carbon Disulfide	NE	--	
Carbon Tetrachloride	1500	USEPA Region IV	
Chlorobenzene	105	USEPA Region IV	
Chloroethane	NE	--	
Chloroform	815	USEPA Region IV	
Chloromethane	NE	--	
cis-1,2-Dichloroethene	NE	--	
cis-1,3-Dichloropropene	7.9	USEPA Region IV	Cis and Trans isomers
Dibromochloromethane	NE	--	
Ethylbenzene	4.3	USEPA Region IV	
Isopropyl ether	NE	--	
Methyl tert-butyl ether	NE	--	
Methylene Chloride	2560	USEPA Region IV	

TABLE 7-2 (continued)
 MEDIA-SPECIFIC SCREENING VALUES
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds	USEPA Region IV Recommended Salt Water Screening Values		
	(ug/L) ⁽²⁾	Reference	Comment
Volatile Organics (Cont):			
Styrene	NE	--	
Tetrachloroethene	45	USEPA Region IV	
Toluene	37	USEPA Region IV	
trans-1,2-Dichloroethene	NE	--	
trans-1,3-Dichloropropene	7.9	USEPA Region IV	Cis and Trans isomers
Trichloroethene (TCE)	NE	--	
Vinyl Chloride	NE	--	
Xylene (Total)	NE	--	
Semivolatile Organics:			
1,2,4-Trichlorobenzene	4.5	USEPA Region IV	
1,2-Dichlorobenzene	19.7	USEPA Region IV	
1,3-Dichlorobenzene	28.5	USEPA Region IV	
1,4-Dichlorobenzene	19.9	USEPA Region IV	
2,2'-Oxybis (1-Chloropropane)	NE	--	
2,4,5-Trichlorophenol	NE	--	
2,4,6-Trichlorophenol	NE	--	
2,4-Dichlorophenol	NE	--	
2,4-Dinitrophenol	48.5	USEPA Region IV	
2,4-Dinitrotoluene	NE	--	
2,4-Dimethylphenol	NE	--	
2,6-Dinitrotoluene	NE	--	
2-Chloronaphthalene	NE	--	
2-Chlorophenol	NE	--	
2-Methylnaphthalene	NE	--	
2-Methylphenol	NE	--	
2-Nitroaniline	NE	--	
2-Nitrophenol	NE	--	
3,3'-Dichlorobenzidine	NE	--	
3-Nitroaniline	NE	--	

TABLE 7-2 (continued)
 MEDIA-SPECIFIC SCREENING VALUES
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds	USEPA Region IV Recommended Salt Water Screening Values		
	(ug/L) ⁽²⁾	Reference	Comment
Semivolatile Organics (Cont):			
4,6-Dinitro-2-Methylphenol	NE	--	
4-Bromophenyl-Phenylether	NE	--	
4-Chloro-3-Methylphenol	NE	--	
4-Chloroaniline	NE	--	
4-Chlorophenyl-Phenylether	NE	--	
4-Methylphenol	NE	--	
4-Nitroaniline	NE	--	
4-Nitrophenol	71.7	USEPA Region IV	
Acenaphthene	9.7	USEPA Region IV	
Acenaphthylene	NE	--	
Anthracene	NE	--	
Benzo(a)anthracene	NE	--	
Benzo(a)pyrene	NE	--	
Benzo(b)fluoranthene	NE	--	
Benzo(g,h,i)perylene	NE	--	
Benzo(k)fluoranthene	NE	--	
bis(2-Chloroethoxy)ether	NE	--	
bis(2-Chloroethoxy)methane	NE	--	
bis(2-Ethylhexyl)phthalate	NE	--	
Butylbenzylphthalate	29.4	USEPA Region IV	
Carbazole	NE	--	
Chrysene	NE	--	
Dibenzo(a,h)anthracene	NE	--	
Dibenzofuran	NE	--	
Diethylphthalate	75.9	USEPA Region IV	
Dimethylphthalate	580	USEPA Region IV	
Di-n-butylphthalate	3.4	USEPA Region IV	
Di-n-octylphthalate	NE	--	
Fluoranthene	1.6	USEPA Region IV	

TABLE 7-2 (continued)
 MEDIA-SPECIFIC SCREENING VALUES
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds Semivolatile Organics (Cont):	USEPA Region IV Recommended Salt Water Screening Values		
	(ug/L) ⁽²⁾	Reference	Comment
Fluorene	NE	--	
Hexachlorobenzene	NE	--	
Hexachlorobutadiene	0.32	USEPA Region IV	
Hexachlorocyclopentadiene	0.07	USEPA Region IV	
Hexachloroethane	9.4	USEPA Region IV	
Indeno(1,2,3-cd)pyrene	NE	--	
Isophorone	129	USEPA Region IV	
Naphthalene	23.5	USEPA Region IV	
Nitrobenzene	66.8	USEPA Region IV	
n-Nitroso-di-n-propylamine	NE	--	
n-Nitrosodiphenylamine	33000	USEPA Region IV	
Pentachlorophenol	12.8	USEPA Region IV pH = 7.8 S.U.	
Phenanthrene	NE	--	
Phenol	58	USEPA Region IV	
Pyrene	NE	--	
PAHs (total)	NE	--	
PCBs/Pesticides:			
Aldrin	0.13	USEPA Region IV	Total Chlordane
alpha-Chlordane	0.004	USEPA Region IV	Total Chlordane
beta-Chlordane	0.004	USEPA Region IV	Total Chlordane
gamma-Chlordane	0.004	USEPA Region IV	Total Chlordane
4,4'-DDT	0.001	USEPA Region IV	
4,4'-DDE	0.14	USEPA Region IV	

TABLE 7-2 (continued)
 MEDIA-SPECIFIC SCREENING VALUES
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds PCBs/Pesticides (cont.):	USEPA Region IV Recommended Salt Water Screening Values		
	(ug/L) ⁽²⁾	Reference	Comment
4-4'-DDD	0.025	USEPA Region IV	
Dieldrin	0.0019	USEPA Region IV	
Endrin	0.0023	USEPA Region IV	
Endrin aldehyde	NE	--	
Endrin ketone	NE	--	
alpha-BHC	1400	USEPA Region IV	
beta-BHC	NE	--	
delta-BHC	NE	--	
gamma-BHC (lindane)	0.016	USEPA Region IV	
Heptachlor	0.0036	USEPA Region IV	
Heptachlor epoxide	0.0036	USEPA Region IV	
Endosulfan I	0.0087	USEPA Region IV	
Endosulfan II	0.0087	USEPA Region IV	
Endosulfan sulfate	NE	--	
Methoxychlor	NE	--	
Toxaphene	0.0002	USEPA Region IV	
Aroclor 1016	0.03	USEPA Region IV	
Aroclor 1221	0.03	USEPA Region IV	
Aroclor 1232	0.03	USEPA Region IV	
Aroclor 1242	0.03	USEPA Region IV	
Aroclor 1248	0.03	USEPA Region IV	
Aroclor 1254	0.03	USEPA Region IV	
Aroclor 1260	0.03	USEPA Region IV	
PCBs (total)	NE	--	
Herbicides			
2,4,5-T	NE	--	
2,4-D	NE	--	
2,4-DB	NE	--	
Dalapon	NE	--	
Dicamba	NE	--	
Dichlorprop	NE	--	
Dinoseb	NE	--	
MCPA	NE	--	
MCPP	NE	--	
Silvex	NE	--	

TABLE 7-2 (continued)
 MEDIA-SPECIFIC SCREENING VALUES
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds	USEPA Region IV Recommended Salt Water Screening Values	
	(ug/L) ⁽³⁾	Reference Comment
Diesel Range Organics (mg/kg)	NE	--
Inorganics (mg/kg or ug/L):		
Aluminum	NE	--
Antimony	NE	--
Arsenic	36	USEPA Region IV Trivalent (+3) form
Barium	NE	--
Beryllium	NE	--
Cadmium	9.3	USEPA Region IV
Calcium	NE	--
Chromium (Total)	9.3	USEPA Region IV value is for hexavalent (+6) form
Chromium III	103	USEPA Region IV
Chromium VI	50	USEPA Region IV
Cobalt	NE	--
Copper	2.9	USEPA Region IV
Iron	NE	--
Lead	8.5	USEPA Region IV
Magnesium	NE	--
Manganese	NE	--
Mercury	0.025	USEPA Region IV

TABLE 7-2 (continued)
 MEDIA-SPECIFIC SCREENING VALUES
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds Inorganics (mg/kg or ug/L)(Cont):	USEPA Region IV Recommended Salt Water Screening Values	
	(ug/L) ⁽²⁾	Reference Comment
Nickel	8.30	USEPA Region IV
Potassium	NE	--
Selenium	71	USEPA Region IV
Silver	0.23	USEPA Region IV
Sodium	NE	--
Thallium	21.3	USEPA Region IV
Vanadium	NE	--
Zinc	86	USEPA Region IV
Cyanide (Total)	1	USEPA Region IV
Total Petroleum Hydrocarbons		
TPH (as Diesel) (mg/kg)	NE	--
TPH (as Gasoline) (ug/kg)	NE	--

Notes:

TAL = Target Analyte List
 TCL = Target Compound List
 ug/kg = microgram per kilogram
 USEPA = United States Environment

- (1) Soil screening values are in microg
 (2) Surface water screening values are
 (3)



TABLE 7-3a
FREQUENCY AND RANGE OF SURFACE SOIL DATA COMPARED TO SURFACE SOIL SCREENING VALUES - BEFORE NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range			Surface Soil Screening Levels (SSSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)					
VOLATILE ORGANICS (ug/kg):									
1,1,1-Trichloroethane	0/25	NA	0.9U - 14U	0.78	NE	NA	NA	No	Not detected
1,1,1,2,2-Tetrachloroethane	0/25	NA	1.8U - 15U	1.29	NE	NA	NA	No	Not detected
1,1,2-Trichloroethane	0/25	NA	1.2U - 22U	1.10	NE	NA	NA	No	Not detected
1,1-Dichloroethane	0/25	NA	0.57U - 19U	0.70	NE	NA	NA	No	Not detected
1,1-Dichloroethene	0/25	NA	1.2U - 24U	1.14	NE	NA	NA	No	Not detected
1,2-Dichloroethane	0/25	NA	0.72U - 15U	0.70	400	0.04	NA	No	Not detected
1,2-Dichloroethene (total)	0/25	NA	1.4U - 40U	1.57	NE	NA	NA	No	Not detected
1,2-Dichloropropane	0/25	NA	0.74U - 13U	0.67	700000	1.86E-05	NA	No	Not detected
2-Butanone	1/25	6.9J - 6.9J	2.7U - 110U	4.76	NE	NA	NA	Yes	No SSSL
2-Hexanone	0/25	NA	1.7U - 42U	1.77	NE	NA	NA	No	Not detected
4-Methyl-2-pentanone	0/25	NA	1.9U - 40U	1.84	NE	NA	NA	No	Not detected
Acetone	1/25	40J - 40J	2.1U - 1400U	32.99	NE	NA	NA	Yes	No SSSL
Benzene	0/25	NA	0.64U - 24U	0.84	50	0.48	NA	No	Not detected
Bromodichloromethane	0/25	NA	1.2U - 14U	0.94	NE	NA	NA	No	Not detected
Bromoform	0/25	NA	1.6U - 22U	1.32	NE	NA	NA	No	Not detected
Bromomethane	0/25	NA	1.8U - 36U	1.71	NE	NA	NA	No	Not detected
Carbon disulfide	0/25	NA	0.77U - 49U	1.41	NE	NA	NA	No	Not detected
Carbon tetrachloride	0/25	NA	0.98U - 14U	0.82	1000000	0.000014	NA	No	Not detected
Chlorobenzene	0/25	NA	0.51U - 11U	0.51	50	0.22	NA	No	Not detected
Chloroethane	0/25	NA	2.2U - 51U	2.23	NE	NA	NA	No	Not detected
Chloroform	0/25	NA	0.81U - 14U	0.73	1	1.4	NA	No	Not detected
Chloromethane	0/25	NA	1.3U - 21U	1.14	NE	NA	NA	No	Not detected
Dibromochloromethane	0/25	NA	1.1U - 18U	0.96	NE	NA	NA	No	Not detected
Ethylbenzene	1/25	330J - 330J	0.58U - 1.5U	13.52	50	0.03	6.60	Yes	Max HQ > 1.0
Isopropyl ether	0/25	NA	0.72U - 64U	6.28	NE	NA	NA	No	Not detected
Methyl tert-butyl ether	0/25	NA	0.83U - 15U	2.90	NE	NA	NA	No	Not detected
Methylene chloride	0/25	NA	1.3U - 57U	1.86	NE	NA	NA	No	Not detected
Styrene	0/25	NA	0.49U - 24U	0.75	100	0.24	NA	No	Not detected
Tetrachloroethene	0/25	NA	1.2U - 21U	1.08	10	2.1	NA	No	Not detected
Toluene	0/25	NA	0.52U - 14U	0.78	50	0.28	NA	No	Not detected
Trichloroethene	0/25	NA	0.75U - 24U	0.90	1	2.4	NA	No	Not detected
Vinyl chloride	0/25	NA	1.4U - 15U	1.07	10	1.50	NA	No	Not detected
Xylenes (total)	2/25	8.7J - 120J	1.9U - 2.2U	6.10	50	0.044	2.40	Yes	Max HQ > 1.0
cis-1,3-Dichloropropene	0/25	NA	0.63U - 17U	0.69	NE	NA	NA	No	Not detected
trans-1,3-Dichloropropene	0/25	NA	0.85U - 15U	0.77	NE	NA	NA	No	Not detected

TABLE 7-3a (continued)
FREQUENCY AND RANGE OF SURFACE SOIL DATA COMPARED TO SURFACE SOIL SCREENING VALUES - BEFORE NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range			Surface Soil Screening Levels (SSSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)					
SEMIVOLATILES (ug/kg)									
1,2,4-Trichlorobenzene	0/25	NA	51U - 6900U	214.62	--	NA	NA	No	Not detected
1,2-Dichlorobenzene	0/25	NA	49U - 6600U	204.86	--	NA	NA	No	Not detected
1,3-Dichlorobenzene	0/25	NA	52U - 7000U	217.60	--	NA	NA	No	Not detected
1,4-Dichlorobenzene	0/25	NA	52U - 7000U	217.60	--	NA	NA	No	Not detected
2,2'-Oxybis(1-Chloropropane)	0/25	NA	54U - 7300U	225.95	--	NA	NA	No	Not detected
2,4,5-Trichlorophenol	0/25	NA	57U - 7700U	238.65	Efroymsen et. al. 1997	1193	NA	No	Not detected
2,4,6-Trichlorophenol	0/25	NA	66U - 8800U	274.44	Efroymsen et. al. 1997	0.88	NA	No	Not detected
2,4-Dichlorophenol	0/25	NA	52U - 7000U	217.60	--	NA	NA	No	Not detected
2,4-Dimethylphenol	0/25	NA	84U - 11000U	343.51	--	NA	NA	No	Not detected
2,4-Dinitrophenol	0/25	NA	110U - 15000U	472.30	Efroymsen et. al. 1997	0.75	NA	No	Not detected
2,4-Dinitrotoluene	0/25	NA	48U - 6400U	199.70	--	NA	NA	No	Not detected
2,6-Dinitrotoluene	0/25	NA	50U - 6700U	207.84	--	NA	NA	No	Not detected
2-Chloronaphthalene	0/25	NA	50U - 6700U	207.84	--	NA	NA	No	Not detected
2-Chlorophenol	0/25	NA	54U - 7300U	225.95	--	NA	NA	No	Not detected
2-Methylnaphthalene	3/25	120J - 92000	50U - 6700U	3872.64	--	NA	NA	Yes	No SSSL
2-Methylphenol	0/25	NA	48U - 6400U	199.70	--	NA	NA	No	Not detected
2-Nitroaniline	0/25	NA	48U - 6400U	199.70	--	NA	NA	No	Not detected
2-Nitrophenol	0/25	NA	48U - 6400U	199.70	--	NA	NA	No	Not detected
3,3'-Dichlorobenzidine	0/25	NA	41U - 5500U	170.69	--	NA	NA	No	Not detected
3-Nitroaniline	0/25	NA	150U - 20000U	617.20	--	NA	NA	No	Not detected
4,6-Dinitro-2-methylphenol	0/25	NA	170U - 22000U	688.30	--	NA	NA	No	Not detected
4-Bromophenyl phenyl ether	0/25	NA	64U - 8500U	264.69	--	NA	NA	No	Not detected
4-Chloro-3-methylphenol	0/25	NA	53U - 7100U	220.79	--	NA	NA	No	Not detected
4-Chloroaniline	0/25	NA	53U - 7100U	220.79	--	NA	NA	No	Not detected
4-Chlorophenyl phenyl ether	0/25	NA	54U - 7300U	225.95	--	NA	NA	No	Not detected
4-Methylphenol	0/25	NA	49U - 6600U	204.86	--	NA	NA	No	Not detected
4-Nitroaniline	0/25	NA	71U - 9500U	295.68	--	NA	NA	No	Not detected
4-Nitrophenol	0/25	NA	200U - 27000U	836.10	Efroymsen et. al. 1997	3.86	NA	No	Not detected
Acenaphthene	8/25	140J - 20000J	53U - 590U	1173.67	Efroymsen et. al. 1997	0.03	100	Yes	Max HQ > 1.0
Acenaphthylene	0/25	NA	49U - 6600U	204.86	--	NA	NA	No	Not detected
Anthracene	8/25	210J - 56000	51U - 560U	2765.16	Beyer 1990	3.6	560	Yes	Max HQ > 1.0
Benzo(a)anthracene	8/25	520 - 190000	57U - 630U	8480.65	--	NA	NA	Yes	No SSSL
Benzo(a)pyrene	7/25	470 - 150000	63U - 1700U	6795.62	Beyer 1990	17	1500	Yes	Max HQ > 1.0
Benzo(b)fluoranthene	7/25	540 - 170000	61U - 1600U	7751.34	--	NA	NA	Yes	No SSSL
Benzo(g,h,i)perylene	9/25	74J - 55000	57U - 630U	2668.01	--	NA	NA	Yes	No SSSL
Benzo(k)fluoranthene	7/25	340J - 120000	55U - 1500U	5342.37	--	NA	NA	Yes	No SSSL
Butyl benzyl phthalate	0/25	NA	53U - 7100U	220.79	--	NA	NA	No	Not detected
Carbazole	7/25	130J - 38000J	54U - 1400U	1781.41	--	NA	NA	Yes	No SSSL

TABLE 7-3a (continued)
FREQUENCY AND RANGE OF SURFACE SOIL DATA COMPARED TO SURFACE SOIL SCREENING VALUES - BEFORE NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Surface Soil Screening Levels (SSSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
SEMIVOLATILES (ug/kg)										
Chrysene	8/25	560 - 180000	48U - 530U	818.10	NE	--	NA	NA	Yes	No SSSL
Di-n-butylphthalate	0/25	NA	160U - 21000U	652.90	20000	Efroymsen et. al. 1997	0.11	NA	No	Not detected
Di-n-octyl phthalate	0/25	NA	56U - 7600U	235.87	NE	--	NA	NA	No	Not detected
Dibenz(a,h)anthracene	7/25	70J - 17000J	53U - 1400U	866.87	NE	--	NA	NA	Yes	No SSSL
Dibenzofuran	7/25	84J - 8900J	52U - 1400U	565.06	NE	--	NA	NA	Yes	No SSSL
Diethylphthalate	0/25	NA	160U - 21000U	652.90	10000	Efroymsen et. al. 1997	0.21	NA	No	Not detected
Dimethylphthalate	0/25	NA	170U - 22000U	688.30	20000	Efroymsen et. al. 1997	0.11	NA	No	Not detected
Fluoranthene	8/25	1200 - 300000	59U - 640U	13872.39	100	Beyer 1990	6.40	3000	Yes	Max HQ > 1.0
Fluorene	9/25	130J - 19000J	50U - 59U	1386.40	30000	Efroymsen et. al. 1997	0.002	0.63	No	HQ < 1.0
Hexachlorobenzene	0/25	NA	59U - 7800U	243.61	2.5	MHSPE 1994	3120	NA	No	Not detected
Hexachlorobutadiene	0/25	NA	47U - 6300U	196.96	NE	--	NA	NA	No	Not detected
Hexachlorocyclopentadiene	1/25	410J - 410J	63U - 8400U	274.92	10000	Efroymsen et. al. 1997	0.84	0.04	No	HQ < 1.0
Hexachloroethane	0/25	NA	50U - 6700U	207.84	NE	--	NA	NA	No	Not detected
Indeno(1,2,3-cd)pyrene	7/25	250J - 59000	73U - 1900U	2808.47	NE	--	NA	NA	Yes	No SSSL
Isophorone	0/25	NA	46U - 6200U	191.79	NE	--	NA	NA	No	Not detected
N-Nitrosodi-n-propylamine	0/25	NA	46U - 6200U	191.79	NE	--	NA	NA	No	Not detected
N-Nitrosodiphenylamine	0/25	NA	51U - 6900U	214.62	20000	Efroymsen et. al. 1997	0.35	NA	No	Not detected
Naphthalene	5/25	140J - 7500J	51U - 1400U	414.22	100	Beyer 1990	1.4	775	Yes	Max HQ > 1.0
Nitrobenzene	0/25	NA	48U - 6400U	199.70	40000	Efroymsen et. al. 1997	0.16	NA	No	Not detected
Pentachlorophenol	0/25	NA	130U - 17000U	526.00	2	MHSPE 1994	8500	NA	No	Not detected
Phenanthrene	9/25	910J - 180000	54U - 63.5U	9728.61	100	Beyer 1990	0.64	1800	Yes	Max HQ > 1.0
Phenol	0/25	NA	51U - 6900U	214.62	50	MHSPE 1994	138	NA	No	Not detected
Pyrene	8/25	760 - 250000	53U - 590U	12012.07	100	Beyer 1990	5.9	2500	Yes	Max HQ > 1.0
bis(2-Chloroethoxy)methane	0/25	NA	49U - 6600U	204.86	NE	--	NA	NA	No	Not detected
bis(2-Chloroethyl) ether	0/25	NA	53U - 7100U	220.79	NE	--	NA	NA	No	Not detected
bis(2-Ethylhexyl) phthalate	1/25	380J - 380J	56U - 7600U	249.76	NE	--	NA	NA	Yes	No SSSL

TABLE 7-3a (continued)
FREQUENCY AND RANGE OF SURFACE SOIL DATA COMPARED TO SURFACE SOIL SCREENING VALUES - BEFORE NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Surface Soil Screening Levels (SSSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
PCBs (ug/kg)										
4,4'-DDD	7/23	3.21 - 3000J	0.83U - 890U	188.72	2.5	MHSPE 1994	356	1200	Yes	Max HQ > 1.0
4,4'-DDE	7/23	2.9625J - 58	0.6U - 640U	57.68	2.5	MHSPE 1994	256	723	Yes	Max HQ > 1.0
4,4'-DDT	7/23	1.9 - 190	1.4U - 1500U	139.11	2.5	MHSPE 1994	600	76	Yes	Max HQ > 1.0
Aldrin	0/23	NA	0.37U - 620U	51.52	2.5	MHSPE 1994	248	NA	No	Not detected
Dieldrin	8/23	3.51 - 320	1.6U - 1700U	161.45	0.5	MHSPE 1994	3400	640	Yes	Max HQ > 1.0
Endosulfan I	0/23	NA	0.7U - 760U	62.97	NE	--	NA	NA	No	Not detected
Endosulfan II	0/23	NA	0.4U - 430U	35.89	NE	--	NA	NA	No	Not detected
Endosulfan sulfate	5/24	3.2 - 40J	0.29U - 320U	29.48	NE	--	NA	NA	Yes	No SSSL
Endrin	1/23	3.6225J - 3.6225J	0.64U - 690U	57.60	1	MHSPE 1994	690	3.62	Yes	Max HQ > 1.0
Endrin aldehyde	7/24	4.5J - 61J	1.6U - 1700U	144.07	NE	--	NA	NA	Yes	No SSSL
Endrin ketone	5/24	1.71 - 26J	0.27U - 290U	25.55	NE	--	NA	NA	Yes	No SSSL
Heptachlor	8/23	1.5J - 22000	0.65U - 7U	1905.72	NE	--	NA	NA	Yes	No SSSL
Heptachlor epoxide	6/23	4.2J - 4500J	0.69U - 7.6U	418.50	NE	--	NA	NA	Yes	No SSSL
Methoxychlor	7/24	1.9J - 79J	0.86U - 920U	81.16	NE	--	NA	NA	Yes	No SSSL
Aroclor-1016	0/91	NA	5.6U - 18000U	283.68	20	MHSPE 1994	900	NA	No	Not detected
Aroclor-1221	0/91	NA	20U - 18000U	539.22	20	MHSPE 1994	900	NA	No	Not detected
Aroclor-1232	0/91	NA	12U - 18000U	349.96	20	MHSPE 1994	900	NA	No	Not detected
Aroclor-1242	0/91	NA	19U - 18000U	433.00	20	MHSPE 1994	900	NA	No	Not detected
Aroclor-1248	4/91	56 - 160000	4.8U - 18000U	2225.83	20	MHSPE 1994	900	8000	Yes	Max HQ > 1.0
Aroclor-1254	1/91	51000 - 51000	21U - 18000U	952.73	20	MHSPE 1994	900	2550	Yes	Max HQ > 1.0
Aroclor-1260	64/91	18J - 200000	7.8U - 4200U	5200.20	20	MHSPE 1994	210	10000	Yes	Max HQ > 1.0
Toxaphene	0/23	NA	7.2U - 7800U	649.48	NE	--	NA	NA	No	Not detected
alpha-BHC	1/23	21 - 21	0.48U - 520U	43.95	2.5	MHSPE 1994	208	8.40	Yes	Max HQ > 1.0
alpha-Chlordane	10/23	2J - 48000J	0.62U - 6.8U	4440.61	NE	--	NA	NA	Yes	No SSSL
beta-BHC	0/23	NA	0.48U - 520U	43.16	1	MHSPE 1994	520	NA	No	Not detected
delta-BHC	0/23	NA	0.5U - 540U	44.92	NE	--	NA	NA	No	Not detected
gamma-BHC (Lindane)	0/23	NA	0.6U - 640U	53.50	0.05	MHSPE 1994	12800	NA	No	Not detected
gamma-Chlordane	10/23	3.5125J - 58000	0.6U - 6.5U	5354.54	NE	--	NA	NA	Yes	No SSSL

TABLE 7-3a (continued)
 FREQUENCY AND RANGE OF SURFACE SOIL DATA COMPARED TO SURFACE SOIL SCREENING VALUES - BEFORE NON-TCRA
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Surface Soil Screening Levels (SSSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC? ⁽³⁾	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detections	Arithmetic Mean (Half Non-Detections)						
HERBICIDES (ug/kg)										
2,4,5-T	0/14	NA	3.3U - 4.3U	1.75	NE	--	NA	NA	No	Not detected
2,4-D	0/14	NA	56U - 74U	29.98	NE	--	NA	NA	No	Not detected
2,4-DB	0/14	NA	41U - 54U	21.98	NE	--	NA	NA	No	Not detected
Dalapon	0/14	NA	39U - 52U	20.96	NE	--	NA	NA	No	Not detected
Dicamba	0/14	NA	16U - 21U	8.52	NE	--	NA	NA	No	Not detected
Dichlorprop	0/14	NA	11U - 14U	5.64	NE	--	NA	NA	No	Not detected
Dinoseb	0/14	NA	13U - 17U	6.86	NE	--	NA	NA	No	Not detected
MCPA	0/14	NA	2400U - 3200U	1296.43	NE	--	NA	NA	No	Not detected
MCPP	0/14	NA	2900U - 3800U	1535.71	NE	--	NA	NA	No	Not detected
Pentachlorophenol	0/25	NA	130U - 17000U	526.00	2	MHSPE 1994	8500	NA	No	Not detected
Silvex	0/14	NA	4.1U - 5.4U	2.20	NE	--	NA	NA	No	Not detected
METALS (mg/kg)										
Aluminum	25/25	1270 - 5910	NA	2634.80	50	Efroymson et. al. 1997	NA	118	Yes	Max HQ > 1.0
Antimony	13/25	0.66J - 3.3J	0.52UJ - 0.6UJ	0.82	3.5	Crommentuijn et. al. 1997	0.17	0.94	No	HQ < 1.0
Arsenic	23/25	0.33J - 9.1	0.32U	1.93	10	Efroymson et. al. 1997	0.03	0.91	No	HQ < 1.0
Barium	22/25	31 - 65.7	3.7U - 9.8U	13.02	165	Crommentuijn et. al. 1997	0.06	0.40	No	HQ < 1.0
Beryllium	5/25	0.06J - 0.075J	0.048U - 0.11U	0.04	1.1	Crommentuijn et. al. 1997	0.10	0.07	No	HQ < 1.0
Cadmium	13/25	0.067J - 0.57	0.045U - 0.049U	0.14	1.6	Crommentuijn et. al. 1997	0.03	0.36	No	HQ < 1.0
Calcium	25/25	109J - 10000J	NA	15241.44	NE	--	NA	NA	Yes	No SSSL
Chromium	25/25	1.7 - 20.2	NA	4.91	0.4	Efroymson et. al. 1997 and CCME 1997	NA	50.50	Yes	Max HQ > 1.0
Cobalt	22/25	0.18J - 0.76J	0.16U - 0.17U	0.29	20	Beyer 1990, Efroymson et. al. 1997, and MHSPE 1994	0.01	0.04	No	HQ < 1.0
Copper	25/25	0.35J - 146	NA	11.26	40	Crommentuijn et. al. 1997	NA	3.65	Yes	Max HQ > 1.0
Iron	25/25	684 - 3480	NA	1934.24	200	Efroymson et. al. 1997	NA	17.40	Yes	Max HQ > 1.0
Lead	25/25	1.8 - 97.3	NA	22.42	50	Beyer 1990 and Efroymson et. al. 1997	NA	1.95	Yes	Max HQ > 1.0
Magnesium	25/25	47.3J - 1480	NA	318.48	NE	--	NA	NA	Yes	No SSSL
Manganese	25/25	2.7 - 32.8	NA	12.70	100	Efroymson et. al. 1997	NA	0.33	No	HQ < 1.0
Mercury	18/25	0.01J - 0.2	0.0089U - 0.0095U	0.03	0.1	Efroymson et. al. 1997	0.10	2.00	Yes	Max HQ > 1.0
Nickel	25/25	0.46J - 2.9J	NA	1.30	30	Efroymson et. al. 1997	NA	0.10	No	HQ < 1.0
Potassium	16/25	70.2J - 258J	34.8U - 97.6U	90.66	NE	--	NA	NA	Yes	No SSSL
Selenium	2/25	0.365J - 0.61	0.32U - 0.56U	0.20	0.81	Crommentuijn et. al. 1997	0.69	0.75	No	HQ < 1.0
Silver	0/25	NA	0.16U - 0.21U	0.08	2	Efroymson et. al. 1997	0.11	NA	No	Not detected
Sodium	3/25	165J - 235J	52.2U - 69.6U	47.93	NE	--	NA	NA	Yes	No SSSL
Thallium	1/25	0.6J - 0.6J	0.52U - 0.7U	0.29	1	Efroymson et. al. 1997	0.7	0.60	No	HQ < 1.0
Vanadium	25/25	2.3J - 10.4	NA	4.80	2	Efroymson et. al. 1997	NA	5.20	Yes	Max HQ > 1.0
Zinc	25/25	1.3J - 154J	NA	25.70	50	Efroymson et. al. 1997	NA	3.08	Yes	Max HQ > 1.0

TABLE 7-3a (continued)
 FREQUENCY AND RANGE OF SURFACE SOIL DATA COMPARED TO SURFACE SOIL SCREENING VALUES - BEFORE NON-TCRA
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Surface Soil Screening Levels (SSSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC ³	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
TOTAL PETROLEUM HYDROCARBONS										
TPH (as Diesel) (mg/kg)	11/11	71 - 470	NA	188.36	NE	--	NA	NA	Yes	No SSSL
TPH (as Gasoline) (ug/kg)	1/11	880 - 880	18U - 19U	88.32	NE	--	NA	NA	Yes	No SSSL
CONVENTIONAL										
Cyanide, Total (mg/kg)	0/11	NA	0.18U - 0.19U	0.09	0.9	CCME 1997	0.21	NA	No	Not detected
Percent Solids (%)	43/43	51.7 - 144.5J	NA	89.47	NA	--	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	2/2	3BG - 13BG	NA	8.00	NA	--	NA	NA	NA	NA

Notes:

HQ = Hazard Quotient
 ECOC = Ecological Contaminant of Concern
 ug/kg = microgram per kilogram
 mg/kg = milligram per kilogram
 NA = Not Applicable
 NE = Note Established
 Non-TCRA = Non Time Critical Removal Action

USEPA = United States Environmental Protection Agency
 U = Chemical was not detected above the method detection limit
 J = Estimated Value
 NJ = Presumptive evidence for the presence of the material at an estimated value.

- ⁽¹⁾ The detection limit HQ is calculated by dividing the maximum detection limit by the screening value.
⁽²⁾ The maximum HQ is calculated by dividing the maximum detected concentration by the screening value.

TABLE 7-3b
FREQUENCY AND RANGE OF SURFACE SOIL DATA COMPARED TO SURFACE SOIL SCREENING VALUES - AFTER NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Surface Soil Screening Levels (SSSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC? ⁽³⁾	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
VOLATILE ORGANICS (ug/kg):										
1,1,1-Trichloroethane	0/13	NA	0.9U - 14U	1.05	NE	--	NA	NA	No	Not detected
1,1,2,2-Tetrachloroethane	0/13	NA	1.8U - 15U	1.58	NE	--	NA	NA	No	Not detected
1,1,2-Trichloroethane	0/13	NA	1.2U - 22U	1.52	NE	--	NA	NA	No	Not detected
1,1-Dichloroethane	0/13	NA	0.57U - 19U	1.05	NE	--	NA	NA	No	Not detected
1,1-Dichloroethane	0/13	NA	1.2U - 24U	1.60	NE	--	NA	NA	No	Not detected
1,2-Dichloroethane	0/13	NA	0.72U - 15U	0.99	400	MHSPE 1994	0.0375	NA	No	Not detected
1,2-Dichloroethane (total)	0/13	NA	1.4U - 40U	2.32	NE	--	NA	NA	No	Not detected
1,2-Dichloropropane	0/13	NA	0.74U - 13U	0.92	700000	Efroymsyn et. al. 1997	1.86E-05	NA	No	Not detected
2-Butanone	1/13	6.9J - 6.9J	2.7U - 110U	7.82	NE	--	NA	NA	Yes	No SSSL
2-Hexanone	0/13	NA	1.7U - 42U	2.57	NE	--	NA	NA	No	Not detected
4-Methyl-2-pentanone	0/13	NA	1.9U - 40U	2.61	NE	--	NA	NA	No	Not detected
Acetone	1/13	40J - 40J	2.1U - 1400U	62.39	NE	--	NA	NA	Yes	No SSSL
Benzene	0/13	NA	0.64U - 24U	1.29	50	MHSPE 1994	0.48	NA	No	Not detected
Bromodichloromethane	0/13	NA	1.2U - 14U	1.21	NE	--	NA	NA	No	Not detected
Bromoform	0/13	NA	1.6U - 22U	1.74	NE	--	NA	NA	No	Not detected
Bromomethane	0/13	NA	1.8U - 36U	2.39	NE	--	NA	NA	No	Not detected
Carbon disulfide	0/13	NA	0.77U - 49U	2.32	NE	--	NA	NA	No	Not detected
Carbon tetrachloride	0/13	NA	0.98U - 14U	1.09	1000000	Efroymsyn et. al. 1997	0.000014	NA	No	Not detected
Chlorobenzene	0/13	NA	0.51U - 11U	0.71	50	Beyer 1990	0.22	NA	No	Not detected
Chloroethane	0/13	NA	2.2U - 51U	3.20	NE	--	NA	NA	No	Not detected
Chloroform	0/13	NA	0.81U - 14U	1.00	1	MHSPE 1994	1.4	NA	No	Not detected
Chloromethane	0/13	NA	1.3U - 21U	1.54	NE	--	NA	NA	No	Not detected
Dibromochloromethane	0/13	NA	1.1U - 18U	1.30	NE	--	NA	NA	No	Not detected
Ethylbenzene	1/13	330J - 330J	0.58U - 1.5U	25.72	50	Beyer 1990 and MHSPE 1994	0.03	6.60	Yes	Max HQ > 1.0
Isopropyl ether	0/13	NA	0.72U - 64U	2.93	NE	--	NA	NA	No	Not detected
Methyl tert-butyl ether	0/13	NA	0.83U - 15U	1.05	NE	--	NA	NA	No	Not detected
Methylene chloride	0/13	NA	1.3U - 57U	2.92	NE	--	NA	NA	No	Not detected
Styrene	0/13	NA	0.49U - 24U	1.20	100	Beyer 1990 and MHSPE 1994	0.24	NA	No	Not detected
Tetrachloroethene	0/13	NA	1.2U - 21U	1.48	10	MHSPE 1994	2.1	NA	No	Not detected
Toluene	0/13	NA	0.52U - 14U	1.25	50	Beyer 1990 and MHSPE 1994	0.28	NA	No	Not detected
Trichloroethene	0/13	NA	0.75U - 24U	1.35	1	MHSPE 1994	24	NA	No	Not detected
Vinyl chloride	0/13	NA	1.4U - 15U	1.36	10	MHSPE 1994	1.5	NA	No	Not detected
Xylenes (total)	2/13	8.7J - 120J	1.9U - 2.2U	10.79	50	Beyer 1990 and MHSPE 1994	0.044	2.40	Yes	Max HQ > 1.0
cis-1,3-Dichloropropene	0/13	NA	0.63U - 17U	1.01	NE	--	NA	NA	No	Not detected
trans-1,3-Dichloropropene	0/13	NA	0.85U - 15U	1.06	NE	--	NA	NA	No	Not detected

TABLE 7-3b (continued)
FREQUENCY AND RANGE OF SURFACE SOIL DATA COMPARED TO SURFACE SOIL SCREENING VALUES - AFTER NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte (ug/kg)	Contaminant Frequency/Range				Surface Soil Screening Levels (SSSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC? ⁽³⁾	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
SEMIVOLATILES (ug/kg)										
1,2,4-Trichlorobenzene	0/13	NA	52U - 1400U	106.96	NE	--	NA	NA	No	Not detected
1,2-Dichlorobenzene	0/13	NA	50U - 1300U	101.12	NE	--	NA	NA	No	Not detected
1,3-Dichlorobenzene	0/13	NA	53U - 1400U	107.77	NE	--	NA	NA	No	Not detected
1,4-Dichlorobenzene	0/13	NA	53U - 1400U	107.77	NE	--	NA	NA	No	Not detected
2,2'-Oxybis(1-Chloropropane)	0/13	NA	55U - 1400U	110.56	NE	--	NA	NA	No	Not detected
2,4,5-Trichlorophenol	0/13	NA	58U - 1500U	117.21	4000	Efroymsen et. al. 1997	0.375	NA	No	Not detected
2,4,6-Trichlorophenol	0/13	NA	67U - 1800U	137.54	10000	Efroymsen et. al. 1997	0.18	NA	No	Not detected
2,4-Dichlorophenol	0/13	NA	53U - 1400U	107.77	NE	--	NA	NA	No	Not detected
2,4-Dimethylphenol	0/13	NA	85U - 2200U	171.21	NE	--	NA	NA	No	Not detected
2,4-Dinitrophenol	0/13	NA	120U - 3100U	239.81	20000	Efroymsen et. al. 1997	0.155	NA	No	Not detected
2,4-Dinitrotoluene	0/13	NA	49U - 1300U	99.96	NE	--	NA	NA	No	Not detected
2,6-Dinitrotoluene	0/13	NA	51U - 1300U	101.92	NE	--	NA	NA	No	Not detected
2-Chloronaphthalene	0/13	NA	51U - 1300U	101.92	NE	--	NA	NA	No	Not detected
2-Chlorophenol	0/13	NA	55U - 1400U	110.56	NE	--	NA	NA	No	Not detected
2-Methylnaphthalene	2/13	350U - 9200U	51U - 550U	7145.38	NE	--	NA	NA	Yes	No SSSL
2-Methylphenol	0/13	NA	49U - 1300U	99.96	NE	--	NA	NA	No	Not detected
2-Nitroaniline	0/13	NA	49U - 1300U	99.96	NE	--	NA	NA	No	Not detected
2-Nitrophenol	0/13	NA	49U - 1300U	99.96	NE	--	NA	NA	No	Not detected
3,3'-Dichlorobenzidine	0/13	NA	41U - 1100U	84.60	NE	--	NA	NA	No	Not detected
3-Nitroaniline	0/13	NA	150U - 3900U	301.54	NE	--	NA	NA	No	Not detected
4,6-Dinitro-2-methylphenol	0/13	NA	170U - 4500U	345.19	NE	--	NA	NA	No	Not detected
4-Bromophenyl phenyl ether	0/13	NA	65U - 1700U	131.67	NE	--	NA	NA	No	Not detected
4-Chloro-3-methylphenol	0/13	NA	54U - 1400U	109.40	NE	--	NA	NA	No	Not detected
4-Chloroaniline	0/13	NA	54U - 1400U	109.40	NE	--	NA	NA	No	Not detected
4-Chlorophenyl phenyl ether	0/13	NA	55U - 1400U	110.56	NE	--	NA	NA	No	Not detected
4-Methylphenol	0/13	NA	50U - 1300U	101.12	NE	--	NA	NA	No	Not detected
4-Nitroaniline	0/13	NA	72U - 1900U	146.96	NE	--	NA	NA	No	Not detected
4-Nitrophenol	0/13	NA	200U - 5300U	411.73	7000	Efroymsen et. al. 1997	0.757143	NA	No	Not detected
Acenaphthene	2/13	2300 - 2800U	54U - 590U	436.71	20000	Efroymsen et. al. 1997	0.0295	0.14	No	HQ < 1.0
Acenaphthylene	0/13	NA	50U - 1300U	101.12	NE	--	NA	NA	No	Not detected
Anthracene	2/13	3500 - 4100U	52U - 560U	626.96	100	Beyer 1990	5.6	1.00	Yes	Max HQ > 1.0
Benzo(a)anthracene	2/13	1800U - 5900	58U - 630U	639.90	NE	--	NA	NA	Yes	No SSSL
Benzo(a)pyrene	1/13	5800 - 5800	64U - 1700U	563.58	100	Beyer 1990	17	58.00	Yes	Max HQ > 1.0
Benzo(b)fluoranthene	1/13	7100 - 7100	61U - 1600U	658.15	NE	--	NA	NA	Yes	No SSSL
Benzo(g,h,i)perylene	2/13	1500U - 3200	58U - 630U	409.13	NE	--	NA	NA	Yes	No SSSL
Benzo(k)fluoranthene	1/13	3800 - 3800	56U - 1500U	395.98	NE	--	NA	NA	Yes	No SSSL
Butyl benzyl phthalate	0/13	NA	54U - 1400U	109.40	NE	--	NA	NA	No	Not detected
Carbazole	1/13	2100 - 2100	55U - 1400U	260.56	NE	--	NA	NA	Yes	No SSSL

TABLE 7-3b (continued)
FREQUENCY AND RANGE OF SURFACE SOIL DATA COMPARED TO SURFACE SOIL SCREENING VALUES - AFTER NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Surface Soil Screening Levels (SSSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
SEMIVOLATILES (ug/kg)										
Chrysene	2/13	2800J - 6700	49U - 530U	770.73	NE	--	NA	NA	Yes	No SSSL
Di-n-butylphthalate	0/13	NA	160U - 4200U	323.65	200000	Efroymsen et. al. 1997	0.021	NA	No	Not detected
Di-n-octyl phthalate	0/13	NA	57U - 1500U	116.37	NE	--	NA	NA	No	Not detected
Dibenz(a,h)anthracene	1/13	1200J - 1200J	54U - 1400U	190.56	NE	--	NA	NA	Yes	No SSSL
Dibenzofuran	1/13	1800J - 1800J	53U - 1400U	235.46	NE	--	NA	NA	Yes	No SSSL
Diethylphthalate	0/13	NA	160U - 4200U	323.65	100000	Efroymsen et. al. 1997	0.042	NA	No	Not detected
Dimethylphthalate	0/13	NA	170U - 4500U	345.19	200000	Efroymsen et. al. 1997	0.0225	NA	No	Not detected
Fluoranthene	2/13	1700J - 16000	59U - 640U	1409.90	100	Beyer 1990	6.4	160.00	Yes	Max HQ > 1.0
Fluorene	3/13	580J - 9000J	51U - 59U	957.31	30000	Efroymsen et. al. 1997	0.001967	0.30	No	HQ < 1.0
Hexachlorobenzene	0/13	NA	59U - 1600U	122.21	NE	MHSPE 1994	640	NA	No	Not detected
Hexachlorobutadiene	0/13	NA	48U - 1300U	99.19	NE	--	NA	NA	No	Not detected
Hexachlorocyclopentadiene	0/13	NA	64U - 1700U	130.50	10000	Efroymsen et. al. 1997	0.17	NA	No	Not detected
Hexachloroethane	0/13	NA	51U - 1300U	101.92	NE	--	NA	NA	No	Not detected
Indeno(1,2,3-cd)pyrene	1/13	3200 - 3200	74U - 1900U	379.71	NE	--	NA	NA	Yes	No SSSL
Isophorone	0/13	NA	47U - 1200U	94.13	NE	--	NA	NA	No	Not detected
N-Nitrosodi-n-propylamine	0/13	NA	47U - 1200U	94.13	NE	--	NA	NA	No	Not detected
N-Nitrosodiphenylamine	0/13	NA	52U - 1400U	106.96	20000	Efroymsen et. al. 1997	0.07	NA	No	Not detected
Naphthalene	1/13	640J - 640J	52U - 1400U	145.42	100	Beyer 1990	7.4	6.40	Yes	Max HQ > 1.0
Nitrobenzene	0/13	NA	49U - 1300U	99.96	40000	Efroymsen et. al. 1997	0.0325	NA	No	Not detected
Penachlorophenol	0/13	NA	130U - 3300U	258.46	2	MHSPE 1994	1650	NA	No	Not detected
Phenanthrene	3/13	910J - 24000	55U - 63.5U	3092.10	100	Beyer 1990	0.635	240.00	Yes	Max HQ > 1.0
Phenol	0/13	NA	52U - 1400U	106.96	50	MHSPE 1994	28	NA	No	Not detected
Pyrene	2/13	10000 - 16000	54U - 590U	2044.40	100	Beyer 1990	5.9	160.00	Yes	Max HQ > 1.0
bis(2-Chloroethoxy)methane	0/13	NA	50U - 1300U	101.12	NE	--	NA	NA	No	Not detected
bis(2-Chloroethyl)ether	0/13	NA	54U - 1400U	109.40	NE	--	NA	NA	No	Not detected
bis(2-Ethylhexyl)phthalate	1/13	380J - 380J	57U - 1500U	143.08	NE	--	NA	NA	Yes	No SSSL

TABLE 7-3b (continued)
FREQUENCY AND RANGE OF SURFACE SOIL DATA COMPARED TO SURFACE SOIL SCREENING VALUES - AFTER NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Surface Soil Screening Levels (SSSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
Pesticides/PCBs (ug/kg)										
4,4'-DDD	4/11	3.61 - 321	0.84U - 1.7U	4.79	2.5	MHSPE 1994	0.68	12.80	Yes	Max HQ > 1.0
4,4'-DDE	1/11	2.9625J - 2.9625J	0.6U - 6.5U	0.96	2.5	MHSPE 1994	2.67	11.9	Yes	Max HQ > 1.0
4,4'-DDT	1/11	8.2J - 8.2J	1.4U - 15U	2.33	2.5	MHSPE 1994	6	3.28	Yes	Max HQ > 1.0
Aldrin	0/11	NA	0.58U - 6.3U	0.72	2.5	MHSPE 1994	2.52	NA	No	Not detected
Dieldrin	3/11	14J - 52	1.6U - 3.3U	8.99	0.5	MHSPE 1994	6.6	104.00	Yes	Max HQ > 1.0
Endosulfan I	0/11	NA	0.71U - 7.7U	0.88	NE	--	NA	NA	No	Not detected
Endosulfan II	0/11	NA	0.4U - 4.4U	0.50	NE	--	NA	NA	No	Not detected
Endosulfan sulfate	5/12	3.2 - 40J	0.3U - 0.61U	9.07	NE	--	NA	NA	Yes	No SSSL
Endrin	1/11	3.6225J - 3.6225J	0.65U - 7U	1.08	1	MHSPE 1994	7	3.62	Yes	Max HQ > 1.0
Endrin aldehyde	5/12	4.5J - 61J	1.6U - 3.3U	15.01	NE	--	NA	NA	Yes	No SSSL
Endrin ketone	4/12	1.7J - 26J	0.28U - 3U	4.65	NE	--	NA	NA	Yes	No SSSL
Heptachlor	0/11	NA	0.65U - 7U	0.80	NE	--	NA	NA	No	Not detected
Heptachlor epoxide	0/11	NA	0.7U - 7.6U	0.86	NE	--	NA	NA	No	Not detected
Methoxychlor	4/12	8.7J - 79J	0.87U - 4.7U	13.74	NE	--	NA	NA	Yes	No SSSL
Aroclor-1016	0/77	NA	5.6U - 18000U	276.34	20	MHSPE 1994	900	NA	No	Not detected
Aroclor-1221	0/77	NA	20U - 18000U	430.97	20	MHSPE 1994	900	NA	No	Not detected
Aroclor-1232	0/77	NA	12U - 18000U	295.32	20	MHSPE 1994	900	NA	No	Not detected
Aroclor-1242	0/77	NA	19U - 18000U	318.53	20	MHSPE 1994	900	NA	No	Not detected
Aroclor-1248	1/77	56 - 56	4.8U - 18000U	274.71	20	MHSPE 1994	900	2.30	Yes	Max HQ > 1.0
Aroclor-1254	0/77	NA	21U - 18000U	324.69	20	MHSPE 1994	900	NA	No	Not detected
Aroclor-1260	58/77	18J - 200000	7.8U - 140U	5980.37	20	MHSPE 1994	900	10000.00	Yes	Max HQ > 1.0
Toxaphene	0/11	NA	7.3U - 79U	9.03	NE	--	NA	NA	No	Not detected
alpha-BHC	1/11	21 - 21	0.49U - 2.6U	2.27	2.5	MHSPE 1994	1.04	8.40	Yes	Max HQ > 1.0
alpha-Chlordane	2/11	2.4175J - 40J	0.63U - 6.8U	4.43	NE	--	NA	NA	Yes	No SSSL
beta-BHC	0/11	NA	0.49U - 5.3U	0.60	1	MHSPE 1994	5.3	NA	No	Not detected
delta-BHC	0/11	NA	0.51U - 5.5U	0.63	NE	--	NA	NA	No	Not detected
gamma-BHC (Lindane)	0/11	NA	0.6U - 6.5U	0.74	0.05	MHSPE 1994	130	NA	No	Not detected
gamma-Chlordane	2/11	3.5125J - 43	0.6U - 6.5U	4.78	NE	--	NA	NA	Yes	No SSSL

TABLE 7-3b (continued)
FREQUENCY AND RANGE OF SURFACE SOIL DATA COMPARED TO SURFACE SOIL SCREENING VALUES - AFTER NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range					Surface Soil Screening Levels (SSSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)	Range of Non-Detects						
HERBICIDES (ug/kg)											
2,4,5-T	0/13	NA	3.3U - 4.3U	1.75		NE	--	NA	NA	No	Not detected
2,4-D	0/13	NA	56U - 74U	30.02		NE	--	NA	NA	No	Not detected
2,4-DB	0/13	NA	41U - 54U	22.02		NE	--	NA	NA	No	Not detected
Dalapon	0/13	NA	39U - 52U	21.00		NE	--	NA	NA	No	Not detected
Dicamba	0/13	NA	16U - 21U	8.52		NE	--	NA	NA	No	Not detected
Dichlorprop	0/13	NA	11U - 14U	5.65		NE	--	NA	NA	No	Not detected
Dinoseb	0/13	NA	13U - 17U	6.88		NE	--	NA	NA	No	Not detected
MCPA	0/13	NA	2400U - 3200U	1296.15		NE	--	NA	NA	No	Not detected
MCPP	0/13	NA	2900U - 3800U	1538.46		NE	--	NA	NA	No	Not detected
Pentachlorophenol	0/13	NA	130U - 3300U	258.46		2	MHSPE 1994	1650	NA	No	Not detected
Silvex	0/13	NA	4.1U - 5.4U	2.20		NE	--	NA	NA	No	Not detected
METALS (mg/kg)											
Aluminum	13/13	1390 - 5910	NA	2770.77		50	Efroymson et. al. 1997	NA	1118.20	Yes	Max HQ > 1.0
Antimony	5/13	0.66J - 2J	0.52UJ - 0.6UJ	0.67		3.5	Cronmuntijn et. al. 1997	0.171429	0.57	No	HQ < 1.0
Arsenic	11/13	0.64J - 6.7	0.32U	1.68		10	Efroymson et. al. 1997	0.032	0.67	No	HQ < 1.0
Barium	11/13	3J - 24.6J	6.3U - 9.8U	8.63		165	Cronmuntijn et. al. 1997	0.059394	0.15	No	HQ < 1.0
Beryllium	0/13	NA	0.051U - 0.11U	0.04		1.1	Cronmuntijn et. al. 1997	0.1	NA	No	Not detected
Cadmium	4/13	0.1155J - 0.23J	0.046U - 0.049U	0.07		1.6	Cronmuntijn et. al. 1997	0.030625	0.14	No	HQ < 1.0
Calcium	13/13	109J - 17900	NA	4368.23		NE	--	NA	NA	No	Low toxicity
Chromium	13/13	1.7 - 7.5	NA	3.67		0.4	Efroymson et. al. 1997 and CCME 1997	NA	18.75	Yes	Max HQ > 1.0
Cobalt	11/13	0.18J - 0.41J	0.16U - 0.17U	0.25		20	Beyer 1990, Efroymson et. al. 1997, and MHSPE 1994	0.0085	0.02	No	HQ < 1.0
Copper	13/13	0.35J - 28.4	NA	4.61		40	Cronmuntijn et. al. 1997	NA	0.71	No	HQ < 1.0
Iron	13/13	950 - 3480	NA	1921.54		200	Efroymson et. al. 1997	NA	17.40	Yes	Max HQ > 1.0
Lead	13/13	1.8 - 65.4	NA	20.50		50	Beyer 1990 and Efroymson et. al. 1997	NA	1.51	Yes	Max HQ > 1.0
Magnesium	13/13	47.3J - 347J	NA	159.42		NE	--	NA	NA	No	Low toxicity
Manganese	13/13	2.7 - 15.9	NA	8.86		100	Efroymson et. al. 1997	NA	0.16	No	HQ < 1.0
Mercury	7/13	0.015J - 0.2	0.0089U - 0.0095U	0.04		0.1	Efroymson et. al. 1997	0.095	2.00	Yes	Max HQ > 1.0
Nickel	13/13	0.46J - 2.6J	NA	1.15		30	Efroymson et. al. 1997	NA	0.09	No	HQ < 1.0
Potassium	7/13	70.2J - 258J	34.8U - 75.9U	71.27		NE	--	NA	NA	No	Low toxicity
Selenium	2/13	0.365J - 0.61	0.33U - 0.43U	0.22		0.81	Cronmuntijn et. al. 1997	0.530864	0.75	No	HQ < 1.0
Silver	0/13	NA	0.16U - 0.21U	0.09		2	Efroymson et. al. 1997	0.105	NA	No	Not detected
Sodium	0/13	NA	53U - 69.6U	28.32		NE	--	NA	NA	No	Not detected
Thallium	0/13	NA	0.53U - 0.7U	0.28		1	Efroymson et. al. 1997	0.7	NA	No	Not detected
Vanadium	13/13	2.5J - 10.4	NA	4.92		2	Efroymson et. al. 1997	NA	5.20	Yes	Max HQ > 1.0
Zinc	13/13	1.3J - 40.7J	NA	12.51		50	Efroymson et. al. 1997	NA	0.81	No	HQ < 1.0

TABLE 7-3b (continued)
 FREQUENCY AND RANGE OF SURFACE SOIL DATA COMPARED TO SURFACE SOIL SCREENING VALUES - AFTER NON-TCRA
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Surface Soil Screening Levels (SSSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
CONVENTIONAL										
Percent Solids (%)	31/31	30.6 - 96	NA	84.37	NA	--	NA	NA	NA	NA
Total Organic Carbon (mg/kg)	2/2	3BG - 13BG	NA	8.00	NA	--	NA	NA	NA	NA

Notes:

HQ = Hazard Quotient
 ECOC = Ecological Contaminant of Concern
 ug/kg = microgram per kilogram
 mg/kg = milligram per kilogram
 NA = Not Applicable
 NE = Note Established

Non-TCRA = Non Time-Critical Removal Action

⁽¹⁾ The detection limit HQ is calculated by dividing the maximum detection limit by the screening value.

⁽²⁾ The maximum HQ is calculated by dividing the maximum detected concentration by the screening value.

USEPA = United States Environmental Protection Agency
 U = Chemical was not detected above the method detection limit
 J = Estimated Value
 NJ = Presumptive evidence for the presence of the material at an estimated value.

TABLE 7-4
FREQUENCY AND RANGE OF LAGOON SEDIMENT DATA COMPARED TO SEDIMENT SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Freshwater Sediment Screening Levels (SSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
Volatile Organics (ug/kg):										
1,1,1-Trichloroethane	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
1,1,2,2-Tetrachloroethane	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
1,1,2-Trichloroethane	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
1,1-Dichloroethane	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
1,1-Dichloroethene	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
1,2-Dichloroethane	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
1,2-Dichloroethene (total)	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
1,2-Dichloropropane	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
2-Butanone	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
2-Hexanone	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
4-Methyl-2-pentanone	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Acetone	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Benzene	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Bromodichloromethane	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Bromoform	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Bromomethane	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Carbon disulfide	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Carbon tetrachloride	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Chlorobenzene	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Chloroethane	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Chloroform	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Chloromethane	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Dibromochloromethane	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Ethylbenzene	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Methylene chloride	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Styrene	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Tetrachloroethene	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Toluene	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Trichloroethene	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Vinyl chloride	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Xylenes (total)	1/1	910J - 910J	NA	910.00	NE	--	NA	NA	Yes	No SSL
Cis-1,3-Dichloropropene	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected
Trans-1,3-Dichloropropene	0/1	NA	2200U	1100.00	NE	--	NA	NA	No	Not detected

TABLE 7-4 (continued)
FREQUENCY AND RANGE OF LAGOON SEDIMENT DATA COMPARED TO SEDIMENT SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIATION INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range			Freshwater Sediment Screening Levels (SSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽³⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)					
SEMIVOLATILES (ug/kg)									
1,2,4-Trichlorobenzene	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
1,2-Dichlorobenzene	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
1,3-Dichlorobenzene	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
1,4-Dichlorobenzene	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
2,2-Oxybis(1-Chloropropane)	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
2,4,5-Trichlorophenol	0/1	NA	1500U	750.00	--	NA	NA	No	Not detected
2,4,6-Trichlorophenol	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
2,4-Dichlorophenol	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
2,4-Dimethylphenol	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
2,4-Dinitrophenol	0/1	NA	1500U	750.00	--	NA	NA	No	Not detected
2,4-Dinitrotoluene	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
2,6-Dinitrotoluene	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
2-Chloronaphthalene	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
2-Chlorophenol	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
2-Methylnaphthalene	1/1	10000 - 10000	NA	10000.00	USEPA 2001	NA	494.3	Yes	Max HQ > 1.0
2-Methylphenol	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
2-Nitroaniline	0/1	NA	1500U	750.00	--	NA	NA	No	Not detected
2-Nitrophenol	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
3,3'-Dichlorobenzidine	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
3-Nitroaniline	0/1	NA	1500U	750.00	--	NA	NA	No	Not detected
4,6-Dinitro-2-methylphenol	0/1	NA	1500U	750.00	--	NA	NA	No	Not detected
4-Bromophenyl phenyl ether	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
4-Chloro-3-methylphenol	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
4-Chloroaniline	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
4-Chlorophenyl phenyl ether	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
4-Methylphenol	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
4-Nitroaniline	0/1	NA	1500U	750.00	--	NA	NA	No	Not detected
4-Nitrophenol	0/1	NA	1500U	750.00	--	NA	NA	No	Not detected
Acenaphthene	0/1	NA	590U	295.00	MacDonald 1994	87.9	NA	No	Not detected
Acenaphthylene	0/1	NA	590U	295.00	MacDonald 1994	100.5	NA	No	Not detected
Anthracene	0/1	NA	590U	295.00	MacDonald 1994	172.7996	NA	No	Not detected
Benzo(a)anthracene	0/1	NA	590U	295.00	MacDonald 1994	7.89	NA	No	Not detected
Benzo(a)pyrene	0/1	NA	590U	295.00	MacDonald 1994	6.64	NA	No	Not detected
Benzo(b)fluoranthene	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
Benzo(g,h,i)perylene	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
Benzo(k)fluoranthene	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
Butyl benzyl phthalate	0/1	NA	590U	295.00	--	NA	NA	No	Not detected
Carbazole	0/1	NA	590U	295.00	--	NA	NA	No	Not detected

TABLE 7-4 (continued)
FREQUENCY AND RANGE OF LAGOON SEDIMENT DATA COMPARED TO SEDIMENT SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Freshwater Sediment Screening Levels (SSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
SEMIVOLATILES (ug/kg)										
Chrysene	0/1	NA	590UJ	295.00	108	MacDonald 1994	5.46	NA	No	Not detected
Di-n-butylphthalate	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
Di-n-octyl phthalate	0/1	NA	590UJ	295.00	NE	--	NA	NA	No	Not detected
Dibenz(a,h)anthracene	0/1	NA	590UJ	295.00	6.22	MacDonald 1994	94.36	NA	No	Not detected
Dibenzofuran	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
Diethylphthalate	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
Dimethylphthalate	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
Fluoranthene	0/1	NA	590U	295.00	113	MacDonald 1994	5.22	NA	No	Not detected
Fluorene	0/1	NA	590U	295.00	21.2	MacDonald 1994	27.83	NA	No	Not detected
Hexachlorobenzene	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
Hexachlorobutadiene	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
Hexachlorocyclopentadiene	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
Hexachloroethane	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
Indeno(1,2,3-cd)pyrene	0/1	NA	590UJ	295.00	NE	--	NA	NA	No	Not detected
Isophorone	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
N-Nitrosodi-n-propylamine	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
N-Nitrosodiphenylamine	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
Naphthalene	1/1	2000 - 2000	NA	2000.00	34.6	MacDonald 1994	NA	57.80	Yes	Max HQ > 1.0
Nitrobenzene	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
Pentachlorophenol	0/1	NA	1500U	750.00	NE	--	NA	NA	No	Not detected
Phenanthrene	1/1	2500 - 2500	NA	2500.00	86.7	MacDonald 1994	NA	28.84	Yes	Max HQ > 1.0
Phenol	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
Pyrene	0/1	NA	590UJ	295.00	153	MacDonald 1994	3.36	NA	No	Not detected
bis(2-Chloroethoxy)methane	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
bis(2-Chloroethyl)ether	0/1	NA	590U	295.00	NE	--	NA	NA	No	Not detected
bis(2-Ethylhexyl)phthalate	1/1	24001 - 2400J	NA	2400.00	182	MacDonald 1994	NA	13.19	Yes	Max HQ > 1.0

TABLE 7-4 (continued)
FREQUENCY AND RANGE OF LAGOON SEDIMENT DATA COMPARED TO SEDIMENT SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Freshwater Sediment Screening Levels (SSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
PCBs (ug/kg)										
AROCOR-1016	0/7	NA	160U - 4700U	734.29	21.6	MacDonald 1994	217.6	NA	No	Not detected
AROCOR-1221	0/7	NA	330U - 9500U	1470.71	21.6	MacDonald 1994	439.8	NA	No	Not detected
AROCOR-1232	0/7	NA	160U - 4700U	734.29	21.6	MacDonald 1994	217.6	NA	No	Not detected
AROCOR-1242	0/7	NA	160U - 4700U	734.29	21.6	MacDonald 1994	217.6	NA	No	Not detected
AROCOR-1248	1/7	2800 - 2800	160U - 4700U	1085.71	21.6	MacDonald 1994	217.6	129.6	Yes	Max HQ > 1.0
AROCOR-1254	0/7	NA	160U - 4700U	734.29	21.6	MacDonald 1994	217.6	NA	No	Not detected
AROCOR-1260	7/7	3700 - 40000	NA	14142.86	21.6	MacDonald 1994	217.6	1851.9	Yes	Max HQ > 1.0
Diesel Range Organics (mg/kg)	3/3	3500 - 11600	NA	6466.67	NE	--	NA	NA	Yes	No SSL
CONVENTIONAL										
pH (solid)	4/4	6.3 - 6.9	NA	6.60	NA	--	NA	NA	NA	NA
Percent moisture (%)	4/4	19.6 - 57.75	NA	37.31	NA	--	NA	NA	NA	NA

Notes:

HQ = Hazard Quotient
ECOC = Ecological Contaminant of Concern
ug/kg = microgram per kilogram
mg/kg = milligram per kilogram
NA = Not Applicable

USEPA = United States Environmental Protection Agency
NE = Not Established
U = Chemical was not detected above the method detection limit
J = Estimated Value
UJ = Estimated method detection limit

- ⁽¹⁾ The detection limit HQ is calculated by dividing the maximum detection limit by the screening value.
⁽²⁾ The maximum HQ is calculated by dividing the maximum detected concentration by the screening value.

TABLE 7-5
FREQUENCY AND RANGE OF LAGOON SURFACE WATER DATA COMPARED TO FRESHWATER SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIATION INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Freshwater Surface Water Screening Levels (SWSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
Volatile Organics (ug/L):										
1,1,1-Trichloroethane	0/1	NA	10U	5.00	528	USEPA Region IV	0.02	NA	No	Not detected
1,1,2,2-Tetrachloroethane	0/1	NA	10U	5.00	240	USEPA Region IV	0.04	NA	No	Not detected
1,1,2-Trichloroethane	0/1	NA	10U	5.00	940	USEPA Region IV	0.01	NA	No	Not detected
1,1-Dichloroethane	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
1,1-Dichloroethene	0/1	NA	10U	5.00	303	USEPA Region IV	0.03	NA	No	Not detected
1,2-Dichloroethane	0/1	NA	10U	5.00	2000	USEPA Region IV	0.01	NA	No	Not detected
1,2-Dichloroethene (total)	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
1,2-Dichloropropane	0/1	NA	10U	5.00	525	USEPA Region IV	0.02	NA	No	Not detected
2-Butanone	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
2-Hexanone	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
4-Methyl-2-pentanone	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
Acetone	1/1	5.6J - 5.6J	00	5.60	NE	--	NA	NA	Yes	No SWSL
Benzene	1/1	1.2J - 1.2J	00	1.20	53	USEPA Region IV	NA	0.02	No	HQ < 1.0
Bromodichloromethane	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
Bromoform	0/1	NA	10U	5.00	293	USEPA Region IV	0.03	NA	No	Not detected
Bromomethane	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
Carbon disulfide	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
Carbon tetrachloride	0/1	NA	10U	5.00	352	USEPA Region IV	0.03	NA	No	Not detected
Chlorobenzene	0/1	NA	10U	5.00	195	USEPA Region IV	0.05	NA	No	Not detected
Chloroethane	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
Chloroform	0/1	NA	10U	5.00	289	USEPA Region IV	0.03	NA	No	Not detected
Chloromethane	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
Dibromochloromethane	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
Ethylbenzene	0/1	NA	10U	5.00	453	USEPA Region IV	0.02	NA	No	Not detected
Methylene chloride	0/1	NA	10U	5.00	1930	USEPA Region IV	0.01	NA	No	Not detected
Styrene	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
Tetrachloroethene	0/1	NA	10U	5.00	84	USEPA Region IV	0.12	NA	No	Not detected
Toluene	1/1	2.7J - 2.7J	00	2.70	175	USEPA Region IV	NA	0.02	No	HQ < 1.0
Trichloroethene	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
Vinyl chloride	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
Xylenes (total)	1/1	3.5J - 3.5J	00	3.50	NE	--	NA	NA	Yes	No SWSL
cis-1,3-Dichloropropene	0/1	NA	10U	5.00	24.4	USEPA Region IV	0.41	NA	No	Not detected
trans-1,3-Dichloropropene	0/1	NA	10U	5.00	24.4	USEPA Region IV	0.41	NA	No	Not detected

TABLE 7-5 (continued)
FREQUENCY AND RANGE OF LAGOON SURFACE WATER DATA COMPARED TO FRESHWATER SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Freshwater Surface Water Screening Levels (SWSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
SEMIVOLATILES (ug/L)										
1,2,4-Trichlorobenzene	0/1	NA	10U	5.00	44.9	USEPA Region IV	0.22	NA	No	Not detected
1,2-Dichlorobenzene	0/1	NA	10U	5.00	15.8	USEPA Region IV	0.63	NA	No	Not detected
1,3-Dichlorobenzene	0/1	NA	10U	5.00	50.2	USEPA Region IV	0.20	NA	No	Not detected
1,4-Dichlorobenzene	0/1	NA	10U	5.00	11.2	USEPA Region IV	0.89	NA	No	Not detected
2,2'-Oxybis(1-Chloropropane)	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
2,4,5-Trichlorophenol	0/1	NA	25U	12.50	NE	--	NA	NA	No	Not detected
2,4,6-Trichlorophenol	0/1	NA	10U	5.00	3.2	USEPA Region IV	3.13	NA	No	Not detected
2,4-Dichlorophenol	0/1	NA	10U	5.00	36.5	USEPA Region IV	0.27	NA	No	Not detected
2,4-Dimethylphenol	0/1	NA	10U	5.00	21.2	USEPA Region IV	0.47	NA	No	Not detected
2,4-Dinitrophenol	0/1	NA	25U	12.50	6.2	USEPA Region IV	4.03	NA	No	Not detected
2,4-Dinitrotoluene	0/1	NA	10U	5.00	310	USEPA Region IV	0.03	NA	No	Not detected
2,6-Dinitrotoluene	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
2-Chloronaphthalene	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
2-Chlorophenol	0/1	NA	10U	5.00	43.8	USEPA Region IV	0.23	NA	No	Not detected
2-Methylnaphthalene	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
2-Methylphenol	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
2-Nitroaniline	0/1	NA	25U	12.50	NE	--	NA	NA	No	Not detected
2-Nitrophenol	0/1	NA	10U	5.00	3500	USEPA Region IV	0.003	NA	No	Not detected
3,3'-Dichlorobenzidine	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
3-Nitroaniline	0/1	NA	25U	12.50	NE	--	NA	NA	No	Not detected
4,6-Dinitro-2-methylphenol	0/1	NA	25U	12.50	2.3	USEPA Region IV	10.87	NA	No	Not detected
4-Bromophenyl phenyl ether	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
4-Chloro-3-methylphenol	0/1	NA	10U	5.00	0.3	USEPA Region IV	33.33	NA	No	Not detected
4-Chloroaniline	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
4-Chlorophenyl phenyl ether	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
4-Methylphenol	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
4-Nitroaniline	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
4-Nitrophenol	0/1	NA	25U	12.50	NE	--	NA	NA	No	Not detected
Acenaphthene	0/1	NA	10U	5.00	82.8	USEPA Region IV	0.30	NA	No	Not detected
Acenaphthylene	0/1	NA	10U	5.00	17	USEPA Region IV	0.59	NA	No	Not detected
Anthracene	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected
Benz(a)anthracene	0/1	NA	10U	5.00	NE	--	NA	NA	No	Not detected

TABLE 7-5 (continued)
FREQUENCY AND RANGE OF LAGOON SURFACE WATER DATA COMPARED TO FRESHWATER SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range			Freshwater Surface Water Screening Levels (SWSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)					
SEMIVOLATILES (ug/L)									
Benzo(a)pyrene	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
Benzo(b)fluoranthene	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
Benzo(g,h,i)perylene	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
Benzo(k)fluoranthene	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
Butyl benzyl phthalate	0/1	NA	10U	5.00	USEPA Region IV	0.45	NA	No	Not detected
Carbazole	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
Chrysene	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
Di-n-butylphthalate	0/1	NA	10U	5.00	USEPA Region IV	1.00	NA	No	Not detected
Di-n-octyl phthalate	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
Dibenz(a,h)anthracene	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
Dibenzofuran	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
Diethylphthalate	0/1	NA	10U	5.00	USEPA Region IV	0.02	NA	No	Not detected
Dimethylphthalate	0/1	NA	10U	5.00	USEPA Region IV	0.03	NA	No	Not detected
Fluoranthene	0/1	NA	10U	5.00	USEPA Region IV	0.25	NA	No	Not detected
Fluorene	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
Hexachlorobenzene	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
Hexachlorobutadiene	0/1	NA	10U	5.00	USEPA Region IV	10.75	NA	No	Not detected
Hexachlorocyclopentadiene	0/1	NA	10U	5.00	USEPA Region IV	142.9	NA	No	Not detected
Hexachloroethane	0/1	NA	10U	5.00	USEPA Region IV	1.02	NA	No	Not detected
Indeno(1,2,3-cd)pyrene	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
Isophorone	0/1	NA	10U	5.00	USEPA Region IV	0.01	NA	No	Not detected
N-Nitrosodi-n-propylamine	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
N-Nitrosodiphenylamine	0/1	NA	10U	5.00	USEPA Region IV	0.17	NA	No	Not detected
Naphthalene	0/1	NA	10U	5.00	USEPA Region IV	0.16	NA	No	Not detected
Nitrobenzene	0/1	NA	10U	5.00	USEPA Region IV	0.04	NA	No	Not detected
Pentachlorophenol ⁽³⁾	0/1	NA	25U	12.50	USEPA Region IV	1.95	NA	No	Not detected
Phenanthrene	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
Phenol	0/1	NA	10U	5.00	USEPA Region IV	0.039	NA	No	Not detected
Pyrene	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
bis(2-Chloroethoxy)methane	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
bis(2-Chloroethyl)ether	0/1	NA	10U	5.00	NE	NA	NA	No	Not detected
bis(2-Ethylhexyl)phthalate	0/1	NA	10U	5.00	USEPA Region IV	13.44	NA	No	Not detected

TABLE 7-5 (continued)
FREQUENCY AND RANGE OF LAGOON SURFACE WATER DATA COMPARED TO FRESHWATER SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Freshwater Surface Water Screening Levels (SWSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
PCBs (ug/L)										
Aroclor-1016	0/9	NA	1UJ - 1.1UJ	0.52	0.014	USEPA Region IV	78.57	NA	No	Not detected
Aroclor-1221	0/9	NA	2UJ - 2.3UJ	1.06	0.014	USEPA Region IV	164.3	NA	No	Not detected
Aroclor-1232	0/9	NA	1UJ - 1.1UJ	0.52	0.014	USEPA Region IV	78.57	NA	No	Not detected
Aroclor-1242	0/9	NA	1UJ - 1.1UJ	0.52	0.014	USEPA Region IV	78.57	NA	No	Not detected
Aroclor-1248	0/9	NA	1UJ - 1.1UJ	0.52	0.014	USEPA Region IV	78.57	NA	No	Not detected
Aroclor-1254	0/9	NA	1UJ - 1.1UJ	0.52	0.014	USEPA Region IV	78.57	NA	No	Not detected
Aroclor-1260	0/9	NA	1UJ - 1.1UJ	0.52	0.014	USEPA Region IV	78.57	NA	No	Not detected

Notes:

HQ = Hazard Quotient

ECOC = Ecological Contaminant of Concern

ug/L = microgram per liter

USEPA = United States Environmental Protection Agency

NA = Not Applicable

NE = Note Established

J = Estimated Value

U = Chemical was not detected above the method detection limit

UJ = Estimated method detection limit

⁽¹⁾ The detection limit HQ is calculated by dividing the maximum detection limit by the screening value.

⁽²⁾ The maximum HQ is calculated by dividing the maximum detected concentration by the screening value.

⁽³⁾ The screening value for this compound is pH dependent. A pH of 7.8 S.U. was assumed.

TABLE 7-6
FREQUENCY AND RANGE OF NORTHEAST CREEK SEDIMENT DATA COMPARED TO SEDIMENT SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Freshwater Sediment Screening Levels (SSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
PCBs (ug/kg):										
AROCLOR-1016	0/3	NA	42U - 59U	26.50	21.6	MacDonald 1994	2.73	NA	No	Not detected
AROCLOR-1221	0/3	NA	84U - 120U	54.00	21.6	MacDonald 1994	5.56	NA	No	Not detected
AROCLOR-1232	0/3	NA	42U - 59U	26.50	21.6	MacDonald 1994	2.73	NA	No	Not detected
AROCLOR-1242	0/3	NA	42U - 59U	26.50	21.6	MacDonald 1994	2.73	NA	No	Not detected
AROCLOR-1248	0/3	NA	42U - 59U	26.50	21.6	MacDonald 1994	2.73	NA	No	Not detected
AROCLOR-1254	0/3	NA	42U - 59U	26.50	21.6	MacDonald 1994	2.73	NA	No	Not detected
AROCLOR-1260	0/3	NA	42U - 59U	26.50	21.6	MacDonald 1994	2.73	NA	No	Not detected

Notes:

HQ = Hazard Quotient
 ECOC = Ecological Contaminant of Concern
 ug/kg = microgram per kilogram
 NA = Not Applicable

USEPA = United States Environmental Protection Agency
 U = Chemical was not detected above the method detection limit

⁽¹⁾ The detection limit HQ is calculated by dividing the maximum detection limit by the screening value.

⁽²⁾ The maximum HQ is calculated by dividing the maximum detected concentration by the screening value.

TABLE 7-7
FREQUENCY AND RANGE OF NORTHEAST CREEK SURFACE WATER DATA COMPARED TO SALTWATER SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Saltwater Surface Water Screening Levels (SWSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
PCBs (ug/L):										
Aroclor-1016	0/3	NA	1.2UJ	0.60	0.03	USEPA Region IV	40.0	NA	No	Not detected
Aroclor-1221	0/3	NA	2.3UJ	1.15	0.03	USEPA Region IV	76.7	NA	No	Not detected
Aroclor-1232	0/3	NA	1.2UJ	0.60	0.03	USEPA Region IV	40.0	NA	No	Not detected
Aroclor-1242	0/3	NA	1.2UJ	0.60	0.03	USEPA Region IV	40.0	NA	No	Not detected
Aroclor-1248	0/3	NA	1.2UJ	0.60	0.03	USEPA Region IV	40.0	NA	No	Not detected
Aroclor-1254	0/3	NA	1.2UJ	0.60	0.03	USEPA Region IV	40.0	NA	No	Not detected
Aroclor-1260	0/3	NA	1.2UJ	0.60	0.03	USEPA Region IV	40.0	NA	No	Not detected

Notes:

HQ = Hazard Quotient
 ECOC = Ecological Contaminant of Concern
 ug/L = microgram per liter
 USEPA = United States Environmental Protection Agency

J = Estimated Value
 U = Chemical was not detected above the method detection limit
 UJ = Estimated method detection limit, chemical was not detected
 NA = Not Applicable

- ⁽¹⁾ The detection limit HQ is calculated by dividing the maximum detection limit by the screening value.
⁽²⁾ The maximum HQ is calculated by dividing the maximum detected concentration by the screening value.

TABLE 7-8
FREQUENCY AND RANGE OF GROUNDWATER DATA COMPARED TO SALTWATER SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Saltwater Surface Water Screening Levels (SWSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
Volatile Organic Compounds (ug/L):										
1,1,1-Trichloroethane	0/19	NA	0.15U - 10U	1.63	312.0	USEPA Region IV	0.03	NA	No	Not detected
1,1,2,2-Tetrachloroethane	0/19	NA	0.25U - 10U	1.66	90.2	USEPA Region IV	0.11	NA	No	Not detected
1,1,2-Trichloroethane	0/19	NA	0.3U - 10U	1.68	NE	--	NA	NA	No	Not detected
1,1-Dichloroethane	0/19	NA	0.16U - 10U	1.63	NE	--	NA	NA	No	Not detected
1,1-Dichloroethane	0/19	NA	0.24U - 10U	1.66	2240.0	USEPA Region IV	0.004	NA	No	Not detected
1,2-Dibromoethane	0/19	NA	0.22U - 10U	1.65	NE	--	NA	NA	No	Not detected
1,2-Dichloroethane	0/19	NA	0.21U - 10U	1.65	1130.0	USEPA Region IV	0.01	NA	No	Not detected
1,2-Dichloroethane (total)	0/19	NA	0.28U - 10U	1.67	NE	--	NA	NA	No	Not detected
1,2-Dichloropropane	0/19	NA	0.17U - 10U	1.64	2400.0	USEPA Region IV	0.004	NA	No	Not detected
2-Butanone	2/19	0.53J - 0.69J	0.41U - 10U	1.76	NE	--	NA	NA	Yes	No SWSL
2-Hexanone	0/19	NA	0.46U - 10U	1.74	NE	--	NA	NA	No	Not detected
4-Methyl-2-pentanone	0/19	NA	0.23U - 10U	1.66	NE	--	NA	NA	No	Not detected
Acetone	0/19	NA	10U	5.00	NE	--	NA	NA	No	Not detected
Benzene	2/19	1.5J - 3.4J	0.16U - 10U	1.37	109.0	USEPA Region IV	0.09	0.03	No	HQ < 1.0
Bromodichloromethane	0/19	NA	0.17U - 10U	1.68	NE	--	NA	NA	No	Not detected
Bromoform	0/19	NA	0.18U - 10U	1.64	640.0	USEPA Region IV	0.02	NA	No	Not detected
Bromomethane	0/19	NA	0.2U - 10U	1.65	NE	--	NA	NA	No	Not detected
Carbon disulfide	1/19	0.49J - 0.49J	0.2U - 10U	1.67	NE	--	NA	NA	Yes	No SWSL
Carbon tetrachloride	0/19	NA	0.12U - 10U	1.62	1500.0	USEPA Region IV	0.01	NA	No	Not detected
Chlorobenzene	0/19	NA	0.14U - 10U	1.63	105.0	USEPA Region IV	0.10	NA	No	Not detected
Chloroethane	0/19	NA	0.26U - 10U	1.67	NE	--	NA	NA	No	Not detected
Chloroform	2/19	16 - 16	0.14U - 10U	3.23	815.0	USEPA Region IV	0.01	0.02	No	HQ < 1.0
Chloromethane	2/19	0.17J - 0.62J	0.13U - 10U	1.66	NE	--	NA	NA	Yes	No SWSL
Dibromochloromethane	0/19	NA	0.26U - 10U	1.67	NE	--	NA	NA	No	Not detected
Ethylbenzene	4/19	0.6J - 6.7J	0.12U - 10U	1.85	4.3	USEPA Region IV	2.33	1.56	Yes	Max HQ > 1.0
Isopropyl ether	0/19	NA	0.69U - 10U	1.82	NE	--	NA	NA	Yes	No SWSL
Methyl tert-butyl ether	1/19	0.52J - 0.52J	0.13U - 10U	1.65	NE	--	NA	NA	No	HQ < 1.0
Methylene chloride	3/19	0.37J - 0.7J	0.34U - 10U	1.78	2560.0	USEPA Region IV	0.0039	0.0003	No	Not detected
Styrene	0/19	NA	0.15U - 10U	1.63	NE	--	NA	NA	No	Not detected
Tetrachloroethane	0/19	NA	0.23U - 10U	1.66	45.0	USEPA Region IV	0.22	NA	No	Not detected
Toluene	0/19	NA	0.18U - 10U	1.94	37.0	USEPA Region IV	0.27	NA	No	Not detected
Trichloroethane	1/19	0.19J - 0.19J	0.14U - 10U	1.63	NE	--	NA	NA	Yes	No SWSL
Vinyl chloride	0/19	NA	0.15U - 10U	1.63	NE	--	NA	NA	No	Not detected
Xylenes (total)	1/19	1.8 - 1.8	0.33U - 10U	1.78	NE	--	NA	NA	Yes	No SWSL
cis-1,3-Dichloropropene	0/19	NA	0.12U - 10U	1.62	7.9	USEPA Region IV	1.27	NA	No	Not detected
trans-1,3-Dichloropropene	0/19	NA	0.27U - 10U	1.67	7.9	USEPA Region IV	1.27	NA	No	Not detected

TABLE 7-8 (continued)
FREQUENCY AND RANGE OF GROUNDWATER DATA COMPARED TO SALTWATER SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Saltwater Surface Water Screening Levels (SWSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
SEMIVOLATILES (ug/L)										
1,2,4-Trichlorobenzene	0/13	NA	0.65U	0.33	4.5	USEPA Region IV	0.14	NA	No	Not detected
1,2-Dichlorobenzene	0/13	NA	0.81U	0.41	19.7	USEPA Region IV	0.04	NA	No	Not detected
1,3-Dichlorobenzene	0/13	NA	0.83U	0.42	28.5	USEPA Region IV	0.03	NA	No	Not detected
1,4-Dichlorobenzene	0/13	NA	0.77U	0.39	19.9	USEPA Region IV	0.04	NA	No	Not detected
2,2'-Oxybis(1-Chloropropane)	0/13	NA	0.78U	0.39	NE	--	NA	NA	No	Not detected
2,4,5-Trichlorophenol	0/13	NA	1.2U	0.60	NE	--	NA	NA	No	Not detected
2,4,6-Trichlorophenol	0/13	NA	1.7U	0.85	NE	--	NA	NA	No	Not detected
2,4-Dichlorophenol	0/13	NA	0.85U	0.43	NE	--	NA	NA	No	Not detected
2,4-Dimethylphenol	0/13	NA	0.85U	0.43	NE	--	NA	NA	No	Not detected
2,4-Dinitrophenol	0/13	NA	3U	1.50	48.5	USEPA Region IV	0.06	NA	No	Not detected
2,4-Dinitrotoluene	0/13	NA	0.79U	0.40	NE	--	NA	NA	No	Not detected
2,6-Dinitrotoluene	0/13	NA	0.57U	0.29	NE	--	NA	NA	No	Not detected
2-Chloronaphthalene	0/13	NA	0.85U	0.43	NE	--	NA	NA	No	Not detected
2-Chlorophenol	0/13	NA	1U	0.50	NE	--	NA	NA	No	Not detected
2-Methylnaphthalene	1/13	1.05I - 1.05J	0.64U	0.38	NE	--	NA	NA	Yes	No SWSL
2-Methylphenol	0/13	NA	1.1U	0.55	NE	--	NA	NA	No	Not detected
2-Nitroaniline	0/13	NA	0.7U	0.35	NE	--	NA	NA	No	Not detected
2-Nitrophenol	0/13	NA	2.1U	1.05	NE	--	NA	NA	No	Not detected
3,3'-Dichlorobenzidine	0/13	NA	0.93U	0.47	NE	--	NA	NA	No	Not detected
3-Nitroaniline	0/13	NA	0.71U	0.36	NE	--	NA	NA	No	Not detected
4,6-Dinitro-2-methylphenol	0/13	NA	1.3U	0.65	NE	--	NA	NA	No	Not detected
4-Bromophenyl phenyl ether	0/13	NA	0.88U	0.44	NE	--	NA	NA	No	Not detected
4-Chloro-3-methylphenol	0/13	NA	0.99U	0.50	NE	--	NA	NA	No	Not detected
4-Chloroaniline	0/13	NA	0.61U	0.31	NE	--	NA	NA	No	Not detected
4-Chlorophenyl phenyl ether	0/13	NA	0.79U	0.40	NE	--	NA	NA	No	Not detected
4-Methylphenol	0/13	NA	1.3U	0.65	NE	--	NA	NA	No	Not detected
4-Nitroaniline	0/13	NA	1.3U	0.65	NE	--	NA	NA	No	Not detected
4-Nitrophenol	0/13	NA	1.9U	0.95	71.7	USEPA Region IV	0.03	NA	No	Not detected
Acenaphthene	0/13	NA	0.8U	0.40	9.7	USEPA Region IV	0.08	NA	No	Not detected
Acenaphthylene	0/13	NA	0.71U	0.36	NE	--	NA	NA	No	Not detected
Anthracene	0/13	NA	0.68U	0.34	NE	--	NA	NA	No	Not detected
Benzo(a)anthracene	0/13	NA	0.7U	0.35	NE	--	NA	NA	No	Not detected
Benzo(a)pyrene	0/13	NA	0.73U	0.37	NE	--	NA	NA	No	Not detected
Benzo(b)fluoranthene	0/13	NA	0.94U	0.47	NE	--	NA	NA	No	Not detected
Benzo(g,h,i)perylene	0/13	NA	0.85U	0.43	NE	--	NA	NA	No	Not detected
Benzo(k)fluoranthene	0/13	NA	0.84U	0.42	NE	--	NA	NA	No	Not detected
Butyl benzyl phthalate	0/13	NA	0.88U	0.44	29.4	USEPA Region IV	0.03	NA	No	Not detected

TABLE 7-8 (continued)
FREQUENCY AND RANGE OF GROUNDWATER DATA COMPARED TO SALTWATER SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Contaminant Frequency/Range				Saltwater Surface Water Screening Levels (SWSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
SEMIVOLATILES (ug/L)(Cont.)										
Carbazole	0/13	NA	0.82U	0.41	NE	--	NA	NA	No	Not detected
Chrysene	0/13	NA	0.75U	0.38	NE	--	NA	NA	No	Not detected
Di-n-butylphthalate	0/13	NA	0.67U	0.34	3.4	USEPA Region IV	0.20	NA	No	Not detected
Di-n-octyl phthalate	0/13	NA	1.1U	0.55	NE	--	NA	NA	No	Not detected
Dibenz(a,h)anthracene	0/13	NA	0.79U	0.40	NE	--	NA	NA	No	Not detected
Dibenzofuran	0/13	NA	1.1U	0.55	NE	--	NA	NA	No	Not detected
Diethylphthalate	0/13	NA	0.65U	0.33	75.9	USEPA Region IV	0.01	NA	No	Not detected
Dimethylphthalate	0/13	NA	0.76U	0.38	580.0	USEPA Region IV	0.001	NA	No	Not detected
Fluoranthene	0/13	NA	0.81U	0.41	1.6	USEPA Region IV	0.51	NA	No	Not detected
Fluorene	0/13	NA	1U	0.50	NE	--	NA	NA	No	Not detected
Hexachlorobenzene	0/13	NA	0.74U	0.37	NE	--	NA	NA	No	Not detected
Hexachlorobutadiene	0/13	NA	0.73U	0.37	0.3	USEPA Region IV	2.28	NA	No	Not detected
Hexachlorocyclopentadiene	0/13	NA	1.1U	0.55	0.1	USEPA Region IV	15.71	NA	No	Not detected
Hexachloroethane	0/13	NA	0.74U	0.37	9.4	USEPA Region IV	0.08	NA	No	Not detected
Indeno(1,2,3-cd)pyrene	0/13	NA	0.63U	0.32	NE	--	NA	NA	No	Not detected
Isophorone	0/13	NA	0.63U	0.32	129.0	USEPA Region IV	0.005	NA	No	Not detected
N-Nitrosodi-n-propylamine	0/13	NA	0.67U	0.34	NE	--	NA	NA	No	Not detected
N-Nitrosodiphenylamine	0/13	NA	1.4U	0.70	33000.0	USEPA Region IV	0.00004	NA	No	Not detected
Naphthalene	1/13	2.2J - 2.2J	0.75U	0.52	23.5	USEPA Region IV	0.03	0.09	No	HQ < 1.0
Nitrobenzene	0/13	NA	0.81U	0.41	66.8	USEPA Region IV	0.01	NA	No	Not detected
Pentachlorophenol ⁽⁴⁾	0/13	NA	2.4U	1.20	12.8	USEPA Region IV	0.19	NA	No	Not detected
Phenanthrene	0/13	NA	0.82U	0.41	NE	--	NA	NA	No	Not detected
Phenol	0/13	NA	2.6U	1.30	58.0	USEPA Region IV	0.04	NA	No	Not detected
Pyrene	0/13	NA	1.1U	0.55	NE	--	NA	NA	No	Not detected
bis(2-Chloroethoxy)methane	0/13	NA	0.87U	0.44	NE	--	NA	NA	No	Not detected
bis(2-Chloroethyl)ether	0/13	NA	0.97U	0.49	NE	--	NA	NA	No	Not detected
bis(2-Ethylhexyl)phthalate	0/13	NA	2.7U	1.35	NE	--	NA	NA	No	Not detected

TABLE 7-8 (continued)
FREQUENCY AND RANGE OF GROUNDWATER DATA COMPARED TO SALTWATER SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Frequency of Detection	Contaminant Frequency/Range		Saltwater Surface Water Screening Levels (SWSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC?	Comments
		Range of Positive Detections	Range of Non-Detects						
PCBs (ug/L)									
4,4'-DDD	3/13	0.0285J - 0.044J	0.0064U - 0.13U	0.025	USEPA Region IV	5.20	1.76	Yes	Max HQ > 1.0
4,4'-DDE	1/13	0.025J - 0.025J	0.0074U - 0.15U	0.140	USEPA Region IV	1.07	0.18	Yes	DL HQ > 1.0
4,4'-DDT	3/13	0.029J - 0.046J	0.0072U - 0.14U	0.001	USEPA Region IV	140.0	46.00	Yes	Max HQ > 1.0
Aldrin	0/13	NA	0.0064U - 0.13U	0.130	USEPA Region IV	1.00	NA	No	Not detected
Dieldrin	0/13	NA	0.0069U - 0.14U	0.002	USEPA Region IV	73.68	NA	No	Not detected
Endosulfan I	1/13	0.023J - 0.023J	0.0069U - 0.14U	0.009	USEPA Region IV	16.09	2.64	Yes	Max HQ > 1.0
Endosulfan II	0/13	NA	0.0066U - 0.13U	0.001	USEPA Region IV	14.94	NA	No	Not detected
Endosulfan sulfate	0/13	NA	0.007U - 0.14U	0.01	USEPA Region IV	NA	NA	No	Not detected
Endrin	0/13	NA	0.0087U - 0.17U	0.002	USEPA Region IV	73.91	NA	No	Not detected
Endrin aldehyde	0/13	NA	0.0064U - 0.13U	0.01	USEPA Region IV	NA	NA	No	Not detected
Endrin ketone	0/13	NA	0.0066U - 0.13U	0.01	USEPA Region IV	NA	NA	No	Not detected
Heptachlor	0/13	NA	0.0071U - 0.14U	0.01	USEPA Region IV	38.89	NA	No	Not detected
Heptachlor epoxide	1/13	0.0167J - 0.0167J	0.0068U - 0.14U	0.01	USEPA Region IV	38.89	4.64	Yes	Max HQ > 1.0
Methoxychlor	0/13	NA	0.0084U - 0.17U	0.01	USEPA Region IV	NA	NA	No	Not detected
Aroclor-1016	0/16	NA	0.018U - 1.2UJ	0.12	USEPA Region IV	40	NA	No	Not detected
Aroclor-1221	0/16	NA	0.094U - 2.4UJ	0.25	USEPA Region IV	80	NA	No	Not detected
Aroclor-1232	0/16	NA	0.16U - 1.2UJ	0.17	USEPA Region IV	40	NA	No	Not detected
Aroclor-1242	0/16	NA	0.3U - 1.2UJ	0.23	USEPA Region IV	40	NA	No	Not detected
Aroclor-1248	0/16	NA	0.22U - 1.2UJ	0.20	USEPA Region IV	40	NA	No	Not detected
Aroclor-1254	0/16	NA	0.096U - 1.2UJ	0.15	USEPA Region IV	40	NA	No	Not detected
Aroclor-1260	0/16	NA	0.065U - 1.2UJ	0.14	USEPA Region IV	40	NA	No	Not detected
Toxaphene	0/13	NA	0.23U - 4.6U	0.28	USEPA Region IV	23000	NA	No	Not detected
alpha-BHC	0/13	NA	0.0059U - 0.12U	0.01	USEPA Region IV	0.0001	NA	No	Not detected
alpha-Chlordane	0/13	NA	0.0067U - 0.13U	0.01	USEPA Region IV	32.50	NA	No	Not detected
beta-BHC	4/13	0.01405J - 0.029J	0.0062U - 0.12U	0.01	USEPA Region IV	NA	NA	Yes	No SWSL
delta-BHC	0/13	NA	0.006U - 0.12U	0.01	USEPA Region IV	7.50	NA	No	Not detected
gamma-BHC (Lindane)	0/13	NA	0.0062U - 0.12U	0.01	USEPA Region IV	32.50	10.00	Yes	Max HQ > 1.0
gamma-Chlordane	1/13	0.04J - 0.04J	0.0065U - 0.13U	0.01	USEPA Region IV	NA	NA	No	Not detected
HERBICIDES (ug/L)									
2,4,5-T	0/13	NA	0.043U - 0.43U	0.04	USEPA Region IV	NA	NA	No	Not detected
2,4-D	0/13	NA	0.077U - 0.77U	0.07	USEPA Region IV	NA	NA	No	Not detected
2,4-DB	0/13	NA	0.33U - 3.3U	0.30	USEPA Region IV	NA	NA	No	Not detected
Dalapon	0/13	NA	0.39UJ - 3.9U	0.36	USEPA Region IV	NA	NA	No	Not detected
Dicamba	0/13	NA	0.059U - 0.59U	0.05	USEPA Region IV	NA	NA	No	Not detected
Dichlorprop	0/13	NA	0.089U - 0.89U	0.08	USEPA Region IV	NA	NA	No	Not detected
Dinoseb	4/13	0.015J - 1.5J	0.013U - 0.13U	0.14	USEPA Region IV	NA	NA	Yes	No SWSL
MCPA	1/13	44J - 44J	8U - 80U	10.46	USEPA Region IV	NA	NA	Yes	No SWSL
MCPP	0/13	NA	25U - 250U	23.08	USEPA Region IV	NA	NA	No	Not detected
Pentachlorophenol	0/13	NA	2.4U	1.20	USEPA Region IV	0.19	NA	No	Not detected
Silvex	0/13	NA	0.036U - 0.36U	0.03	USEPA Region IV	NA	NA	No	Not detected

TABLE 7-8 (continued)
FREQUENCY AND RANGE OF GROUNDWATER DATA COMPARED TO SALTWATER SCREENING VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte (mg/L)	Contaminant Frequency/Range				Saltwater Surface Water Screening Levels (SWSL)	Reference	Detect Limit HQ ⁽¹⁾	Max. HQ ⁽²⁾	ECOC ³	Comments
	Frequency of Detection	Range of Positive Detections	Range of Non-Detects	Arithmetic Mean (Half Non-Detects)						
METALS (mg/L)										
Aluminum	9/13	0.44 - 0.73	0.11U - 0.225U	0.408	NE	--	NA	NA	Yes	No SWSL
Antimony	3/13	0.0022J - 0.011J	0.0022U	0.002	NE	--	NA	NA	Yes	No SWSL
Arsenic ⁽⁵⁾	3/13	0.0074J - 0.03	0.0039U	0.005	36.0	USEPA Region IV	0.0001	0.0008	No	HQ < 1.0
Barium	13/13	0.0036J - 0.12J	NA	0.040	NE	--	NA	NA	Yes	No SWSL
Beryllium	13/13	0.00057J - 0.0011J	NA	0.001	NE	--	NA	NA	Yes	No SWSL
Cadmium	2/13	0.00056J - 0.00061J	0.00028U	0.0002	9.3	USEPA Region IV	0.00003	0.00007	No	HQ < 1.0
Calcium	13/13	1.4J - 106	NA	45.83	NE	--	NA	NA	Yes	No SWSL
Chromium	3/13	0.0011J - 0.0022J	0.0014U	0.001	9.3	USEPA Region IV	0.0002	0.0002	No	HQ < 1.0
Cobalt	3/13	0.0022J - 0.0057J	0.0013U	0.001	NE	--	NA	NA	Yes	No SWSL
Copper	0/13	NA	0.0042U	0.002	2.9	USEPA Region IV	0.001	NA	Yes	Not detected
Iron	11/13	0.18 - 67.7	0.088U	13.29	NE	--	NA	NA	Yes	No SWSL
Lead	0/13	NA	0.0025U	0.001	8.5	USEPA Region IV	0.0003	NA	No	Not detected
Magnesium	13/13	0.34J - 11.3	NA	4.92	NE	--	NA	NA	Yes	No SWSL
Manganese	13/13	0.004J - 0.45	NA	0.10	NE	--	NA	NA	Yes	No SWSL
Mercury	1/13	0.00072J - 0.000072J	0.000069U	0.000000	0.025	USEPA Region IV	0.003	0.003	No	HQ < 1.0
Nickel	2/13	0.0027J - 0.011J	0.0022U	0.002	8.3	USEPA Region IV	0.0003	0.001	No	HQ < 1.0
Potassium	10/13	0.86J - 11	0.26U - 0.69U	2.80	NE	--	NA	NA	Yes	No SWSL
Selenium	0/13	NA	0.0045U	0.002	71.0	USEPA Region IV	0.00006	NA	No	Not detected
Silver	0/13	NA	0.0015U	0.001	0.2	USEPA Region IV	0.007	NA	No	Not detected
Sodium	13/13	2.1J - 22	NA	8.47	NE	--	NA	NA	Yes	No SWSL
Thallium	2/13	0.0054J - 0.0057J	0.005U	0.003	21.3	USEPA Region IV	0.0002	0.0003	No	HQ < 1.0
Vanadium	9/13	0.00084J - 0.0037J	0.00082U	0.002	NE	--	NA	NA	Yes	No SWSL
Zinc	3/13	0.013J - 0.31	0.012U	0.03	86.0	USEPA Region IV	0.0001	0.004	No	HQ < 1.0

Notes:

HQ = Hazard Quotient
 NA = Not Applicable
 ug/L = microgram per liter

NE = Note Established

ECOC = Ecological Contaminant of Concern

U = Chemical was not detected above the method detection limit

J = Estimated Value

⁽¹⁾ The detection limit HQ is calculated by dividing the maximum detection limit by the screening value.

⁽²⁾ The maximum HQ is calculated by dividing the maximum detected concentration by the screening value.

⁽³⁾ The screening value for this compound is pH dependent. A pH of 7.8 S.U. was assumed.

⁽⁴⁾ The surface water screening value shown is for trivalent arsenic.

TABLE 7-9a
SUMMARY OF ECOLOGICAL CHEMICALS OF CONCERN IN SURFACE SOIL - BEFORE NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Detected concentrations exceeded Region IV screening values	Detected concentrations were less than screening values and method detection limits exceeded screening values	Compounds were detected but no screening value has been established by Region IV
Ethylbenzene Xylenes (total) Acenaphthene Anthracene Benzo(a)pyrene Fluoranthene Naphthalene Phenanthrene Pyrene 4,4'-DDD 4,4'-DDE 4,4'-DDT Dieldrin Endrin Fluorene* Aroclor-1248 Aroclor-1254 Aroclor-1260 alpha-BHC Aluminum Chromium Copper Iron Lead Mercury Vanadium Zinc		2-Butanone Acetone 2-Methylnaphthalene Benzo(a)anthracene Benzo(b)fluoranthene Benzo(ghi)perylene Benzo(k)fluoranthene Carbazole Chrysene Dibenz(a,h)anthracene Dibenzofuran Indeno(1,2,3-cd)pyrene bis(2-Ethylhexyl) phthalate Endosulfan sulfate Endrin aldehyde Endrin ketone Heptachlor Heptachlor epoxide Methoxychlor alpha-Chlordane gamma-Chlordane TPH (as Diesel) (mg/kg) TPH (as Gasoline) (ug/kg)

* Fluorene was detected at concentrations less than surface soil screening levels but was retained as an ecological contaminant of concern (ECOC) due to its molecular similarity to other polynuclear aromatic hydrocarbons (PAHs) that were identified as ECOCs. Shading indicates compounds that have the potential to bioaccumulate in foodwebs (USEPA 2000).
Non-TCRA = Non Time Critical Removal Action

TABLE 7-9b
SUMMARY OF ECOLOGICAL CHEMICALS OF CONCERN IN SURFACE SOIL - AFTER NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Detected concentrations exceeded Region IV screening values	Detected concentrations were less than screening values and method detection limits exceeded screening values	Compounds were detected but no screening value has been established by Region IV
Ethylbenzene		2-Butanone
Xylenes (total)		Acetone
Anthracene		2-Methylnaphthalene
Benzo(a)pyrene		Benzo(a)anthracene
Fluoranthene		Benzo(b)fluoranthene
Naphthalene		Benzo(g,h,i)perylene
Phenanthrene		Benzo(k)fluoranthene
Pyrene		Carbazole
4,4'-DDD		Chrysene
4,4'-DDE		Dibenz(a,h)anthracene
4,4'-DDT		Dibenzofuran
Dieldrin		Indeno(1,2,3-cd)pyrene
Endrin		bis(2-Ethylhexyl)phthalate
Fluorene*		Endosulfan sulfate
Aroclor-1248		Endrin aldehyde
Aroclor-1260		Endrin ketone
alpha-BHC		Methoxychlor
Aluminum		alpha-Chlordane
Chromium		gamma-Chlordane
Iron		
Lead		
Mercury		
Vanadium		

Non-TCRA = Non Time-Critical Removal Action

* Fluorene was detected at concentrations less than surface soil screening levels but was retained as an ecological contaminant of concern (ECOC) due to its molecular similarity to other polynuclear aromatic hydrocarbons (PAHs) that were identified as ECOCs. Shading indicates compounds that have the potential to bioaccumulate in foodwebs (USEPA 2000).

TABLE 7-10
SUMMARY OF ECOLOGICAL CHEMICALS OF CONCERN IN LAGOON SEDIMENT
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Detected concentrations exceeded Region IV screening values	Detected concentrations were less than screening values and method detection limits exceeded screening values	Compounds were detected but no screening value has been established by Region IV
2-Methylnaphthalene Naphthalene Phenanthrene bis(2-Ethylhexyl)phthalate AROCLOP-1248 AROCLOP-1260		Xylenes (total) Diesel Range Organics (mg/kg)

Shading indicates compounds that have the potential to bioaccumulate in foodwebs (USEPA 2000).

TABLE 7-11
SUMMARY OF ECOLOGICAL CHEMICALS OF CONCERN IN LAGOON SURFACE WATER
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Detected concentrations exceeded Region IV screening values	Detected concentrations were less than screening values and method detection limits exceeded screening values	Compounds were detected but no screening value has been established by Region IV
		Acetone Xylenes (total)

TABLE 7-12
SUMMARY OF ECOLOGICAL CHEMICALS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Detected concentrations exceeded Region IV screening values	Detected concentrations were less than screening values and method detection limits exceeded screening values	Compounds were detected but no screening value has been established by Region IV
Ethylbenzene 4,4'-DDD 4,4'-DDT Endosulfan I Heptachlor epoxide gamma-Chlordane Naphthalene*	4,4'-DDE	2-Butanone Carbon disulfide Chloromethane Methyl tert-butyl ether Trichloroethene Xylenes (total) 2-Methylnaphthalene beta-BHC Dinoseb MCPA Aluminum Antimony Barium Beryllium Cobalt Iron Manganese Vanadium

* Naphthalene was detected at concentrations less than surface water screening levels but was retained as an ecological contaminant of concern (ECOC) due to its molecular similarity to 2-methylnaphthalene (both are polynuclear aromatic hydrocarbons). 2-Methylnaphthalene was identified as an ECOC due to a lack of screening values.
 Shading indicates compounds that have the potential to bioaccumulate in foodwebs (USEPA 2000).

TABLE 7-13
MEDIA-SPECIFIC SCREENING VALUES FOR STEP 3A
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIATION INVESTIGATION, CTO-0219
MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds	Surface Soil Screening Values			Freshwater Screening Values			Sediment Screening Values		
	(ug/kg) ⁽¹⁾	Reference	Comment	(ug/L) ⁽²⁾	Reference	Comment	(ug/kg) ⁽³⁾	Reference	Comment
Volatiles Organics:									
2-Butanone	NE	--		NE	--		NE	--	
Acetone	NE	--		90,000	USEPA Region III, 1995	LC50 with safety factor of 100	NE	--	
Carbon Disulfide	NE	--		NE	--		NE	--	
Chloromethane	NE	--		NE	--		NE	--	
Ethylbenzene	50	Beyer 1990 and MHSPE 1994		453	USEPA Region IV		NE	--	
Methyl tert-butyl ether	NE	--		NE	--		NE	--	
Trichloroethene (TCE)	1	MHSPE 1994		NE	--		NE	--	
Xylene (Total)	50	Beyer 1990 and MHSPE 1994		130	USEPA Region III, 1995		40	USEPA Region III, 1995	Apparent Effects Threshold
Semivolatile Organics:									
2-Methylnaphthalene	NE	--		NE	--		20.23	USEPA 2001	
Acenaphthene	20,000	Efroymson et al. 1997		17	USEPA Region IV		6.71	MacDonald 1994	
Anthracene	100	Beyer 1990		NE	--		46.9	MacDonald 1994	
Benzo(a)anthracene	100	USEPA Region III, 1995		NE	--		74.8	MacDonald 1994	
Benzo(a)pyrene	100	Beyer 1990		NE	--		88.8	MacDonald 1994	
Benzo(b)fluoranthene	100	USEPA Region III, 1995		NE	--		NE	--	
Benzo(g,h,i)perylene	100	USEPA Region III, 1995		NE	--		NE	--	
Benzo(k)fluoranthene	100	USEPA Region III, 1995		NE	--		NE	--	
bis(2-Ethylhexyl)phthalate	NE	--		0.299	USEPA Region IV		182	MacDonald 1994	
Carbazole	NE	--		NE	--		NE	--	
Chrysene	100	USEPA Region III, 1995		NE	--		108	MacDonald 1994	
Dibenzo(a,h)anthracene	100	USEPA Region III, 1995		NE	--		6.22	MacDonald 1994	
Dibenzofuran	NE	--		NE	--		NE	--	
Fluoranthene	100	Beyer 1990		39.8	USEPA Region IV		113	MacDonald 1994	

TABLE 7-13 (continued)
 MEDIA-SPECIFIC SCREENING VALUES FOR STEP 3A
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds	Surface Soil Screening Values			Freshwater Screening Values			Sediment Screening Values		
	(ug/kg) ⁽¹⁾	Reference	Comment	(ug/L) ⁽²⁾	Reference	Comment	(ug/kg) ⁽³⁾	Reference	Comment
Semivolatile Organics (Cont):									
Fluorene	30,000	Efroymsen et. al. 1997 USEPA Region III, 1995		NE	--		21.2	MacDonald 1994	
Indeno(1,2,3-cd)pyrene	100			NE	--		NE	--	
Naphthalene	100	Beyer 1990		62	USEPA Region IV		34.6	MacDonald 1994	
Phenanthrene	100	Beyer 1990		NE	--		86.7	MacDonald 1994	
Pyrene	100	Beyer 1990		NE	--		153	MacDonald 1994	
PAHs (total)	1000	Beyer 1990, MHSPE 1994		NE	--		312	MacDonald 1994	value for low molecular weight PAHs
PCBs/Pesticides:									
alpha-Chlordane	100	USEPA Region III, 1995	upper limit value for chlordane	0.0043	USEPA Region IV	Total Chlordane	0.5	Long et. al. 1991	Total Chlordane
gamma-Chlordane	100	USEPA Region III, 1995	upper limit value for chlordane	0.0043	USEPA Region IV	Total Chlordane	0.5	Long et. al. 1991	Total Chlordane
4,4'-DDT	2.5	MHSPE 1994	Total DDT, DDE, and DDD	0.001	USEPA Region IV		1.19	MacDonald 1994	
4,4'-DDE	2.5	MHSPE 1994	Total DDT, DDE, and DDD	10.5	USEPA Region IV		2.07	MacDonald 1994	
4,4'-DDD	2.5	MHSPE 1994	Total DDT, DDE, and DDD	0.0064	USEPA Region IV		1.22	MacDonald 1994	
Dieldrin	0.5	MHSPE 1994		0.0019	USEPA Region IV		0.02	Long et. al. 1991	
Endrin	1	MHSPE 1994		0.0023	USEPA Region IV		0.02	Long et. al. 1991	
Endrin aldehyde	NE	--		NE	--		NE	--	
Endrin ketone	NE	--		NE	--		NE	--	
alpha-BHC	2.5	MHSPE 1994		500	USEPA Region IV		NE	--	
beta-BHC	1	MHSPE 1994		5,000	USEPA Region IV		NE	--	
Heptachlor	100	USEPA Region III, 1995	value for heptachlor epoxide	0.0038	USEPA Region IV		NE	--	
Heptachlor epoxide	100	USEPA Region III, 1995	value is upper limit	0.0038	USEPA Region IV		NE	--	
Endosulfan I	NE	--		0.056	USEPA Region IV		NE	--	

TABLE 7-13 (continued)
 MEDIA-SPECIFIC SCREENING VALUES FOR STEP 3A
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds PCBs/Pesticides (cont.):	Surface Soil Screening Values			Freshwater Screening Values			Sediment Screening Values		
	(ug/kg) ⁽¹⁾	Reference	Comment	(ug/L) ⁽²⁾	Reference	Comment	(ug/kg) ⁽³⁾	Reference	Comment
Endosulfan sulfate	NE	--		NE	--		NE	--	
Methoxychlor	100	USEPA Region III, 1995	value is upper limit	NE	--		NE	--	
Aroclor 1248	20	MHSPE 1994	Total PCBs	0.014	USEPA Region IV		21.6	MacDonald 1994	Total PCBs
Aroclor 1254	20	MHSPE 1994	Total PCBs	0.014	USEPA Region IV		21.6	MacDonald 1994	Total PCBs
Aroclor 1260	20	MHSPE 1994	Total PCBs	0.014	USEPA Region IV		21.6	MacDonald 1994	Total PCBs
Herbicides									
Dinoseb	NE	--		NE	--		NE	--	
MCPA	NE	--		NE	--		NE	--	
Diesel Range Organics (mg/kg)	NE	--		NE	--		NE	--	
Inorganics (mg/kg or ug/L):									
Aluminum	50	Efroymson et. al. 1997		87	USEPA Region IV		NE	--	
Antimony	3.5	Crommentuijn et. al. 1997		160	USEPA Region IV		2	Long et. al. 1991	
Barium	165	Crommentuijn et. al. 1997		NE	--		NE	--	
Beryllium	1.1	Crommentuijn et. al. 1997		0.53	USEPA Region IV		NE	--	
Chromium (Total)	0.4	Efroymson et. al. 1997 and CCME 1997		NE	--		52.3	MacDonald 1994	
Cobalt	20	Beyer 1990, Efroymson et. al. 1997, and MHSPE 1994		NE	--		NE	--	
Copper	40	Crommentuijn et. al. 1997							
Iron	200	Efroymson et. al. 1997		15.25	USEPA Region IV	Hardness dependent	18.7	MacDonald 1994	
Lead	50	Beyer 1990 and Efroymson et. al. 1997		1000	USEPA Region IV		NE	--	
Manganese	100	Efroymson et. al. 1997		4.65	USEPA Region IV	Hardness dependent	30.2	MacDonald 1994	
Mercury	0.1	Efroymson et. al. 1997		NE	--		NE	--	
Vanadium	2	Efroymson et. al. 1997		0.012	USEPA Region IV		0.13	MacDonald 1994	
Zinc	50	Efroymson et. al. 1997		NE	--		NE	--	
				136.42	USEPA Region IV	Hardness dependent	124	MacDonald 1994	

TABLE 7-13 (continued)
 MEDIA-SPECIFIC SCREENING VALUES FOR STEP 3A
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds Total Petroleum Hydrocarbons TPH (as Diesel) (mg/kg) TPH (as Gasoline) (ug/kg)	Surface Soil Screening Values			Freshwater Screening Values			Sediment Screening Values		
	(ug/kg) ⁽¹⁾	Reference	Comment	(ug/L) ⁽²⁾	Reference	Comment	(ug/kg) ⁽³⁾	Reference	Comment
	NE	--		NE	--		NE	--	
	NE	--		NE	--		NE	--	

Notes:

TAL = Target Analyte List
 TCL = Target Compound List
 ug/kg = microgram per kilogram
 USEPA = United States Environmental Protection Agency
 ug/L = microgram per
 mg/kg = milligram per
 NE = Not Established

⁽¹⁾ Soil screening values are in microgram per kilogram (ug/kg) for volatile and semivolatile organic compounds and in milligram per kilogram (mg/kg) for inorganic compounds.
⁽²⁾ Surface water screening values are in microgram per liter (ug/L) for all listed compounds.
⁽³⁾ Sediment screening values are in microgram per kilogram (ug/kg) for volatile and semivolatile organic compounds and in milligram per kilogram (mg/kg) for inorganic compounds.
 All non-shaded screening values are those recommended by USEPA Region IV and are identical to values used in Steps 1 and 2, SERA
 Shading indicates a screening value not established by USEPA Region IV.

TABLE 7-13 (continued)
 MEDIA-SPECIFIC SCREENING VALUES FOR STEP 3A
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds	Salt Water Screening Values		
	(ug/l) ⁽²⁾	Reference	Comment
Volatile Organics:			
2-Butanone	NE	--	
Acetone	NE	--	
Carbon Disulfide	2	USEPA Region III, 1995	
Chloromethane	NE	--	
Ethylbenzene	4.3	USEPA Region IV	
Methyl tert-butyl ether	NE	--	
Trichloroethene (TCE)	200	USEPA Region III, 1995	acute endpoint, safety factor of 10 applied
Xylene (Total)	135	USEPA Region III, 1995	
Semivolatile Organics:			
2-Methylnaphthalene	30	USEPA Region III, 1995	acute endpoint, safety factor of 10 applied
Acenaphthene	9.7	USEPA Region IV	
Anthracene	NE	--	
Benzo(a)anthracene	NE	--	
Benzo(a)pyrene	NE	--	
Benzo(b)fluoranthene	NE	--	
Benzo(g,h,i)perylene	NE	--	
Benzo(k)fluoranthene	NE	--	
bis(2-Ethylhexyl)phthalate	NE	--	
Carbazole	NE	--	
Chrysene	NE	--	
Dibenzo(a,h)anthracene	NE	--	
Dibenzofuran	NE	--	
Fluoranthene	1.6	USEPA Region IV	

TABLE 7-13 (continued)
 MEDIA-SPECIFIC SCREENING VALUES FOR STEP 3A
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds	Salt Water Screening Values	
	(ug/L) ⁽²⁾	Reference Comment
Semivolatile Organics (Cont):		
Fluorene	NE	--
Indeno(1,2,3-cd)pyrene	NE	--
Naphthalene	23.5	USEPA Region IV
Phenanthrene	NE	--
Pyrene	NE	--
PAHs (total)	NE	--
PCBs/Pesticides:		
alpha-Chlordane	0.004	USEPA Region IV Total Chlordane
gamma-Chlordane	0.004	USEPA Region IV Total Chlordane
4,4'-DDT	0.001	USEPA Region IV
4,4'-DDE	0.14	USEPA Region IV
4,4'-DDD	0.025	USEPA Region IV
Dieldrin	0.0019	USEPA Region IV
Endrin	0.0023	USEPA Region IV
Endrin aldehyde	NE	--
Endrin ketone	NE	--
alpha-BHC	1400	USEPA Region IV
beta-BHC	0.034	USEPA Region III, 1995 acute endpoint, safety factor of 10 applied
Heptachlor	0.0036	USEPA Region IV
Heptachlor epoxide	0.0036	USEPA Region IV
Endosulfan I	0.0087	USEPA Region IV

TABLE 7-13 (continued)
 MEDIA-SPECIFIC SCREENING VALUES FOR STEP 3A
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds	Salt Water Screening Values		
	(ug/L), ⁽²⁾	Reference	Comment
PCBs/Pesticides (cont.):			
Endosulfan sulfate	NE	--	
Methoxychlor	NE	--	
Atroclor 1248	0.03	USEPA Region IV	
Atroclor 1254	0.03	USEPA Region IV	
Atroclor 1260	0.03	USEPA Region IV	
Herbicides			
Dinoseb	NE	--	
MCPA	NE	--	
Diesel Range Organics (mg/kg)	NE	--	
Inorganics (mg/kg or ug/L):			
Aluminum	NE	--	
Antimony	500	USEPA Region III, 1995	proposed value
Barium	1000	USEPA Region III, 1995	acute endpoint, safety factor of 10 applied
Beryllium	NE	--	
Chromium (Total)	9.3	USEPA Region IV	value is for hexavalent (+6) form
Cobalt	NE	--	
Copper	2.9	USEPA Region IV	
Iron	NE	--	
Lead	8.5	USEPA Region IV	
Manganese	NE	--	
Mercury	0.025	USEPA Region IV	
Vanadium	10,000	USEPA Region III, 1995	value is upper limit
Zinc	86	USEPA Region IV	

TABLE 7-13 (continued)
 MEDIA-SPECIFIC SCREENING VALUES FOR STEP 3A
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO-0219
 MCB CAMP LEJUENE, NORTH CAROLINA

TAL/TCL Compounds	Salt Water Screening Values	
	(ug/L) ⁽²⁾	Reference Comment
Total Petroleum Hydrocarbons		
TPH (as Diesel) (mg/kg)	NE	--
TPH (as Gasoline) (ug/kg)	NE	--

Notes:

TAL = Target Analyte List
 TCL = Target Compound List
 ug/kg = microgram per kilogram
 USEPA = United States Environmental Protection Agency

- (1) Soil screening values are in microgram per kilogram
 (2) Surface water screening values are in micrograms per liter
 (3) Sediment screening values are in micrograms per kilogram
 All non-shaded screening values are those recommended by the USEPA
 Shading indicates a screening value not established by the USEPA

TABLE 7-14a
REFINED ASSESSMENT OF ECOLOGICAL CONTAMINANTS OF CONCERN IN SURFACE SOIL - BEFORE NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Ecological Contaminant of Concern based on Steps 1 and 2	Refined Risk Screening				Background			Frequency of Detection		ECOC based on refinement?	Comments
	Arithmetic Mean (Half Non-Detects)	Refined Surface Soil Screening Levels (SSSL)	Reference	Mean HQ ⁽¹⁾	Mean HQ <1.0?	Maximum Site Concentration	Mean + 2 X Std. Deviation Background ⁽²⁾ Concentration	Maximum Site Concentration Less than Background?	Frequency of Detection	Detected in < 5% of samples and N ≥ 20?	
VOLATILE ORGANICS (ug/kg):											
2-Butanone	4.76	NE	--	NA	No	7 J	NA	NA	1/25	Yes	Low Frequency of Detection
Acetone	32.99	NE	--	NA	No	40 J	NA	NA	1/25	Yes	Low Frequency of Detection
Ethylbenzene	13.52	50	Beyer 1990 and MHSPE 1994	0.27	Yes	330 J	NA	NA	1/25	Yes	Mean HQ < 1.0
Xylenes (total)	6.10	50	Beyer 1990 and MHSPE 1994	0.12	Yes	120 J	NA	NA	2/25	No	Mean HQ < 1.0
SEMI-VOLATILES (ug/kg)											
2-Methylnaphthalene	3872.64	NE	--	NA	No	92000	NA	NA	3/25	No	Mean HQ < 1.0
Acenaphthene	1173.67	20000	Efroymsen et. al. 1997	0.06	Yes	20000 J	NA	NA	8/25	No	Mean HQ < 1.0
Anthracene	2765.16	100	Beyer 1990	27.65	No	56000	NA	NA	8/25	No	Mean HQ < 1.0
Benzo(a)anthracene	8480.65	100	USEPA Region III, 1995	84.81	No	190000	NA	NA	8/25	No	Mean HQ < 1.0
Benzo(b)fluoranthene	6795.62	100	Beyer 1990	67.96	No	150000	NA	NA	7/25	No	Mean HQ < 1.0
Benzo(k)fluoranthene	7751.34	100	USEPA Region III, 1995	77.51	No	170000	NA	NA	7/25	No	Mean HQ < 1.0
Benzo(a)pyrene	2668.01	100	USEPA Region III, 1995	26.68	No	55000	NA	NA	9/25	No	Mean HQ < 1.0
Benzo(e)fluoranthene	5342.37	100	USEPA Region III, 1995	53.42	No	120000	NA	NA	7/25	No	Mean HQ < 1.0
Carbazole	1781.41	NE	--	NA	No	38000 J	NA	NA	7/25	No	Mean HQ < 1.0
Chrysene	8181.10	100	USEPA Region III, 1995	81.81	No	180000	NA	NA	8/25	No	Mean HQ < 1.0
Dibenz(a,h)anthracene	866.87	100	USEPA Region III, 1995	8.67	No	17000 J	NA	NA	7/25	No	Mean HQ < 1.0
Dibenzofuran	565.06	NE	--	NA	No	8900 J	NA	NA	7/25	No	Mean HQ < 1.0
Fluoranthene	13872.39	100	Beyer 1990	138.72	No	300000	NA	NA	8/25	No	Mean HQ < 1.0
Indeno(1,2,3-cd)pyrene	2808.47	100	USEPA Region III, 1995	28.08	No	59000	NA	NA	7/25	No	Mean HQ < 1.0
Naphthalene	414.22	100	Beyer 1990	4.14	No	7500 J	NA	NA	5/25	No	Mean HQ < 1.0
Phenanthrene	9728.61	100	Beyer 1990	97.29	No	180000	NA	NA	9/25	No	Mean HQ < 1.0
Pyrene	12012.07	100	Beyer 1990	120.12	No	250000	NA	NA	8/25	No	Mean HQ < 1.0
bis(2-Ethylhexyl) phthalate	249.76	NE	--	NA	No	380 J	NA	NA	1/25	Yes	Low Frequency of Detection
PCBs (ug/kg)											
4,4'-DDD	188.72	2.5	MHSPE 1994	75.49	No	3000 J	NA	NA	7/23	No	Mean HQ < 1.0
4,4'-DDE	57.68	2.5	MHSPE 1994	23.07	No	58	NA	NA	7/23	No	Mean HQ < 1.0
4,4'-DDT	139.11	2.5	MHSPE 1994	33.64	No	190	NA	NA	7/23	No	Mean HQ < 1.0
Dieldrin	161.45	0.5	MHSPE 1994	32.80	No	320	NA	NA	8/23	No	Mean HQ < 1.0
Endosulfan sulfate	29.48	NE	--	NA	No	40 J	NA	NA	5/24	No	Mean HQ < 1.0
Endrin	57.60	1	MHSPE 1994	3.62	No	4 J	NA	NA	1/23	Yes	Low Frequency of Detection
Endrin aldehyde	144.07	NE	--	NA	No	61 J	NA	NA	7/24	No	Mean HQ < 1.0
Endrin ketone	25.55	NE	--	NA	No	26 J	NA	NA	5/24	No	Mean HQ < 1.0
Heptachlor	1905.72	100	USEPA Region III, 1995	19.06	No	22000	NA	NA	8/23	No	Mean HQ < 1.0
Heptachlor epoxide	418.50	100	USEPA Region III, 1995	4.18	No	4500 J	NA	NA	8/23	No	Mean HQ < 1.0
Methoxychlor	81.16	100	USEPA Region III, 1995	0.79	Yes	79 J	NA	NA	7/24	No	Mean HQ < 1.0
Aroclor-1248	2225.83	20	MHSPE 1994	11.129	No	160000	NA	NA	4/91	Yes	Low Frequency of Detection
Aroclor-1254	952.73	20	MHSPE 1994	47.64	No	51000	NA	NA	1/91	Yes	Low Frequency of Detection
Aroclor-1260	5200.20	20	MHSPE 1994	260.01	No	200000	NA	NA	64/91	Yes	Low Frequency of Detection
alpha-BHC	43.95	2.5	MHSPE 1994	8.40	No	21	NA	NA	1/23	Yes	Low Frequency of Detection
alpha-Chlordane	4440.61	100	USEPA Region III, 1995	44.41	No	48000 J	NA	NA	10/23	No	Low Frequency of Detection
gamma-Chlordane	5354.54	NE	--	NA	No	58000	NA	NA	10/23	No	Low Frequency of Detection

TABLE 7-14a (continued)
REFINED ASSESSMENT OF ECOLOGICAL CONTAMINANTS OF CONCERN IN SURFACE SOIL - BEFORE NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Ecological Contaminant of Concern based on Steps 1 and 2	Arithmetic Mean (Half Non-Detects)	Refined Risk Screening			Mean HQ ⁽¹⁾	Mean HQ <1.0?	Background			Frequency of Detection		ECOC based on refinement?	Comments
		Refined Surface Soil Screening Levels (SSSL)	Reference				Maximum Site Concentration	Mean ± 2 X Std. Deviation Background ⁽²⁾	Maximum Site Concentration Less than Background?	Frequency of Detection	Detected in < 5% of samples and N ≥ 20?		
METALS (mg/kg)													
Aluminum	2634.80	50	Efroymson et. al. 1997 and CCME 1997		32.70	No	5910	6069.57	Yes	25/25	No	No	< Background
Chromium	4.91	0.4			12.27	No	20	7.02	No	25/25	No	Yes	
Copper	11.26	40	Crommentuijn et. al. 1997		0.28	Yes	146	15.83	No	25/25	No	No	Mean HQ < 1.0
Iron	1934.24	200	Efroymson et. al. 1997		9.67	No	3480	3162.06	No	25/25	No	Yes	
Lead	22.42	50	Beyer 1990 and Efroymson et. al. 1997		0.45	Yes	97	20.17	No	25/25	No	No	Mean HQ < 1.0
Mercury	0.03	0.1	Efroymson et. al. 1997		0.35	Yes	0.20	0.08	No	18/25	No	No	Mean HQ < 1.0
Vanadium	4.80	2	Efroymson et. al. 1997		2.40	No	10	9.17	No	25/25	No	Yes	
Zinc	25.70	50	Efroymson et. al. 1997		0.51	Yes	154 J	30.02	No	25/25	No	No	Mean HQ < 1.0
TOTAL PETROLEUM HYDROCARBONS													
TPH (as Diesel) (mg/kg)	188.36	NE	--		NA	No	470	NA	NA	11/11	No	Yes	
TPH (as Gasoline) (ug/kg)	88.32	NE	--		NA	No	880	NA	NA	1/11	No	Yes	

Notes:

HQ = Hazard Quotient

ECOC = Ecological Contaminant of Concern

ug/kg = microgram per kilogram

mg/kg = milligram per kilogram

NA = Not Applicable

NE = Not Established

N = sample size

NON-TCRA = Non Time Critical Removal Action

UTL = Upper Trophic Level Receptor

⁽¹⁾ The mean HQ represents the mean (half non-detect) concentration divided by the screening value. In cases where the mean exceeds the maximum the maximum value is used.

⁽²⁾ The background concentration presented is for fine sandy surface soils (Background Study Report (Baker 2001)).

TABLE 7-14b
REFINED ASSESSMENT OF ECOLOGICAL CONTAMINANTS OF CONCERN IN SURFACE SOIL - AFTER NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Ecological Contaminant of Concern based on Steps 1 and 2	Refined Risk Screening					Background			Frequency of Detection		ECOC based on refinement?	Comments
	Arithmetic Mean (Half Non-Detects)	Refined Surface Soil Screening Levels (SSSL)	Reference	Mean HQ ⁽¹⁾	Mean HQ <1.0?	Maximum Site Concentration	2X Mean Background ⁽²⁾ Concentration	Maximum Site Concentration Less than Background?	Frequency of Detection	Detected in < 5% of samples and N ≥20?		
VOLATILE ORGANICS (ug/kg):												
2-Butanone	7.82	NE	--	NA	No	7 J	NA	NA	1/13	No	Yes	
Acetone	62.39	NE	--	NA	No	40 J	NA	NA	1/13	No	Yes	
Ethylbenzene	25.72	50	Beyer 1990 and MHSPE 1994	0.51	Yes	330 J	NA	NA	1/13	No	No	Mean HQ < 1.0
Xylenes (total)	10.79	50	Beyer 1990 and MHSPE 1994	0.22	Yes	120 J	NA	NA	2/13	No	No	Mean HQ < 1.0
SEMIVOLATILES (ug/kg)												
2-Methylnaphthalene	7145.38	NE	--	NA	No	92000	NA	NA	2/13	No	Yes	
Anthracene	626.96	100	Beyer 1990	6.27	No	4100 J	NA	NA	2/13	No	Yes	
Benzof(a)anthracene	639.90	100	USEPA Region III, 1995	6.40	No	5900	NA	NA	2/13	No	Yes	
Benzof(a)pyrene	563.58	100	Beyer 1990	5.64	No	5800	NA	NA	1/13	No	Yes	
Benzof(b)fluoranthene	658.15	100	USEPA Region III, 1995	6.58	No	7100	NA	NA	1/13	No	Yes	
Benzof(g,h,i)perylene	409.13	100	USEPA Region III, 1995	4.09	No	3200	NA	NA	2/13	No	Yes	
Benzof(k)fluoranthene	395.98	100	USEPA Region III, 1995	3.96	No	3800	NA	NA	1/13	No	Yes	
Carbazole	260.56	NE	--	NA	No	2100	NA	NA	1/13	No	Yes	
Chrysene	770.73	100	USEPA Region III, 1995	7.71	No	6700	NA	NA	2/13	No	Yes	
Dibenzof(a,h)anthracene	190.56	100	USEPA Region III, 1995	1.91	No	1200 J	NA	NA	1/13	No	Yes	
Dibenzofuran	235.46	NE	--	NA	No	1800 J	NA	NA	1/13	No	Yes	
Fluoranthene	1409.90	100	Beyer 1990	14.10	No	16000	NA	NA	2/13	No	Yes	
Fluorene	957.31	30000	Eftymovson et. al. 1997	0.03	Yes	9000 J	NA	NA	3/13	No	No	Mean HQ < 1.0
Indeno(1,2,3-cd)pyrene	379.71	100	USEPA Region III, 1995	3.80	No	3200	NA	NA	1/13	No	Yes	
Naphthalene	145.42	100	Beyer 1990	1.45	No	640 J	NA	NA	1/13	No	Yes	
Phenanthrene	3092.10	100	Beyer 1990	30.92	No	24000	NA	NA	3/13	No	Yes	
Pyrene	2044.40	100	Beyer 1990	20.44	No	16000	NA	NA	2/13	No	Yes	
bis(2-Ethylhexyl)phthalate	143.08	NE	--	NA	No	380 J	NA	NA	1/13	No	Yes	
Pesticides/PCBs (ug/kg)												
4,4'-DDD	4.79	2.5	MHSPE 1994	1.92	No	32 J	NA	NA	4/11	No	Yes	
4,4'-DDE	0.96	2.5	MHSPE 1994	0.39	Yes	3 J	NA	NA	1/11	No	No	Mean HQ < 1.0
4,4'-DDT	2.33	2.5	MHSPE 1994	0.93	Yes	8 J	NA	NA	1/11	No	No	Mean HQ < 1.0
Dieldrin	8.99	0.5	MHSPE 1994	17.98	No	52	NA	NA	3/11	No	Yes	
Endosulfan sulfate	9.07	NE	--	NA	No	40 J	NA	NA	5/12	No	Yes	
Endrin	1.08	1	MHSPE 1994	1.08	No	4 J	NA	NA	1/11	No	Yes	
Endrin aldehyde	15.01	NE	--	NA	No	61 J	NA	NA	5/12	No	Yes	
Endrin ketone	4.65	NE	--	NA	No	26 J	NA	NA	4/12	No	Yes	
Methoxychlor	13.74	100	USEPA Region III, 1995	0.14	Yes	79 J	NA	NA	4/12	No	No	Mean HQ < 1.0
Aroclor-1248	274.71	20	MHSPE 1994	2.80	No	56	NA	NA	1/77	Yes	No	Mean Frequency of Detection
Aroclor-1260	5980.37	20	MHSPE 1994	299.02	No	200000	NA	NA	58/77	No	Yes	
alpha-BHC	2.27	2.5	MHSPE 1994	0.91	Yes	21	NA	NA	1/11	No	No	Mean HQ < 1.0
alpha-Chlordane	4.43	100	USEPA Region III, 1995	0.04	Yes	40 J	NA	NA	2/11	No	No	Mean HQ < 1.0
gamma-Chlordane	4.78	NE	--	NA	No	43	NA	NA	2/11	No	No	

TABLE 7-14b (continued)
REFINED ASSESSMENT OF ECOLOGICAL CONTAMINANTS OF CONCERN IN SURFACE SOIL - AFTER NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Ecological Contaminant of Concern based on Steps 1 and 2	Refined Risk Screening				Background			Frequency of Detection		ECOC based on refinement?	Comments	
	Arithmetic Mean (Half Non-Detects)	Refined Surface Soil Screening Levels (SSSL)	Reference	Mean HQ ⁽¹⁾	Mean HQ <1.0?	Maximum Site Concentration	2X Mean Background ⁽²⁾ Concentration	Maximum Site Concentration Less than Background?	Frequency of Detection			Detected in < 5% of samples and N ≥20?
METALS (mg/kg)												
Aluminum	2770.77	50	Efroymson et. al. 1997	55.42	No	5910	3556.31	No	13/13	No	No	See text
Chromium	3.67	0.4	Efroymson et. al. 1997 and CCME 1997	9.18	No	8	4.50	No	13/13	No	Yes	
Iron	1921.54	200	Efroymson et. al. 1997	9.61	No	3480	1737.43	No	13/13	No	Yes	
Lead	20.50	50	Beyer 1990 and Efroymson et. al. 1997	0.41	Yes	65	10.47	No	13/13	No	No	Mean HQ < 1.0
Mercury	0.04	0.1	Efroymson et. al. 1997	0.39	Yes	0.20	0.07	No	7/13	No	No	Mean HQ < 1.0
Vanadium	4.92	2	Efroymson et. al. 1997	2.46	No	10	5.99	No	13/13	No	Yes	

Notes:

HQ = Hazard Quotient

ECOC = Ecological Contaminant of Concern

ug/kg = microgram per kilogram

mg/kg = milligram per kilogram

NA = Not Applicable

NE = Not Established

N = sample size

Non-TCRA = Non Time Critical Removal Action

UTL = Upper Trophic Level Receptor

⁽¹⁾ The mean HQ represents the mean (half non-detect) concentration divided by the screening value. In cases where the mean exceeds the maximum the maximum value is used.

⁽²⁾ The background concentration presented is for fine sandy surface soils (Background Study Report (Baker 2001)).

TABLE 7-15
REFINED ASSESSMENT OF ECOLOGICAL CONTAMINANTS OF CONCERN IN LAGOON SEDIMENT
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Ecological Contaminant of Concern based on Steps 1 and 2	Refined Risk Screening				Frequency of Detection		ECOC based on refinement?	Comments
	Maximum Detected Site Concentration	Arithmetic Mean (Half Non-Detects)	Refined Sediment Screening Levels (SSL)	Reference	Mean HQ <1.0?	Frequency of Detection	Detected in < 5% of samples and N ≥ 20?	
Volatile Organics (ug/kg):								
Xylenes (total)	910	910	40	USEPA Region III, 1995	No	1/1	No	Yes
SEMIVOLATILES (ug/kg)								
2-Methylnaphthalene	10000	10000	20.23	USEPA 2001	No	1/1	No	Yes
Naphthalene	2000	2000	34.6	MacDonald 1994	No	1/1	No	Yes
Phenanthrene	2500	2500	86.7	MacDonald 1994	No	1/1	No	Yes
bis(2-Ethylhexyl)phthalate	2400	2400	182	MacDonald 1994	No	1/1	No	Yes
PCBs (ug/kg)								
AROCLO-1248	2800	1086	21.6	MacDonald 1994	No	1/7	No	Yes
AROCLO-1260	40000	14143	21.6	MacDonald 1994	No	7/7	No	Yes
Diesel Range Organics (mg/kg)	11600	6467	NE	--	No	3/3	No	Yes

Notes:

HQ = Hazard Quotient
 ECOC = Ecological Contaminant of Concern
 ug/kg = microgram per kilogram
 mg/kg = milligram per kilogram
 NA = Not Applicable
 NE = Not Established

(1) The mean HQ represents the mean (half non-detect) concentration divided by the screening value. In cases where the mean exceeds the maximum the maximum value is used.

TABLE 7-16
REFINED ASSESSMENT OF ECOLOGICAL CONTAMINANTS OF CONCERN IN LAGOON SURFACE WATER
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Ecological Contaminant of Concern based on Steps 1 and 2	Refined Risk Screening					Frequency of Detection		ECOC based on refinement?	Comments
	Maximum Detected Site Concentration	Arithmetic Mean (Half Non-Detects)	Refined Fresh Surface Water Screening Levels (SWSL)	Reference	Mean HQ (1)	Mean HQ <1.0?	Frequency of Detection		
							Detected in < 5% of samples and N ≥ 20?		
Volatile Organics (ug/L):									
Acetone	5.60	5.60	90000	USEPA Region III, 1995	0.0001	Yes	No	No	Mean HQ < 1.0
Xylenes (total)	3.50	3.50	130	USEPA Region III, 1995	0.03	Yes	No	No	Mean HQ < 1.0

Notes:

HQ = Hazard Quotient
ECOC = Ecological Contaminant of Concern
ug/L = microgram per liter
USEPA = United States Environmental Protection Agency
NE = Not Established
NA = Not Applicable

(1) The mean HQ represents the mean (half non-detect) concentration divided by the screening value. In cases where the mean exceeds the maximum the maximum value is used.

TABLE 7-17
REFINED ASSESSMENT OF ECOLOGICAL CONTAMINANTS OF CONCERN IN GROUNDWATER
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Analyte	Refined Risk Screening						Frequency of Detection		ECOC based on refinement?	Comments
	Maximum Detected Site Concentration	Arithmetic Mean (Half Non-Detects)	Refined Salt Surface Water Screening Levels (SWSL)	Reference	Mean HQ ⁽¹⁾	Mean HQ <1.0?	Frequency of Detection	Detected in < 5% of samples and N ≥20?		
Volatile Organic Compounds (ug/L):										
2-Butanone	0.69	1.76	NE	--	NA	No	2/19	No	Yes	
Carbon disulfide	0.49	1.67	2	USEPA Region III, 1995	0.25	Yes	1/19	No	No	Mean HQ < 1.0
Chloromethane	0.62	1.66	NE	--	NA	No	2/19	No	Yes	
Ethylbenzene	6.70	1.85	4.3	USEPA Region IV	0.43	Yes	4/19	No	No	Mean HQ < 1.0
Methyl tert-butyl ether	0.52	1.65	NE	--	NA	No	1/19	No	Yes	
Trichloroethene	0.19	1.63	200	USEPA Region III, 1995	0.00	Yes	1/19	No	No	Mean HQ < 1.0
Xylenes (total)	1.80	1.78	135	USEPA Region III, 1995	0.01	Yes	1/19	No	No	Mean HQ < 1.0
SEMIVOLATILES (ug/L)										
2-Methylnaphthalene	1.05	0.38	30	USEPA Region III, 1995	0.01	Yes	1/13	No	No	Mean HQ < 1.0
Naphthalene	2.20	0.52	23.5	USEPA Region IV	0.02	Yes	1/13	No	No	Mean HQ < 1.0
PCBs (ug/L)										
4,4'-DDD	0.04	0.02	0.025	USEPA Region IV	0.62	Yes	3/13	No	No	Mean HQ < 1.0
4,4'-DDE	0.03	0.01	0.14	USEPA Region IV	0.08	Yes	1/13	No	No	Mean HQ < 1.0
4,4'-DDT	0.05	0.02	0.001	USEPA Region IV	17.10	No	3/13	No	Yes	
Endosulfan I	0.02	0.01	0.0087	USEPA Region IV	1.16	No	1/13	No	Yes	
Heptachlor epoxide	0.02	0.01	0.0036	USEPA Region IV	2.64	No	1/13	No	Yes	
beta-BHC	0.03	0.01	0.034	USEPA Region III, 1995	0.40	Yes	4/13	No	No	Mean HQ < 1.0
gamma-Chlordane	0.04	0.01	0.004	USEPA Region IV	2.70	No	1/13	No	Yes	
HERBICIDES (ug/L)										
Dinoseb	1.50	0.14	NE	--	NA	No	4/13	No	Yes	
MCPA	44.00	10.46	NE	--	NA	No	1/13	No	Yes	
METALS (mg/L)										
Aluminum	0.73	0.41	NE	--	NA	No	9/13	No	Yes	
Antimony	0.01	0.0020	500	USEPA Region III, 1995	0.000	Yes	3/13	No	No	Mean HQ < 1.0
Barium	0.12	0.04	1000	USEPA Region III, 1995	0.000	Yes	13/13	No	No	Mean HQ < 1.0
Beryllium	0.00	0.00	NE	--	NA	No	13/13	No	Yes	
Cobalt	0.01	0.0013	NE	--	NA	No	3/13	No	Yes	
Iron	67.70	13.29	NE	--	NA	No	11/13	No	Yes	
Manganese	0.45	0.10	NE	--	NA	No	13/13	No	Yes	
Vanadium	0.00	0.0015	10000	USEPA Region III, 1995	0.000	Yes	9/13	No	No	Mean HQ < 1.0

Notes:

HQ = Hazard Quotient
 NA = Not Applicable
 ug/L = microgram per liter

TABLE 7-18a
SUMMARY OF CONSERVATIVE HAZARD QUOTIENTS FOR FOOD WEB EXPOSURES - TERRESTRIAL HABITAT, BEFORE NON-TCRA
OPERABLE UNIT 19, SITE 84/ BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Short-tailed shrew		White-footed mouse		Meadow vole		Red fox		American robin		Mourning dove		Eastern screech-owl		Red-tailed hawk	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Chromium	5.20	0.52	1.13	0.11	0.16	0.02	0.29	0.03	5.26	1.05	0.20	0.04	3.47	0.69	0.30	0.06
Copper	2.19	1.70	0.67	0.52	0.91	0.70	0.57	0.44	0.50	0.38	0.34	0.26	0.52	0.40	0.13	0.10
Lead	2.12	0.21	0.59	0.06	0.68	0.07	0.19	0.02	13.13	1.31	7.25	0.72	2.38	0.24	0.27	0.03
Mercury	13.43	2.69	3.82	0.76	3.63	0.73	0.69	0.41	0.83	0.41	0.36	0.18	0.40	0.20	<0.01	<0.01
Zinc	1.29	0.65	0.33	0.17	0.22	0.11	0.98	0.10	1.78	1.30	3.22	0.36	5.74	0.97	1.23	0.14
4,4'-DDD	0.83	0.17	0.18	0.04	0.03	<0.01	0.05	<0.01	10.16	1.02	0.06	<0.01	6.35	0.64	0.24	0.02
4,4'-DDE	0.08	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.98	0.10	<0.01	<0.01	0.63	0.06	0.02	<0.01
4,4'-DDT	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.25	0.03	0.02	<0.01	0.15	0.02	<0.01	<0.01
alpha-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-Chlordane	3.37	1.69	0.73	0.37	0.11	0.05	0.23	0.11	5.56	1.11	0.22	0.04	3.51	0.70	0.13	0.03
Aroclor-1248	20.60	20.16	4.48	4.48	4.82	0.48	12.92	1.29	1123.42	112.34	9.02	0.90	720.56	72.06	25.47	2.55
Aroclor-1254	1228.51	122.85	273.02	27.30	29.11	2.91	38.24	7.76	358.05	35.80	2.73	0.27	229.66	22.97	8.11	0.81
Aroclor-1260	481.64	48.17	1070.47	107.05	113.43	11.34	149.94	30.42	1404.00	140.40	10.26	1.03	900.58	90.06	31.78	3.18
beta-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	13.31	1.33	2.95	0.29	0.38	0.04	0.87	0.09	2.67	0.27	0.06	<0.01	1.70	0.17	0.06	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01
Gamma-Chlordane	4.08	2.04	0.88	0.44	0.13	0.06	0.27	0.14	6.72	1.34	0.27	0.05	4.24	0.85	0.15	0.03
Heptachlor	227.82	22.78	50.45	5.05	5.70	0.57	14.70	1.47	43.39	4.34	0.54	0.05	27.77	2.78	0.99	0.10
Heptachlor Epoxide	46.61	4.66	10.57	1.04	1.16	0.14	3.02	0.30	8.90	0.89	0.18	0.02	5.69	0.57	0.21	0.02
Methoxychlor	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.10	0.01	0.06	<0.01	0.05	<0.01	<0.01	<0.01
Benzo(a)anthracene	8.31	0.83	1.47	0.15	1.02	0.10	0.77	0.08	0.16	0.02	0.06	<0.01	0.09	<0.01	<0.01	<0.01
Benzo(a)pyrene	7.62	0.76	1.37	0.14	0.70	0.07	0.66	0.07	0.15	0.01	0.04	<0.01	0.08	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	6.39	0.64	1.04	0.10	0.72	0.07	0.61	0.06	0.12	0.01	0.04	<0.01	0.07	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	0.01	<0.01	0.02	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	4.51	0.45	0.73	0.07	0.51	0.05	0.43	0.04	0.09	<0.01	0.03	<0.01	0.05	<0.01	<0.01	<0.01
Chrysene	10.99	1.10	2.09	0.21	1.03	0.10	0.92	0.09	0.21	0.02	0.05	<0.01	0.12	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	1.12	0.11	0.21	0.02	0.07	<0.01	0.09	<0.01	0.02	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Fluoranthene	0.13	0.01	0.03	<0.01	0.02	<0.01	0.01	<0.01	0.32	0.03	0.12	0.01	0.18	0.02	0.01	<0.01
Fluorene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	0.06	<0.01	0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.17	0.02	0.11	0.01	0.09	<0.01	<0.01	<0.01
Pyrene	0.11	0.01	0.02	<0.01	0.02	<0.01	<0.01	<0.01	0.28	0.03	0.10	<0.01	0.16	0.02	<0.01	<0.01

TABLE 7-18b
SUMMARY OF CONSERVATIVE HAZARD QUOTIENTS FOR FOOD WEB EXPOSURES - TERRESTRIAL HABITAT, AFTER NON-TCRA
OPERABLE UNIT 19, SITE 84/ BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Short-tailed shrew		White-footed mouse		Meadow vole		Red fox		American robin		Mourning dove		Eastern screech-owl		Red-tailed hawk	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Chromium	0.19	0.42	0.04	0.06	<0.01	<0.01	0.11	0.01	0.39	0.07	0.01	0.01	0.26	0.11	0.02	0.02
Copper	0.43	0.13	0.10	0.18	0.14	0.14	0.11	0.09	0.10	0.07	0.07	0.05	0.10	0.08	0.03	0.02
Lead	0.14	0.40	0.04	0.46	0.05	0.05	0.13	0.01	0.83	0.88	0.49	0.16	0.16	0.18	0.02	0.02
Mercury	0.13	0.76	0.76	0.33	0.73	0.73	0.69	0.41	0.83	0.41	0.36	0.18	0.40	0.20	<0.01	<0.01
Zinc	0.34	0.09	0.04	0.06	0.03	0.03	0.26	0.03	0.34	0.85	0.09	0.26	0.26	0.33	0.04	0.04
4,4'-DDD	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.11	0.01	<0.01	<0.01	0.07	<0.01	<0.01	<0.01
4,4'-DDE	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01
4,4'-DDT	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-Chlordane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aroclor-1248	0.07	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.39	0.04	<0.01	<0.01	0.25	0.03	<0.01	<0.01
Aroclor-1254	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aroclor-1260	0.48	0.05	0.05	0.06	<0.01	<0.01	0.14	0.01	0.43	0.04	<0.01	<0.01	0.28	0.03	<0.01	<0.01
beta-BHC	0.22	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01
Gamma-Chlordane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Methoxychlor	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	0.26	0.03	0.05	0.03	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	0.29	0.03	0.05	0.03	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	0.27	0.03	0.04	0.03	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	0.14	0.01	0.02	0.02	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	0.41	0.04	0.08	0.04	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	0.08	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01

TABLE 7-19a
SUMMARY OF CONSERVATIVE HAZARD QUOTIENTS FOR FOOD WEB EXPOSURES - AQUATIC HABITAT
(LAGOON) BEFORE NON-TCRA
OPERABLE UNIT 19, SITE 84/ BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Raccoon		Mink		Marsh wren		Great blue heron	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Chromium	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	0.05	0.04	<0.01	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	<0.01	<0.01	0.08	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDD	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDE	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDT	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-Chlordane	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Aroclor-1248	0.77	0.08	2.73	0.27	91.91	9.19	9.18	0.92
Aroclor-1254	<0.01	<0.01	3.24	0.66	<0.01	<0.01	<0.01	<0.01
Aroclor-1260	102.16	20.73	229.51	46.57	1313.02	131.30	131.13	13.11
beta-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.01	<0.01	0.07	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Gamma-Chlordane	<0.01	<0.01	0.02	0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	<0.01	<0.01	1.24	0.12	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	<0.01	<0.01	0.25	0.03	<0.01	<0.01	<0.01	<0.01
Methoxychlor	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	<0.01	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

TABLE 7-19b
SUMMARY OF CONSERVATIVE HAZARD QUOTIENTS FOR FOOD WEB EXPOSURES - AQUATIC HABITAT
(LAGOON), AFTER NON-TCRA
OPERABLE UNIT 19, SITE 84/ BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Raccoon		Mink		Marsh wren		Great blue heron	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Chromium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDD	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDE	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDT	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-Chlordane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aroclor-1248	0.77	0.08	1.63	0.16	91.91	9.19	9.18	0.92
Aroclor-1254	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aroclor-1260	102.16	20.73	229.51	46.57	1313.02	131.30	131.13	13.11
beta-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Gamma-Chlordane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Methoxychlor	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

TABLE 7-20a
SUMMARY OF REFINED HAZARD QUOTIENTS FOR FOOD WEB EXPOSURES - TERRESTRIAL HABITAT, BEFORE NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Short-tailed shrew		White-footed mouse		Meadow vole		Red fox		American robin		Mourning dove		Eastern screech-owl		Red-tailed hawk	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Chromium	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	0.11	0.02	0.03	<0.01	0.10	0.02	0.02	<0.01
Copper	0.02	0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.46	0.05	0.20	0.02	0.09	<0.01	<0.01	<0.01
Mercury	0.05	0.01	<0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	0.24	0.03	0.08	<0.01	0.20	0.02	0.02	<0.01
4,4'-DDD	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.39	0.04	<0.01	<0.01	0.26	0.03	<0.01	<0.01
4,4'-DDE	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.60	0.06	<0.01	<0.01	0.41	0.04	<0.01	<0.01
4,4'-DDT	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.11	0.01	<0.01	<0.01	0.07	<0.01	<0.01	<0.01
alpha-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-Chlordane	0.20	0.10	0.03	0.01	<0.01	<0.01	0.03	0.02	0.32	0.06	0.01	<0.01	0.21	0.04	<0.01	<0.01
Aroclor-1248	0.50	0.05	0.07	<0.01	0.01	<0.01	0.08	<0.01	2.67	0.27	0.09	<0.01	1.80	0.18	0.03	<0.01
Aroclor-1254	4.91	0.49	0.71	0.07	0.11	0.01	0.14	0.03	1.14	0.11	0.04	<0.01	0.77	0.08	0.01	<0.01
Aroclor-1260	26.78	2.68	3.86	0.39	0.56	0.06	0.76	0.15	6.22	0.62	0.19	0.02	4.19	0.42	0.07	<0.01
beta-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	2.32	0.23	0.34	0.03	0.05	<0.01	0.39	0.04	0.83	0.08	0.02	<0.01	0.56	0.06	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Gamma-Chlordane	0.24	0.12	0.03	0.02	<0.01	<0.01	0.04	0.02	0.38	0.08	0.02	<0.01	0.26	0.05	<0.01	<0.01
Heptachlor	5.23	0.52	0.77	0.08	0.10	<0.01	0.87	0.09	2.32	0.23	0.03	<0.01	1.57	0.16	0.03	<0.01
Heptachlor Epoxide	1.15	0.11	0.17	0.02	0.03	<0.01	0.19	0.02	0.51	0.05	0.01	<0.01	0.35	0.03	<0.01	<0.01
Methoxychlor	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	0.24	0.02	0.03	<0.01	0.02	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	0.22	0.02	0.03	<0.01	0.02	<0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	0.19	0.02	0.02	<0.01	0.02	<0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	0.13	0.01	0.01	<0.01	0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	0.32	0.03	0.04	<0.01	0.02	<0.01	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

TABLE 7-20b
SUMMARY OF REFINED HAZARD QUOTIENTS FOR FOOD WEB EXPOSURES - TERRESTRIAL HABITAT, AFTER NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Short-tailed shrew		White-footed mouse		Meadow vole	Red fox	American robin	Mourning dove	Eastern screech-owl	Red-tailed hawk
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Chromium	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.07	0.01
Copper	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.02	0.08	<0.01
Mercury	0.06	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.10	<0.01
4,4'-DDD	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDE	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDT	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-Chlordane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aroclor-1248	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	0.33	0.01	0.22	<0.01
Aroclor-1254	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aroclor-1260	30.80	3.08	4.44	0.44	0.65	0.18	7.16	0.22	4.82	0.08
beta-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	0.13	0.01	0.02	<0.01	<0.01	<0.01	0.05	<0.01	0.03	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Gamma-Chlordane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Methoxychlor	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

TABLE 7-21a
SUMMARY OF REFINED HAZARD QUOTIENTS FOR FOOD WEB EXPOSURES - AQUATIC HABITAT (LAGOON),
BEFORE NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Raccoon		Mink		Marsh wren		Great blue heron	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Chromium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDD	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDE	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDT	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-Chlordane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aroclor-1248	0.10	<0.01	0.51	0.05	1.59	0.16	2.30	0.23
Aroclor-1254	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aroclor-1260	4.95	1.00	25.67	5.21	20.72	2.07	29.94	2.99
beta-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Gamma-Chlordane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Methoxychlor	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

TABLE 7-21b
SUMMARY OF REFINED HAZARD QUOTIENTS FOR FOOD WEB EXPOSURES - AQUATIC HABITAT (LAGOON),
AFTER NON-TCRA
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Raccoon		Mink		Marsh wren		Great blue heron	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Chromium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lead	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mercury	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDD	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDE	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDT	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
alpha-Chlordane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aroclor-1248	0.10	<0.01	0.51	0.05	1.59	0.16	2.30	0.23
Aroclor-1254	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aroclor-1260	4.95	1.00	25.67	5.21	20.72	2.07	29.94	2.99
beta-BHC	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Gamma-Chlordane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor Epoxide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Methoxychlor	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Acenaphthylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(b)fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(g,h,i)perylene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(k)fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chrysene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dibenz(a,h)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoranthene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluorene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phenanthrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pyrene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

TABLE 7-22
REFINED LIST OF ECOLOGICAL CONTAMINANTS OF CONCERN
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Ecological Contaminant of Concern		Surface Soils		Lagoon		Northeast Creek		Ground- water	Upper Trophic Level Receptors				
		Before Non-TCRA	After Non-TCRA	Sediment	Surface Water	Sediment	Surface Water		Before Non-TCRA		After Non-TCRA		
									Terrestrial	Aquatic (lagoon)	Terrestrial	Aquatic (lagoon)	
Volatile Organics:													
2-Butanone	No	NA	No	No	NE	NE	NA	NE	NE	NE	NE	NE	NE
Acetone	No	NA	No	No	NE	NE	NA	NE	NE	NE	NE	NE	NE
Chloromethane	No	No	No	No	NE	NE	NA	NE	NE	NE	NE	NE	NE
Methyl tert-butyl ether	No	No	NE	NE	NE	NE	NA	NE	NE	NE	NE	NE	NE
Xylene (Total)	No	No	22.75	No	NE	NE	No	NE	NE	NE	NE	NE	NE
Semivolatile Organics:													
2-Methylnaphthalene	NA	NA	494.32	No	NE	NE	No	NE	NE	NE	NE	NE	NE
Anthracene	27.65	627	No	No	NE	NE	No	No	No	No	No	No	No
Benzo(a)anthracene	84.81	640	No	No	NE	NE	No	No	No	No	No	No	No
Benzo(a)pyrene	67.96	564	No	No	NE	NE	No	No	No	No	No	No	No
Benzo(b)fluoranthene	77.51	658	No	No	NE	NE	No	No	No	No	No	No	No
Benzo(g,h,i)perylene	26.68	409	No	No	NE	NE	No	No	No	No	No	No	No
Benzo(k)fluoranthene	53.42	396	No	No	NE	NE	No	No	No	No	No	No	No
bis(2-Ethylhexyl)phthalate	No	NA	13.19	No	NE	NE	No	NE	NE	NE	NE	NE	NE
Carbazole	NA	NA	No	No	NE	NE	No	NE	NE	NE	NE	NE	NE
Chrysene	81.81	771	No	No	NE	NE	No	No	No	No	No	No	No
Dibenzo(a,h)anthracene	8.67	191	No	No	NE	NE	No	No	No	No	No	No	No
Dibenzofuran	NA	NA	No	No	NE	NE	No	NE	NE	NE	NE	NE	NE
Fluoranthene	138.72	14.10	No	No	NE	NE	No	No	No	No	No	No	No
Indeno(1,2,3-cd)pyrene	28.08	380	No	No	NE	NE	No	NE	NE	NE	NE	NE	NE
Naphthalene	4.14	145	57.80	No	NE	NE	No	NE	NE	NE	NE	NE	NE
Phenanthrene	97.99	30.92	28.84	No	NE	NE	No	No	No	No	No	No	No
Pyrene	120.12	20.44	No	No	NE	NE	No	No	No	No	No	No	No
PCBs/Pesticides:													
alpha-Chlordane	44.41	No	NE	NE	NE	NE	No	No	No	No	No	No	No
gamma-Chlordane	NA	NA	NE	NE	NE	NE	270	No	No	No	No	No	No
4,4'-DDT	55.64	No	NE	NE	NE	NE	1710	No	No	No	No	No	No
4,4'-DDE	23.07	No	NE	NE	NE	NE	No	No	No	No	No	No	No
4,4'-DDD	75.49	192	NE	NE	NE	NE	No	No	No	No	No	No	No
Dieldrin	322.90	17.98	NE	NE	NE	NE	No	Yes	No	No	No	No	No
Endrin	No	108	NE	NE	NE	NE	No	No	No	No	No	No	No
Endrin aldehyde	NA	NA	NE	NE	NE	NE	No	NE	NE	NE	NE	NE	NE
Endrin ketone	NA	NA	NE	NE	NE	NE	No	NE	NE	NE	NE	NE	NE
alpha-BHC	8.40	No	NE	NE	NE	NE	No	No	No	No	No	No	No
Heptachlor	19.06	No	NE	NE	NE	NE	No	Yes	No	No	No	No	No
Heptachlor epoxide	4.18	No	NE	NE	NE	NE	2.64	Yes	No	No	No	No	No
Endosulfan I	No	No	NE	NE	NE	NE	11.6	No	No	No	No	No	No
Endosulfan sulfate	NA	NA	NE	NE	NE	NE	No	NE	NE	NE	NE	NE	NE
PCBs/Pesticides (cont.):													

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REMEDIAL INVESTIGATION, CTO-0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Ecological Contaminant of Concern	Surface Soils		Lagoon		Northeast Creek		Ground-water	Upper Trophic Level Receptors			
	Before	After	Sediment	Surface Water	Sediment	Before Non-TCRA		After Non-TCRA			
						Terrestrial		Aquatic (lagoon)	Terrestrial	Aquatic (lagoon)	
Aroclor 1248	111.29	No	50.26	No	No	No	No	Yes	Yes	No	Yes
Aroclor 1254	47.64	No	No	No	No	No	No	Yes	No	No	No
Aroclor 1260	260.01	299.02	654.76	No	No	No	No	Yes	Yes	Yes	Yes
Herbicides											
Dinoseb	No	No	NE	NE	NE	NE	NA	NE	NE	NE	NE
MCPA	No	No	NE	NE	NE	NE	NA	NE	NE	NE	NE
Diesel Range Organics	NE	NE	NA	NE	NE	NE	NE	NE	NE	NE	NE
Inorganics											
Aluminum	No	No	NE	NE	NE	NE	NA	NE	NE	NE	NE
Beryllium	NE	No	NE	NE	NE	NE	NA	NE	NE	NE	NE
Chromium (Total)	12.27	9.18	NE	NE	NE	NE	No	No	No	No	No
Cobalt	No	No	NE	NE	NE	NE	NA	NE	NE	NE	NE
Iron	9.67	9.61	NE	NE	NE	NE	NA	NE	NE	NE	NE
Manganese	No	No	NE	NE	NE	NE	NA	NE	NE	NE	NE
Vanadium	2.40	2.46	NE	NE	NE	NE	No	NE	NE	NE	NE
Total Petroleum Hydrocarbons											
TPH (as Diesel) (mg/kg)	NA	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
TPH (as Gasoline) (ug/kg)	NA	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE

Notes:

Shaded cells indicated compound was selected as an Ecological Contaminant of Concern (ECOC) for that media.

Numbers in shaded cells are refined Hazard Quotients (HQs)

NA in shaded cells indicate that the compound was retained as an ECOC but no screening value was available with which to evaluate potential risks.

NE indicates that compound was not evaluated in this media or food web.

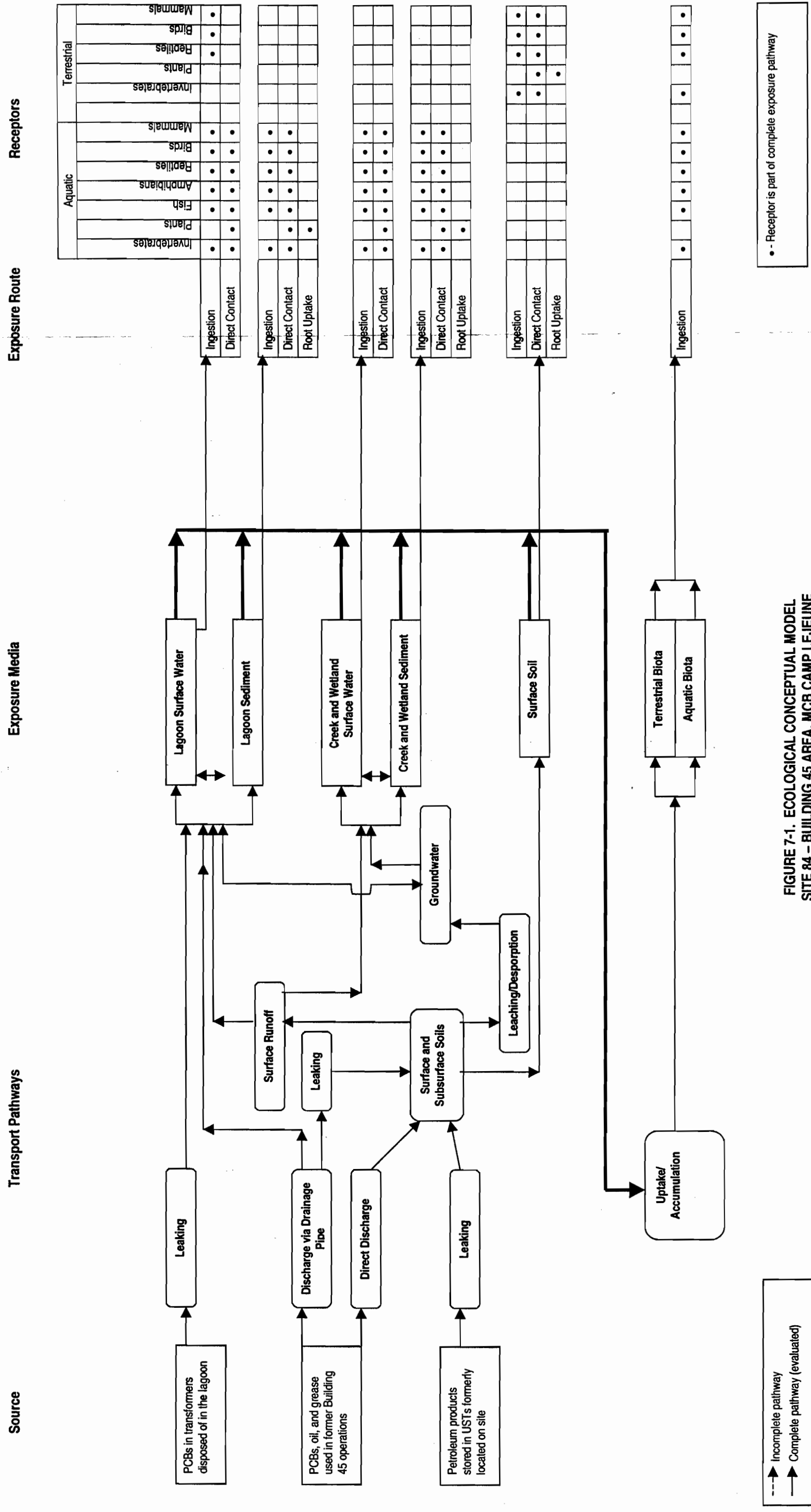
Upper Trophic Level Risk reflects potential risk to receptors under more realistic exposure assumptions with doses compared to No Observed Adverse Effects Levels (NOAELs).

Upper Trophic Level Risks were evaluated only for those ECOCs considered to be important bioaccumulative compounds by the Environmental Protection Agency (USEPA 2000)

Non-TCRA = Non Time Critical Removal Action



FIGURES



8.0 CONCLUSIONS AND RECOMMENDATIONS

Activities at Site 84 began more than 70 years ago. The site is inactive now, but contains multiple sources of contamination including former storage tanks, power plant operations, heavy equipment maintenance, ect. Various portions of Site 84 have been investigated, beginning with a series of reports related to petroleum contamination in the early 1990's, continuing through this recent body of work which has assembled previous data with recent information. The following sections present the conclusions and recommendations for Site 84 based on the findings of the Remedial Investigation.

8.1 Conclusions

Soils

- Soils at Site 84 have been impacted due to past site operations by PCBs. The presence of PCB contamination is most likely associated with the operation of Building 45 as a power generating facility. PCB contamination at Site 84 is widespread at low concentrations (1-10 ppm); however, there are three "hot spots" of PCB contamination, including the lagoon area, the midfield area (near boring SB-27), and the Building 45 area. The overall widespread low level concentrations may be a result of soil particles mobilized by dust from mowing operations, vehicle traffic, application of oil (which may have contained PCBs) to suppress dust, or overland flow from periods of heavy participation. Areas of higher concentration appear to be related multiple sources, including transformer storage/disposal in and around the lagoon, operations at Building 45, drainage features, and possible spill areas. The distribution of PCBs above the Region IX PRG covers approximately 190,000 square feet.
- Soils at Site 84 also have been impacted due to past site operations by VOCs, SVOCs, organic pesticides, TPH, and inorganics. Their presence may be associated with the operation of Building 45 as a maintenance facility. These contaminants are primarily distributed around Building 45 and the former AST in locations where spills and leaks may have occurred as a result of daily work practices. Concentrations of VOCs and TPH are low compared with SVOCs. Concentrations of SVOCs decrease significantly with depth.

A non-Time Critical Removal Action (non-TCRA) involving the demolition of the foundation of former Building 45 and excavation of soils in the immediate area of the foundation is planned. The removal action addresses one of the three "hot spots" for soil at Site 84 and should significantly reduce site risks. A significant portion of PCB contamination at Site 84 is local to former Building 45, however, other portions of the site exhibit concentrations above the applicable regulatory standards (i.e., TSCA) and guidance criteria (i.e, Region IX PRGs). For example, the lagoon has long been known to be a source of contamination. And there are other sampling locations across the site with high concentrations of PCBs. For example the highest detection observed to date is SB27-01 at 200,000 $\mu\text{g/kg}$, a surface soil sample located in the mid-field area shown on Figure 4-3 of this document. Although the removal action is focused on removing the remaining portions of Building 45 and impacted soil in that area, all other areas of the site must be addressed. These areas are defined in the Feasibility Study along with the various remedial alternatives. Further, the removal action work plan contains provisions for confirmatory sampling to ensure that remedial goals are met.

Groundwater

- The sampling completed as part of the RI identified several VOCs, SVOCs, organic pesticides, herbicides, and inorganics in groundwater. Benzene, chloroform, heptachlor epoxide, and gamma-chlordane exceeded screening criteria in a limited number of samples. It is important to note that groundwater has been impacted by petroleum products in the northeast portion of the site near former Building 780. Free-phase petroleum as well as a significant dissolved phase plume has been identified by previous site investigations. This portion of the site is being addressed by the UST program with an active treatment system. The system is operated and maintained by J.A. Jones.

Surface Water and Sediment

- Northeast Creek does not appear impacted by past site operations. Contaminants were not detected in surface water or sediment samples from the creek.
- Lagoon sediments have been impacted due to past site operations by VOCs and PCBs. The presence of these contaminants is most likely related to the drain pipe that runs from the former building to the lagoon, which was apparently used to discharge waste material from the building. In addition, the presence of PCBs may be related to the reported disposal of transformers in the lagoon.

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Baseline Risk Assessments

- The baseline human health RA for Site 84 evaluated current adolescent and adult recreational users and military Base personnel, and future adult and child residents, construction workers, and industrial/commercial workers. A summary of the potential risk for soil and groundwater is provided below:

➤ Soil

Total risk values calculated at the site indicate potentially unacceptable carcinogenic risk for the current adult recreational users, future adult and child residents, and future industrial/commercial site workers. Values that exceeded the USEPA acceptable risk range were primarily from ingestion of and dermal contact with benzo(a)pyrene, heptachlor, and Aroclor-1260 in the surface soil, evaluated before the non-TCRA. Aroclor-1260 in soil evaluated after the non-TCRA was the primary contributor to unacceptable carcinogenic risks for the future residential receptors.

Total site HI values calculated indicate potentially unacceptable noncarcinogenic hazard levels for the current Base personnel, future adult and child residents, future construction worker, and future industrial/commercial site worker. The HI values that exceeded the USEPA acceptable hazard level of 1.0 were primarily from ingestion of and dermal contact with heptachlor epoxide, gamma-Chlordane, alpha-Chlordane, and Aroclor-1254 in the surface soil before the non-TCRA. Soil evaluated after the non-TCRA did not contribute significantly to unacceptable noncarcinogenic adverse health effects for these receptors.

➤ Groundwater

Arsenic in the shallow groundwater contributed to potentially unacceptable carcinogenic risk values for the future receptors evaluated for exposure to groundwater. 2-Methyl-4-chlorophenoxyacetic Acid (MCPA), arsenic, iron, and thallium in the shallow groundwater also contributed to unacceptable total site HI values.

- Based on the ecological risk assessment, PAHs, organic pesticides, PCBs, and inorganics in surface soils may pose unacceptable risks to the terrestrial ecological community at Site 84. VOCs, SVOCs, and PCBs in lagoon sediments may pose unacceptable risks to ecological receptors using the lagoon. The lagoon area and area along the perimeter of former Building 45 are the most hazardous to ecological receptors at Site 84. Although potential risks to ecological receptors will decrease substantially following the non-TCRA in the vicinity of Building 45, unacceptable risks to terrestrial flora, fauna, and upper trophic level receptors will still exist at the site. After the removal action, potential risk from most surface soil contaminants to terrestrial receptors will be moderate to low; however, Aroclor-1260 will continue to pose substantial risks to the terrestrial community. No unacceptable risks were estimated for surface waters or sediment of Northeast Creek. Organic pesticides in groundwater may pose unacceptable risks to ecological receptors in Northeast Creek if dilution upon discharge to the creek is negligible; however, potential risks contributed by groundwater are anticipated to be low.

8.2 Recommendations

Based on data and information evaluations made during the RI, several recommendations have been made. These recommendations are summarized as follows:

1. PCB concentrations are above regulatory criteria in the soil primarily in the area immediately surrounding Building 45, in the lagoon area, and in the midfield area. Specific attention will be given to the building area through the non-TCRA. All other areas of concern at the site will be addressed in the FS.
2. SVOC and pesticide concentrations remain above screening criteria in the subsurface soils immediately surrounding the Building 45 foundation. Again, implementation of the non-TCRA. The non-TCRA is designed to remove contaminated surface and subsurface soil immediately surrounding Building 45 as well as remove the foundation materials. This action will eliminate a significant portion of the risk associated with the site.

3. As noted, subsequent remedial actions will be required for the remaining hot spots, including the lagoon and midfield areas to address PCBs at the site. In addition to the PCB contamination, the FS will be prepared to address the elevated levels of other constituents including VOCs, SVOCs, and several inorganics in the surface and subsurface soils at Site 84.
4. Although the majority of the contamination at Site 84 is limited to shallow soils, concentrations of VOCs (notably BTEX), organic pesticides and inorganics exceed applicable groundwater standards and were indentified as contaminants of concern in the human health risk assessment. The most significant contribution to groundwater contamination at the site are petroleum products in the northeast portion of the site. It has been noted that a free-phase and dissolved phase plume exist in this are of Site 84. Currently, this contamination is addressed by an active SVE/air sparging system. In addition to the active remediation taking place, this portion of the site will benefit from the planned non-TCRA. Given its location, the petroleum contaminated soil coincident to the area of the removal action will be removed as the excavation for the non-TCRA occurs. This will help to reduce the source of groundwater contamination. The FS will present remedial alternatives for groundwater, including a monitoring program and aquifer use restrictions. Chemicals of concern in groundwater are the BTEX compounds, organic pesticides, and selected inorganics. A monitoring program is recommended to include a minimum of four rounds of sampling for organic pesticides, BTEX, and natural attenuation parameters. Inorganics, (such as iron, manganese, aluminum ect) should be compared to Base background concentrations to determine if these constituents exceed established concentrations (i.e., naturally occurring levels). In addition to the monitoring program, an aquifer use restriction is recommended until concentrations reach acceptable levels (i.e., below North Carolina Standards and/or Federal MCLs) .
5. The FS will address remedial alternatives, taking into account the planned non-TCRA and various potential land uses at the site. Moving forward, the strategy and clean-up criteria hinges on the future land use (i.e, industrial vs. residential) and the relative restrictions placed on land use. As possible future land use is of particular interest to the Base, a short letter/executive summary was prepared for the Activity in April 2002. This document was used by the Base to provide information to executive managers and decision-makers, concerning the disposition of Site 84. Upon review of this

information, the Base intends to continue to use Site 84 for industrial purposes. Accordingly, the FS process will further define the remedial goals based on this type land use, as well as others, and present various alternatives appropriate for the site.

6. Site specific knowledge that will be acquired during the demolition of the Building 45 foundation and associated non-TCRA will be helpful for future remedial actions at the site. LANTDIV and MCB Camp Lejeune should incorporate any "lessons learned" from the removal action into future decisions at Site 84.

FINAL

**REMEDIAL INVESTIGATION
OPERABLE UNIT NO. 19
SITE 84 / BUILDING 45 AREA**

**MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA**

VOLUME II

CONTRACT TASK ORDER 0219

JUNE 2002

Prepared for:

**DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES
ENGINEERING COMMAND**
Norfolk, Virginia

Under the:

**LANTDIV CLEAN II Program
Contract N62470-95-D-6007**

Prepared by:

CH2M HILL Inc.
Herndon, Virginia

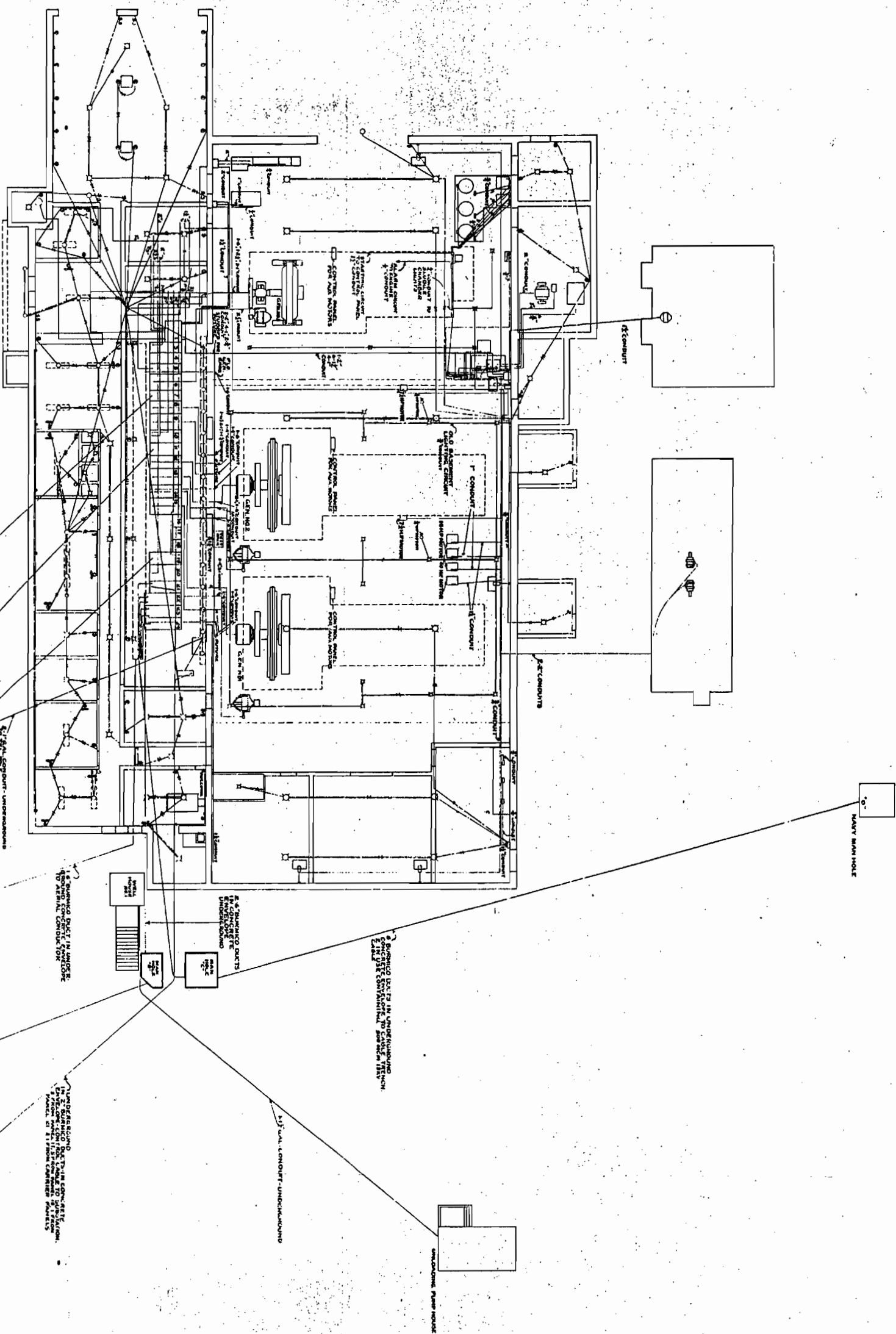
BAKER ENVIRONMENTAL, INC.
Coraopolis, Pennsylvania

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- B Test Boring Records
- C Slug Test Data and Groundwater Velocity Calculations
- D Chain-of-Custody Records
- E Technical Memorandum - Summary of Groundwater Data and Aquifer Characteristics
- F Analytical Data
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- I RAGS Part D Tables
- J Ecological Chemical Profiles of Ecological Contaminants of Concern Based on Steps 1 and 2
- K Endpoints Exposure Estimate and Risk Calculations for Upper Trophic Level Receptors

APPENDIX A
BUILDING 45 HISTORICAL DRAWINGS



1. 1000 MCM CABLE IN 6\"/>

1. 1000 MCM CABLE IN 6\"/>

1. 1000 MCM CABLE IN 6\"/>

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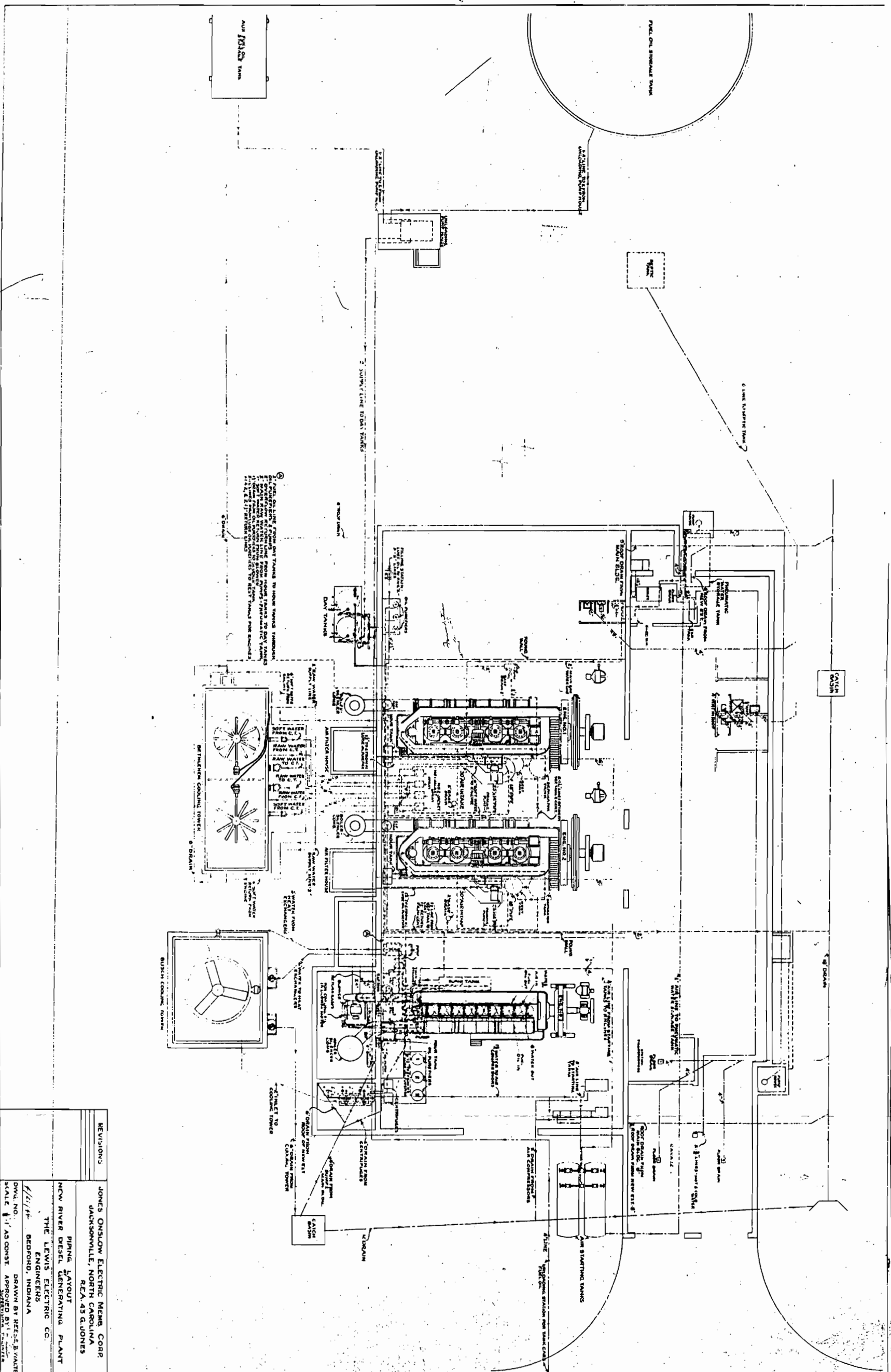
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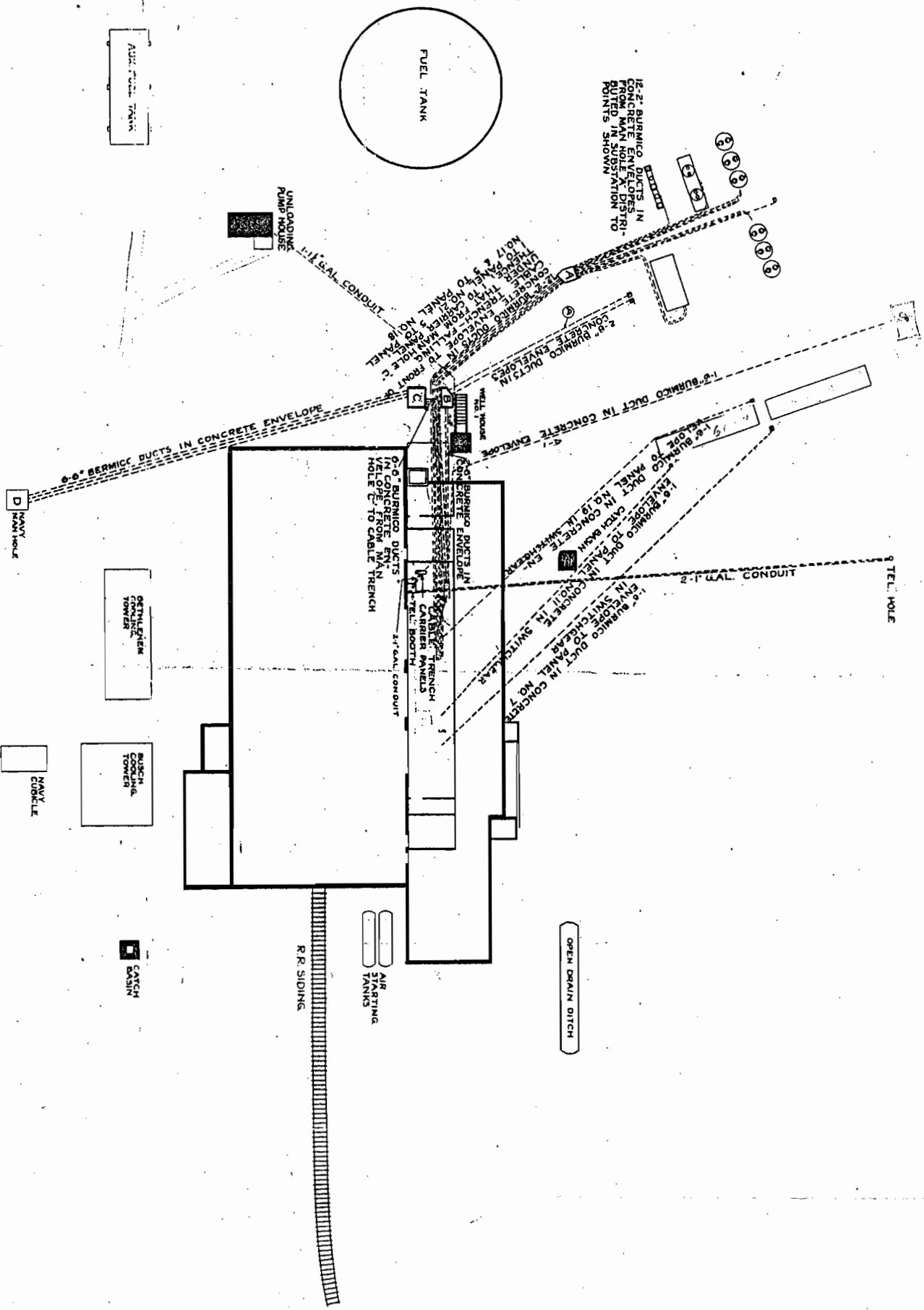
1. 1000 MCM CABLE IN 6\"/>

REVISIONS	
JONES ONSLOW ELECTRIC MEMB CORP JACKSONVILLE NORTH CAROLINA R.E.A.N.C.A.S.G. JONES	
ELECTRICAL SYSTEM- CONDUITS, DUCTS & CABLE NEW RIVER DIESEL GENERATING PLANT	
THE LEWIS ELECTRIC CO ENGINEERS BEDFORD, INDIANA	
DWG. NO 208-436 SCALE 1/4\"/>	DRAWN BY REESE RYAN WALTER APPROVED BY (Signature) SUPERVISING ENGINEER

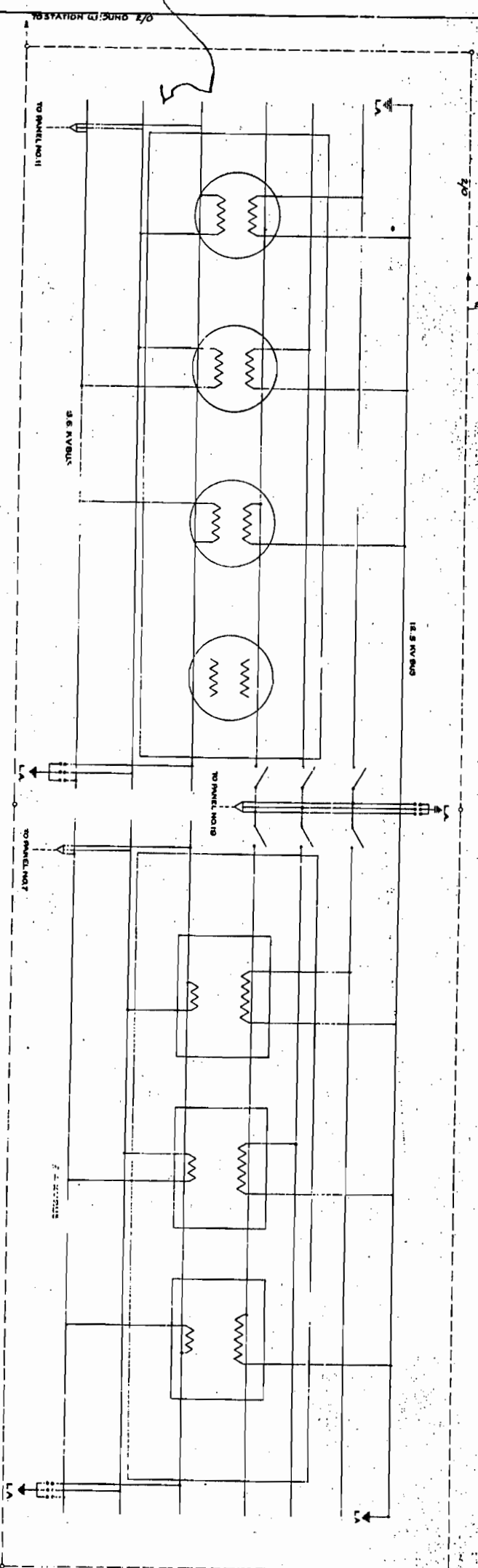
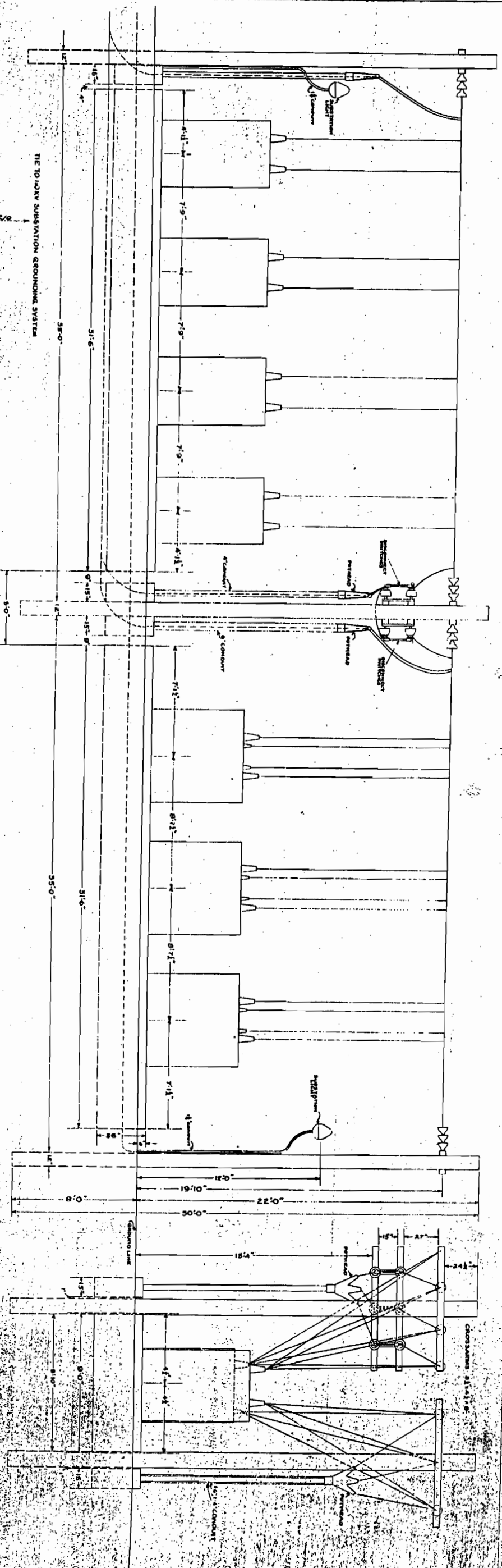
FIGURE A-1
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

Baker





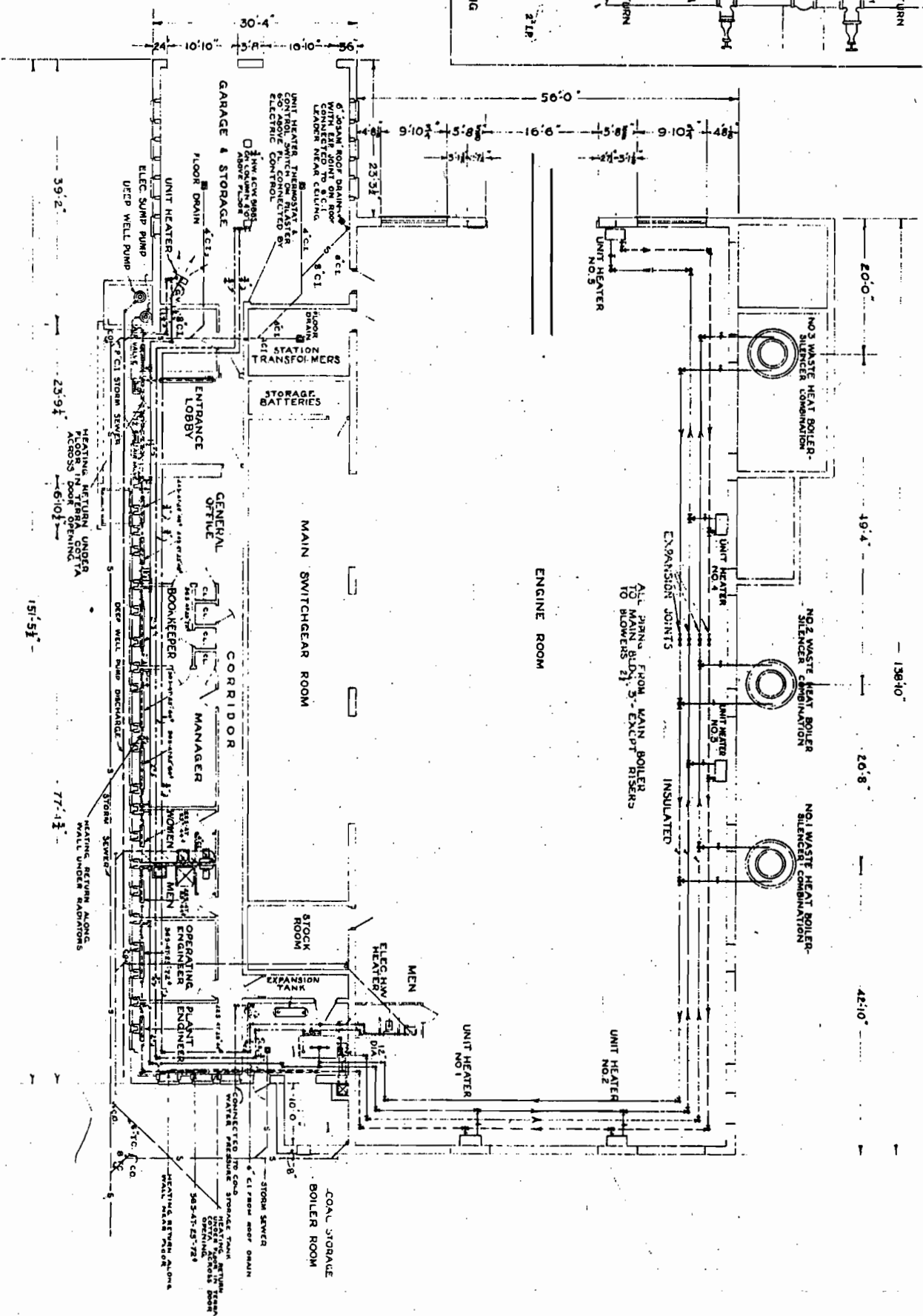
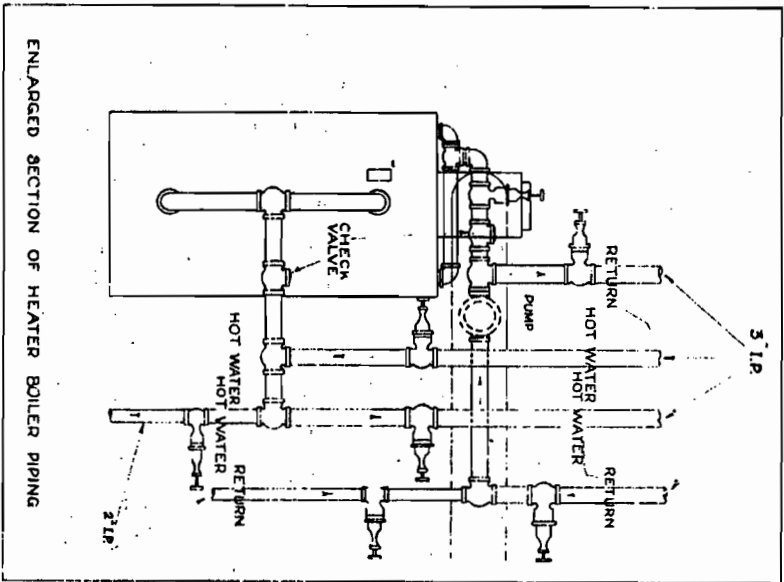
REVISIONS		JONES ONSLOW ELECTRIC MEMB. CORP JACKSONVILLE, NORTH CAROLINA R.E.A. 43 G. JONES
		UNDERGROUND DUCTS, MAIN HOLES & CABLE NEW RIVER DIESEL GENERATING PLANT THE LEWIS ELECTRIC CO. ENGINEERS
		REDFORD, INDIANA
		DWG. NO. 209486B DRAWN BY REESE WALTER SCALE 1/8" = 1'-0" APPROVED BY J. J. JONES DATE 10/1/54



REVISIONS	
1	JONES, ONSLOW ELECTRIC MEMB CORP JACKSONVILLE NORTH CAROLINA H.L. ONSLOW, E.E.C. LICENSED STEP-UP SUBSTATION - AS CONSTRUCTED NEW RIVER DIESEL, GENERATING PLANT
2	THE LEWIS ELECTRIC CO. ENGINEERS BEDFORD INDIANA
3	DWG. NO 209-436 DRAWN BY R.F.F. & B.W. 1/20/50

FIGURE A-4
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

Baker



REVISIONS	
1	JONES ON-LAW ELECTRIC MEMB CORP JACKSONVILLE, NORTH CAROLINA R.E.A. N.C. 45 G. JONES
2	BUILDING HEATING NEW RIVER DIESEL GENERATING PLANT
3	DWG. NO. EDS-450
4	1/2" = 1'-0"
5	SCALE 1/2" = 1'-0"
6	DRAWN BY REESE SPALTER APPROVED BY [Signature] SUPERVISING ENGINEER
7	LEWIS ELECTRIC CO. BEDFORD IND.

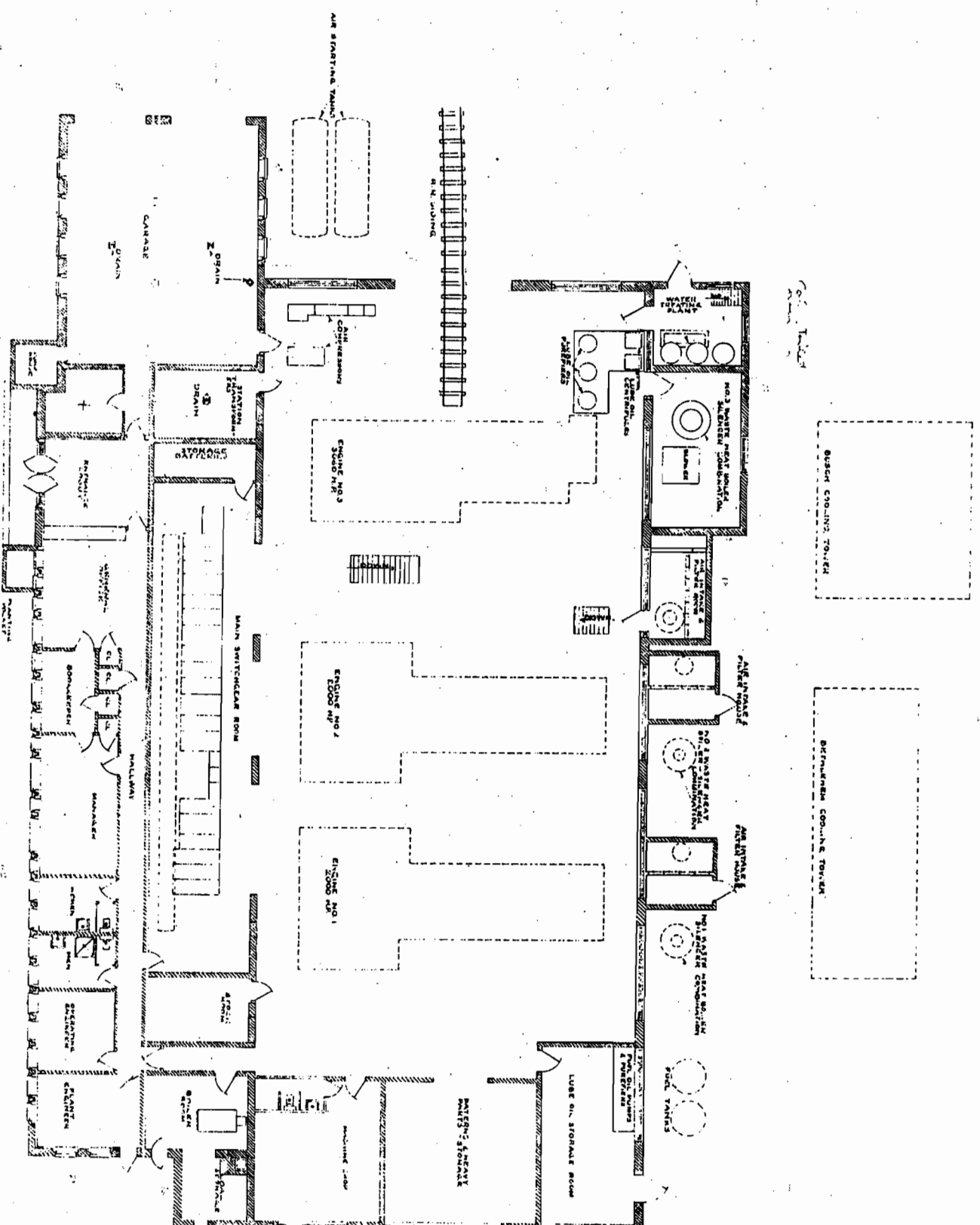
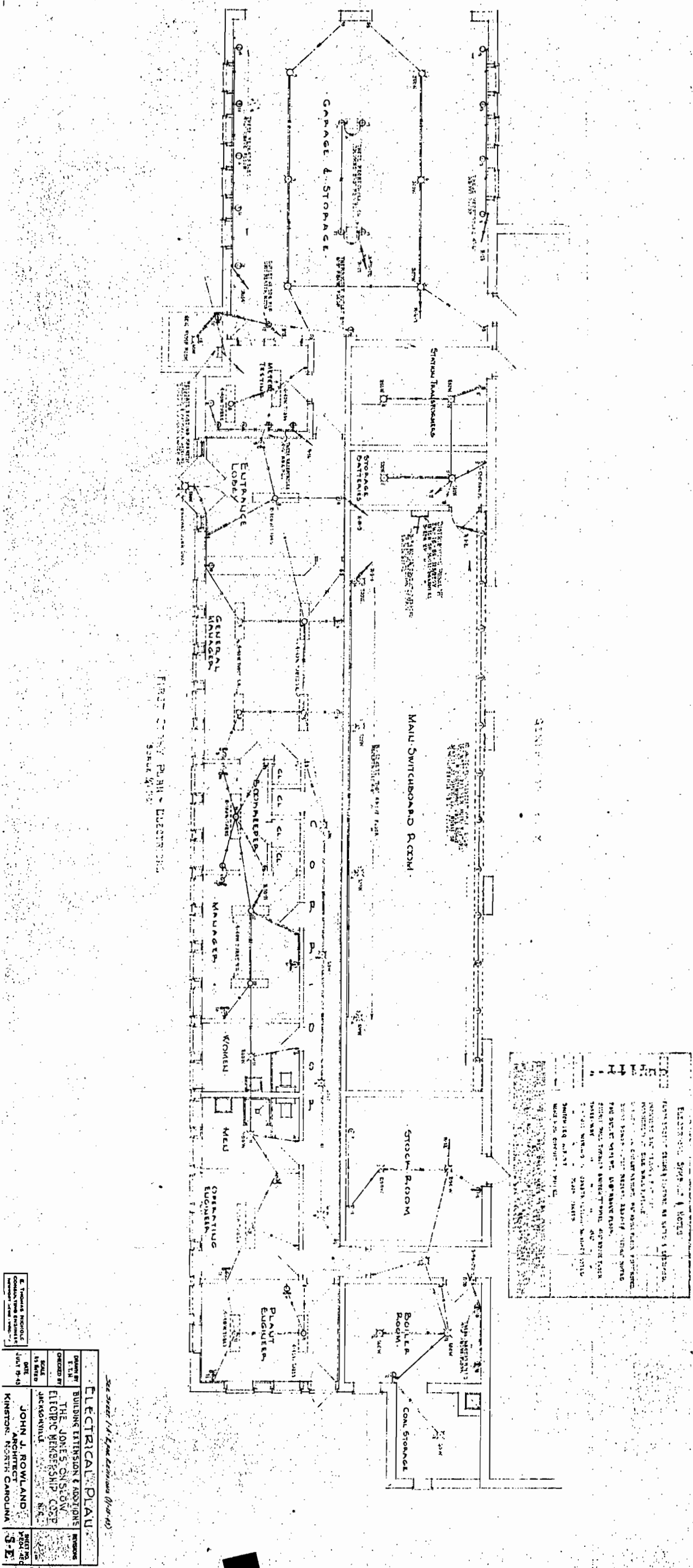
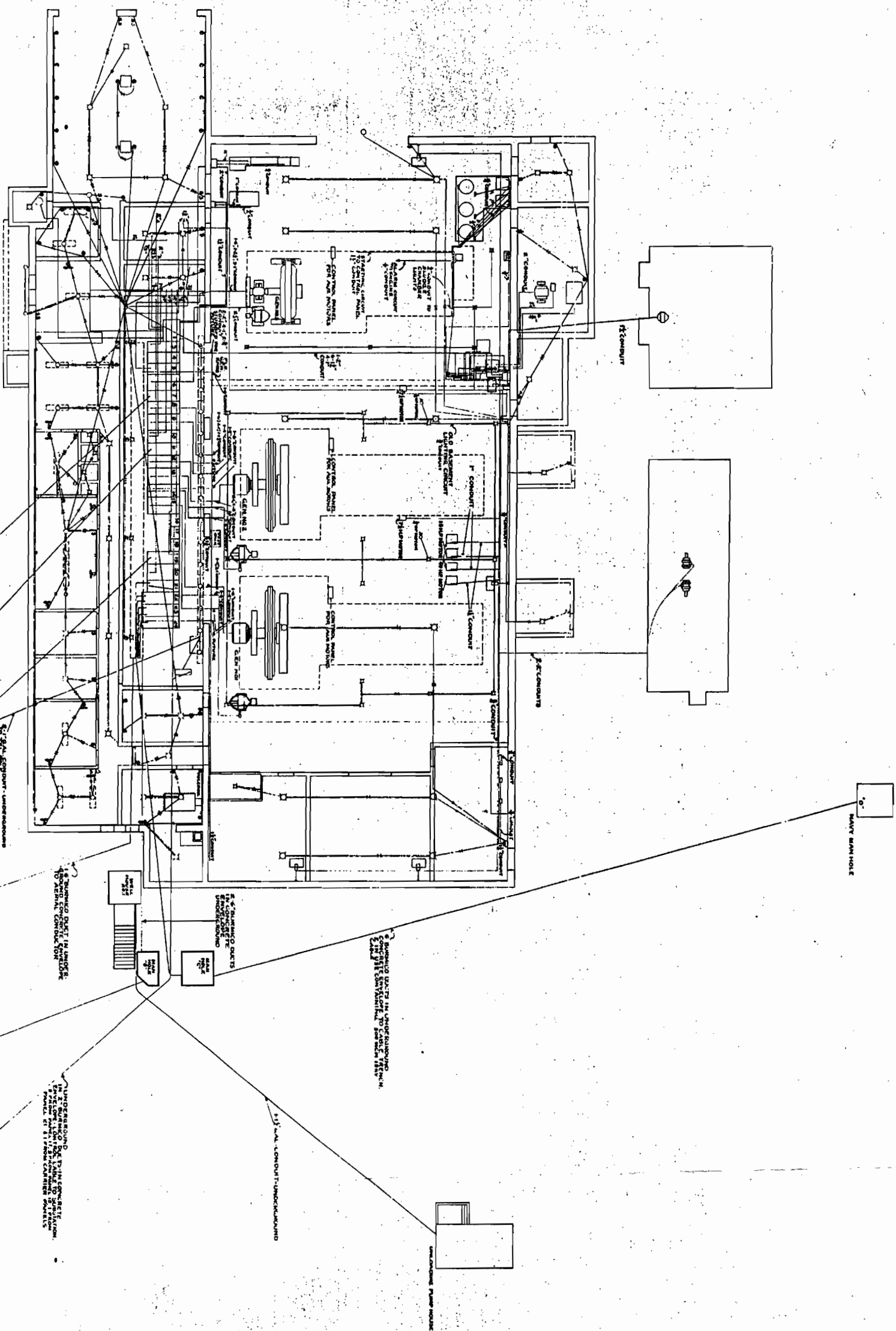


FIGURE A-6
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA





UNDERGROUND CABLE, 1/2\"/>

UNDERGROUND CABLE, 1/2\"/>

UNDERGROUND CABLE, 1/2\"/>

UNDERGROUND DUCT IN UNDERGROUND CABLE TRUNK

UNDERGROUND DUCT IN UNDERGROUND CABLE TRUNK

UNDERGROUND DUCT IN UNDERGROUND CABLE TRUNK

UNDERGROUND DUCT IN UNDERGROUND CABLE TRUNK

UNDERGROUND DUCT IN UNDERGROUND CABLE TRUNK

REVISIONS	
1	JONES ONSLOW ELECTRIC MEMB CORP JACKSONVILLE, NORTH CAROLINA R.E.A.N. C.43 G. JONES
2	ELECTRICAL SYSTEM - CONDUCITS, DUCTS & CABLE NEW RIVER DIESEL GENERATING PLANT
3	THE LEWIS ELECTRIC CO. ENGINEERS BEDFORD, INDIANA
4	DWG. NO. 208-43G SCALE 1/4\"/>
5	DRAWN BY REESE, B. WALTER APPROVED BY [Signature] NORTH CAROLINA ENGINEERS

APPENDIX B
TEST BORING RECORDS



Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Baker Site 84

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP01

COORDINATES: EAST: 2495261.5584

NORTH:

361669.6933

ELEVATION: SURFACE: 8.46

Rig: Powerprobe (Geoprobe rig)					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/17/01	6.0'	Sunny, Hot	2.5'
Length	2'							
Type	Standard							
Hammer Wt.	NA							
Fall	NA							

Remarks: Used 4' macrocorer in addition to standard split spoon

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description		Elevation (Ft. MSL)
1	S-1	1.75'				Light brown, very fine sand, trace silt		8.46
2								
3	▲ S-2	4'						
4								
5								
6								2.46
7						TD @ 6.0'		
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: E. Hanna

BORING NO.: DP01

SHEET 1 OF 1



TEST BORING RECORD

PROJECT: Baker Site 84
 PROJ. NO.: CTO-219 BORING NO.: IR84-DP02
 COORDINATES: EAST: 2495285.0185 NORTH: 361623.9327
 ELEVATION SURFACE: 13.99

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/17/01	8.0'	Sunny, Hot	6.5'
Length	2'							
Type	Standard							
Hammer Wt.	NA							
Fall	NA							

Remarks: Used 4' macrocorer in addition to standard split spoon

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm ps/bg)	Visual Description	Elevation (Ft. MSL)
1	S-1					Fine sand, gravel fill Brown fine sand, little to trace silt, damp	13.99
2							
3	S-2					Light gray, gravel, fine sand Gray, very fine sand, trace silt, damp	
4							
5							7.49
6	M-1					Light gray, fine sand, trace gravel, dry Brown, fine sand, trace silt, damp	
7						Water table @ 6.5'	5.99
8							
9						TD @ 8.0'	
10							

DRILLING COMPANY Parratt Wolff Inc.
 DRILLER: Louie LeFever

BAKER REP.: E. Hanna
 BORING NO.: IR84-DP02 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Baker Site 84

PROJ. NO.: CTO-219

BORING NO.:

IR84-DP03

COORDINATES: EAST: 2495223.1092

NORTH:

361698.5804

ELEVATION SURFACE: 7.08

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/17/01	4.0'	Sunny, Hot	3.5'
Length	4'							
Type	macrocorer							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm ps/bg)	Visual Description	Elevation (Ft. MSL)
							7.08
1						Dark brown, very fine sand, little silt, damp	
2						Sandy clay	
3	M-1	4'					
4						Water table @ 3.5'	3.58 3.08
5						Petroleum odor @ 3.5 feet	
6						TD @ 4.0'	
7							
8							
9							
10							

DRILLING COMPANY Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP03 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Baker Site 84

PROJ. NO.: CTO-219

BORING NO.:

IR84-DP04

COORDINATES: EAST: 2495431.9970

NORTH:

361479.5889

ELEVATION SURFACE: 20.59

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/17/01	12	Sunny, Hot	11
Length	2'							
Type	Standard							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm ps/bg)	Visual Description	Elevation (Ft. MSL) 20.59
1	S-1	1.6'				Light gray, very fine sand, dry Light gray, very fine sand, slightly damp	
2							
3	S-2	1.7'					
4							
5	S-3	1.5'					
6							
7	S-4	1.5'				Very fine sand, white, orange, stratified trace silt	
8						Light gray, very fine sand, slightly damp	
9						Little silt, light brown sand, slightly damp	
10	S-5	1.5'					
						Orange, white, very fine sand, trace, silt	

DRILLING COMPANY Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP04 SHEET 1 OF 2

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Baker Site 84CTO NO.: 219BORING NO.: DP04

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
11	▲ S-6	1.75				Light brown/gray sand	8.59
12						Water table @ 11.0'	
						Trace to little silt	
						TD @ 12.0'	
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
Continued from Sheet 1							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP04SHEET 2 OF 2

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Baker Site 84

PROJ. NO.: CTO-219

BORING NO.:

IR84-DP05

COORDINATES: EAST: _____

NORTH: _____

ELEVATION SURFACE: _____

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/17/01	12.0'	Sunny, Hot	10.5
Length	2'							
Type	Standard							
Hammer Wt.	NA							
Fall	NA							

Remarks: 4' macrocorer in addition to standart split spoon

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm ps/bg)	Visual Description	Elevation (Ft. MSL)
1	S-1	1.5'				Light brown, very fine sand, dry, top .5'	
2						0.5-1', light gray, medium to coarse sand with gravel, dry	
3	S-2	1.3'				1.5-2', brown, very fine sand, slightly damp	
4							
5	S-3	1.1'				Gray, very fine sand, trace silt, damp	
6							
7	S-4	1.9'				Gray, very fine sand, trace silt, very damp	
8							
9	M-1					light gray, very fine sand	
10						Water table @ 10.5	

DRILLING COMPANY Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP05 SHEET 1 OF 2

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Baker Site 84CTO NO.: 219BORING NO.: IR84-DP05

SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
11	▲					light gray, very fine sand	
12						TD @ 12.0'	
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

Continued from Sheet 1

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP05SHEET 2 OF 2

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Baker Site 84PROJ. NO.: CTO-0219BORING NO.: IR84-DP06COORDINATES: EAST: 2495516.7463NORTH: 361261.3573ELEVATION: SURFACE: 22.45

Rig: Powerprobe (Geoprobe rig)					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/17/01	2.0'	Sunny, Hot	
Length	2'							
Type	Standard							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
							22.45
1	S-1	1.75'				Light brown, fine sand, trace silt, dry	
2							20.45
3						Refusal @ 2.0'	
4						TD @ 2.0'	
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: E. HannaBORING NO.: DP06

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Baker Site 84

PROJ. NO.: CTO-219

BORING NO.:

IR84-DP07

COORDINATES: EAST: 2495413.2178

NORTH:

361219.1996

ELEVATION SURFACE: 20.96

Rig: Powerprobe (Geoprobe rig)					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Split Spoon	Casing	Augers	Macro Tube					
Size (ID)	2"				7/17/01	2.5'	Sunny, Hot	
Length	2'							
Type	Standard							
Hammer Wt.	NA							
Fall	NA							
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm ps/bg)	Visual Description		Elevation (Ft. MSL) 20.96
1	S-1	2				Dark gray, very fine sand, trace silt, dry		
2						Light gray, fine sand with gravel.		
	S-2							18.46
3						Refusal @ 2.5'		
4						TD @ 2.5'		
5								
6								
7								
8								
9								
10								

DRILLING COMPANY Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: E. Hanna

BORING NO.: DP07

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Baker Site 84

PROJ. NO.: CTO-219

BORING NO.:

IR84-DP08

COORDINATES: EAST: 2495372.3567

NORTH:

361252.2274

ELEVATION SURFACE: 20.93

Rig: Powerprobe (Geoprobe rig)					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/17/01	12.0'	Sunny, Hot	10.1
Length	2'							
Type	Standard							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm ps/bg)	Visual Description	Elevation (Ft. MSL)
1	S-1	2.0'				Dark gray, very fine sand, trace silt, slightly damp	13.63
2							
3	S-2	1.5'					
4							
5	S-3	1.6'					10.83
6							
7	S-4	1.1'				went through wood from 7.3 - 7.6'	10.83
8						Fine sand, mottled tan/dark gray	
9						Dark gray, very fine sand, trace silt, slightly damp, with trace gravel	
10	M-1					Dark reddish brown (peat colored) water table @ 10.1'	

DRILLING COMPANY Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: E. Hanna

BORING NO.: DP08

SHEET 1 OF 2

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Baker Site 84CTO NO.: 219BORING NO.: IR84-DP08

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
11						Dark reddish brown (peat color)	10.43
12	12.0					TD @ 12.0'	8.93
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

Continued from Sheet 1

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: E. HannaBORING NO.: DP08SHEET 2 OF 2



TEST BORING RECORD

PROJECT: Baker Site 84
 PROJ. NO.: CTO-0219 BORING NO.: IR84-DP09
 COORDINATES: EAST: 2495298.2548 NORTH: 361313.5422
 ELEVATION: SURFACE: 20.13

Rig: Powerprobe (Geoprobe rig)					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/18/01	10.0'	Hazy, Hot, Sunny	8.55
Length	2'							
Type	Standard							
Hammer Wt.	NA							
Fall	NA							

Remarks: Used 4' macrocorer in addition to standard split spoon

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 20.13	
1	S-1	1.7'				Very fine sand, little silt, grayish brown		
2								
3	S-2	1.5'				Very fine sand, trace silt, light brown, slightly damp		
4								
5	S-3	1.5'				Very fine sand, trace silt, light brown/gray, damp		
6								
7								
8	M-1					Very fine sand, trace silt, light brown mottled with orange, damp		
9						Light grayish brown very fine sand, trace		
10						Light brown mottled with orange, wet, very fine sand, trace silt	11.58	
						TD @ 10.0'	10.13	

DRILLING COMPANY: Parratt Wolff Inc. BAKER REP.: E. Hanna
 DRILLER: Louie LeFever BORING NO.: 01 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Baker Site 84PROJ. NO.: CTO-0219BORING NO.: IR84-DP10COORDINATES: EAST: 2495262.5204NORTH: 361348.6244ELEVATION: SURFACE: 17.84

Rig: Powerprobe (Geoprobe rig)					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/18/01	10.0'	Hazy, Hot, Sunny	10
Length	2'							
Type	Standard							
Hammer Wt.	NA							
Fall	NA							
Remarks: Used 4' macrocorer in addition to standard split spoon								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1	S-1	2.0'				Light gray, very fine sand with gravel, dry, trace silt and clay		
2						Light brown, very fine sand, trace silt, slightly damp	15.84	
3	S-2	2.0'					13.84	
4								
5	S-3	2.0'				Light gray, very fine sand with gravel, dry		
6						Orange, very fine sand, trace silt, slightly damp	11.84	
7	M-1	4.0'				Light gray, very fine sand		
8						Very fine light orange sand, damp		
9								
10						Water Table @10.0'	7.84	
	▲					TD - 10'		

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP10 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Baker Site 84

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP11

COORDINATES: EAST: 2495222.2960

NORTH:

361381.2514

ELEVATION: SURFACE: 15.75

Rig: Powerprobe (Geoprobe rig)					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/18/01	8		5.71
Length	2'							
Type	Standard							
Hammer Wt.	NA							
Fall	NA							

Remarks: Used 4' macrocorer in addition to standard split spoon

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1		S-1	1.8'				Light gray, trace silt, gravel, dry	15.75
2							Light brown, trace silt, slightly damp	
3		S-2						
4								
5	▲	M-1					Light gray, dry, very fine sand, little silt	10.05
6							Water table @ 5.7'	
7							Light gray, striated with orange, very fine sand	
8								7.75
9							TD @ 8.0'	
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP11 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Baker Site 84PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP12COORDINATES: EAST: 2495161.6649

NORTH:

361424.5780ELEVATION: SURFACE: 11.51

Rig: Powerprobe (Geoprobe rig)					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	7/18/01	6	Hazy, Hot, Sunny	5
Length	2'			4'				
Type	Standard			acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				

Remarks: Used 4' macrocorer in addition to standard split spoon

SAMPLE TYPE					DEFINITIONS			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description		Elevation (Ft. MSL)
1	S-1	1.6'				Light gray to tan very fine sand, damp, trace silt		11.51
2								
3						Dark gray, very fine sand, trace silt, damp		
4	M-1	2.4'				Light gray, very fine sand with gravel damp		
5						Tan, very fine sand, damp		6.51
6						Orange, very fine sand with trace clay		5.51
						Water table @ 5.0'		
7						TD @ 6.0'		
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP12 SHEET 1 OF 1



Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP13

COORDINATES: EAST: 2495192.3850

NORTH:

361509.9676

ELEVATION: SURFACE: 12.04

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	7/18/01	6.0'	hot, hazy, sunny	5.1
Length	2'			4'				
Type	Std.			acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				

Remarks: Used 4' macrocorer in addition to std. Split spoon.

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
							12.04	
1	S-1	2.0'				Light gray, very fine sand with gravel, trace silt dry		
2						Brownish gray, very fine sand with gravel, trace silt		
3								
4	M-1	2.0'				Light gray, very fine sand with trace silt, gravel dry		
5							6.94	
6						Tan, very fine sand, trace silt, damp to water table, water table @5.1'	6.04	
7						End of Boring = 6.0'		
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: DP-13 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP14

COORDINATES: EAST: 2496248.9616

NORTH:

361436.0497

ELEVATION: SURFACE: 15.16

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	7/18/01	10.0'	hot, sunny	7.7'
Length	2'			4'				
Type	Std.			acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				
Remarks: Used 4' macrocorer in addition to std. split spoon								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM-D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1	S-1	2.0'				Very fine to fine sand, with trace clay, light brown		
2						Dry @ 1.5', dark brown with petroleum odor	13.66	
3	S-2	2.0'				Light brown, very fine, fine sand, damp @ 3.0'	12.16	
4						thin layer of black, petroleum odor @ 3.0'		
5	S-3	1.5'						
6						(no odor)	9.16	
7						6.0 to 7.4' dark brown to black layers with petroleum odor water table @ 7.7'		
8	M-1					7.4' to 10.0' light gray, very fine sand, wet	7.76	
9								
10						TD @ 10.0'	5.16	

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: DP-14

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP15

COORDINATES: EAST: _____

NORTH: _____

ELEVATION: SURFACE: _____

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	7/18/01	10.0'	hot, sunny	6.75'
Length	2'			4'				
Type	Std.			acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				

Remarks: Used 4' macrocorer in addition to std. split spoon

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1	S-1	1.5'				Light gray, very fine to coarse sand, gravel dry		
2						Dry @ 1.5', dark brown with petroleum odor		
3	S-2	1.6'				Dark brown, slightly damp, petroleum odor, very fine sand, trace silt		
4						Light gray, very fine to coarse sand, gravel dry petroleum odor		
5	S-3	1.5'				Product, black sand glistening with product		
6						WT @ 6.75'		
7	M-1	4.0'				Black sludge @ 7.0' to bottom of boring very fine sand; light gray stained to dark, brown/black by product		
8								
9								
10						TD @ 10.0'		

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: DP-15 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP16

COORDINATES: EAST: 2495308.6434

NORTH:

361448.4669

ELEVATION SURFACE: 19.39

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	7/18/01	12.0'	hot, sunny	8.9'
Length	2'			4'				
Type	Std.			Acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				

Remarks: Used 4' macrocorer in addition to std. split spoon

SAMPLE TYPE							DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample							SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm ps/bg)	Visual Description	Elevation (Ft. MSL) 19.39	
1	S-1	1.7'				Dark gray, very fine sand, little sand	10.49	
2						Light brown very fine sand, little silt, slightly damp		
3	S-2	1.4'						
4								
5	S-3	1.1'						
6						Tan, very fine soil, trace silt, slightly damp		
7	S-4	1.6'						
8						Dark brown, very fine sand, trace silt		
9	M-1	4.0'				Very fine sand, light brown, damp WT @ 8.9'		
10						Dark to medium brown, very fine sand, trace silt		

DRILLING COMPANY Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: DP-16

SHEET 1 OF 2

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

CTO NO.: 219

BORING NO.:

IR84-DP16

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
11	M-1 (cont.)					Continued from Sheet 1	8.89
12						Light gray, very fine sand, trace silt	7.39
13						TD @ 12.0'	
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

DRILLING COMPANY: Parratt - Wolff

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: DP-16

SHEE 2 of 2

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP17

COORDINATES: EAST: 2495327.6759

NORTH:

361444.1491

ELEVATION: SURFACE: 17.36

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	Split Spoon	Casing	Augers	Macro Tube				
Length	2"				7/19/01	4.2'	overcast, warm	--
Type	Std.							
Hammer Wt.	NA							
Fall	NA							
Remarks: Used 4' macrocorer in addition to std. split spoon								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1	S-1	1.5'				Light brown, very fine sand, trace silt, damp	17.36	
2								
3	S-2	1.5'						
4							13.16	
5	S-3	0.2'				TD @ 4.2' Refusal @ 4.2'		
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: DP-17 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP18

COORDINATES: EAST: 2495250.4213

NORTH:

361509.9675

ELEVATION: SURFACE: 12.40

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	7/19/01	6.01	overcast, warm	4.35
Length	2'			4'				
Type	Std.			acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				

Remarks: Used 4' macrocorer in addition to std. split spoon

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description		Elevation (Ft. MSL)
1	S-1	2.0'				Light brownish, gray, very fine sand with little clay, slight petroleum odor @ 1.5' Damp		12.4
2								10.90
3	M-1	2.7'						
4						Tan, very fine sand, trace silt, damp to wet W.T. @ 4.35'		8.05
5								
6								6.40
7						TD @ 6.0'		
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP18

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP19

COORDINATES: EAST: 2495277.6132

NORTH:

361660.4346

ELEVATION: SURFACE: 12.04

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	7/19/01	6.0'	overcast, warm	2.8'
Length	2'			4'				
Type	Std.			acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				

Remarks: Used 4' macrocorer in addition to std. split spoon

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 12.04
1	S-1	1.4'				Very fine sand, light brown, little silt	11.54
2						Black layer @0.5', very fine sand, trace silt	
3	M-1					W.T. @ 2.8'	9.24
4							
5							
6							
7						TD @ 6.0'	6.04
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP19 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP20

COORDINATES: EAST: 2495319.4451

NORTH:

361521.6893

ELEVATION: SURFACE: 14.46

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	7/19/01	6.0'	overcast, warm	3.7'
Length	2'			4'				
Type	Std.			Acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				

Remarks: Used 4' macrocorer in addition to std. split spoon

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1		S-1	2.0'				Small pieces of brick, light brownish gray, very fine sand, little silt, dry	14.46
2							Slightly damp, light brown, very fine sand, trace silt	
3		M-1	3.0'				WT @ 3.7'	10.76
4	▼							
5								
6								
7							TD - 6.0'	8.46
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP20

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP21

COORDINATES: EAST: 2495354.9775

NORTH:

361487.0325

ELEVATION: SURFACE: 17.37

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Split Spoon	Casing	Augers	Macro Tube					
Size (ID)	2"			2"	7/19/01	10.0'	overcast, warm,	--
Length	2'			4'			sprinkling	
Type	Std.			acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				
Remarks: Used 4' macrocorer in addition to std. split spoon								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1	S-1	2.0'				Light brown, very fine sand, trace silt, slightly damp, pebbles @ 0.5'	16.87	
2						Tan, very fine sand, damp		
3	S-2	2.0'				Tan, slightly orange, very fine sand, trace silt and some clay		
4								
5	S-3	1.0'				Gray clay with some very fine sand, damp		
6								
7	M-1					Acetate sleeve stuck in macrocorer could not determine WT depth collected sample @ approximately 8.0'	9.37	
8								
9								
10								
						TD @ 10.0'	7.37	

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP21 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP22

COORDINATES: EAST: _____

NORTH: _____

ELEVATION: SURFACE: _____

Rig: Hand Auger					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/19/01	0.5'	overcast, warm,	--
Length	8"						sprinkling	
Type	Std.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1	S-1	0.5'				Small coated wires/cable stuck in auger, very fine dark brown sand, some silt, dry to slightly damp, roots	
2						TD @ 0.5'	
3							
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP22 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219

BORING NO.:

IR84-DP23COORDINATES: EAST: 2495199.8947

NORTH:

361759.7729ELEVATION: SURFACE: 6.00

Rig: <u>Hand Auger</u>					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/19/01	0.5'	overcast, warm,	--
Length	8"							
Type	Std.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description		Elevation (Ft. MSL)
	S-1	0.5'				Light brown to dark brown, very fine sand, trace silt and clay roots, damp		5.50
1								
2						TD @ 0.5'		
3								
4						Sucking sound when pulled out bucket		
5								
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP23SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP24

COORDINATES: EAST: 2495182.0073

NORTH:

361728.6810

ELEVATION: SURFACE: 6.37

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/19/01	4.0'	overcast, warm,	0.7'
Length	4"							
Type	macro.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

<u>SAMPLE TYPE</u>	<u>DEFINITIONS</u>
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample	SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 6.37
1	▲ M-1	3.5'				0.4' dark brown, very fine sand, some silt trace clay	W.T. @ 0.7'
2						0.4' to 4.0'	
3						Light gray, very fine sand, little silt	
4							
5						TD @ 4.0'	2.37
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP24

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP25COORDINATES: EAST: 2495136.0365NORTH: 361758.0701ELEVATION: SURFACE: 6.27

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/19/01	4.0'	overcast, warm,	0.9'
Length	4"							
Type	macro.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
							6.27
1	▲ M-1					W.T. @ 0.9'	5.37
2						Dark brown, very fine sand, trace silt @ 1.4'	4.87
3						changes to light brown very fine sand,	
4						trace silt	2.27
5						TD @ 4.0'	
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP25 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219

BORING NO.:

IR84-DP26COORDINATES: EAST: 2495163.6073

NORTH:

361796.7266ELEVATION: SURFACE: 6.22

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/19/01	4.0'	overcast, warm,	
Length	4"							
Type	macro.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
							6.22	
1	S-1	2.9'				Dark gray, very fine sand with trace silt and clay		
2						Light brown sand mottled with dark brown very fine sand with trace clay		
3								
4						W.T. @ 3.5'	2.72	
						black at end of 4.0'	2.22	
5						Slight petroleum odor		
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP26 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP27

COORDINATES: EAST: 2495106.1500

NORTH:

361718.0032

ELEVATION: SURFACE: 6.37

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/19/01	4.0'	overcast, hot	2.1'
Length	4"							
Type	macro.							
Hammer Wt.	NA							
Fall	NA							
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1	M-1	2.9'				Dark brown, lite brown, mottled very fine sand with little silt, damp	4.27	
2						W.T. @ 2.1'		
3						Light brown sand with trace silt		
4								
5						TD @ 4.0'	2.37	
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP27 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219

BORING NO.:

IR84-DP28COORDINATES: EAST: 2495155.1896

NORTH:

361695.6763ELEVATION: SURFACE: 6.94

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/19/01	4.0'	overcast, hot	2.5'
Length	4"							
Type	macro.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
							6.94	
1	▼ M-1	2.9'				Dark brown, very fine sand, little silt, trace silt, trace clay, damp		
2						W.T. @ 2.5'		
3						Light brown, very fine sand		
4						trace silt	4.44	
							2.94	
5						TD @ 4.0'		
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP28 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP29COORDINATES: EAST: 2495297.8143NORTH: 361358.0013ELEVATION: SURFACE: 6.94

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/19/01	4.0'	Hazy, hot	2.1'
Length	4"							
Type	macro.							
Hammer Wt.	NA							
Fall	NA							
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1						Dark gray, very fine sand with trace silt	6.94	
2	▼	M-1	3.3'			W.T. @ 2.1'	4.84	
3								
4						1.8' to 4.0' petroleum odor	2.94	
5						TD @ 4.0'		
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP29 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP30

COORDINATES: EAST: 2495358.4006

NORTH:

361545.9271

ELEVATION: SURFACE: 14.76

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	7/19/01	8.0'	overcast, hot	6.6'
Length	2"			4'				
Type	Standard			acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 14.76
1	S-1	1.3'				Light brown, very fine sand, trace to no silt, dry	
2							
3	S-2	1.8'				Light gray very fine sand, trace silt, damp, then dry with trace gravel	
4							
5	S-3	4.7'					
6							
7						Light gray with orangish tan straitions, very fine sand W. T. @ 6.6'	8.16
8						with trace silt and clay	6.76
9						TD @ 8.0'	
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP30

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219

BORING NO.:

IR84-DP31COORDINATES: EAST: 2495108.7587

NORTH:

361768.0654ELEVATION: SURFACE: 5.95

Rig: <u>Hand Auger</u>					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)						0.5'	overcast, hot	
Length								
Type								
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
	S-1	0.5'					5.95
1						Dark brown, very fine sand with trace silt and clay, very damp, sacking sound when pulled bucket out	5.45
2							
3							
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP31SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219

BORING NO.:

IR84-DP32COORDINATES: EAST: 2495358.4006

NORTH:

361545.9271ELEVATION: SURFACE: 7.03

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/20/01	2.0'	overcast, warm	0.0
Length	2"							
Type	Standard							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
							7.03
1	S-1	1.85'				Dark gray, very fine sand with trace coarse sand and silt	
2						W.T. @ 0.0'	5.03
3						TD @ 2.0'	
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP32 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP33

COORDINATES: EAST: 2495237.5529

NORTH:

361610.5651

ELEVATION: SURFACE: 8.55

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/20/01	4.0'	overcast, warm	2.4'
Length	4"							
Type	Macro.							
Hammer Wt.	NA							
Fall	NA							
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1	M-1	4.0'				Light brown, very fine sand, with trace silt damp	8.55	
2						Dary gray, very fine sand, trace silt		
3						W.T. @ 2.4'		
4								
5						TD @ 4.0'		
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP33 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219

BORING NO.:

IR84-DP34COORDINATES: EAST: 2495310.2454

NORTH:

361571.7829ELEVATION: SURFACE: 12.07

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/20/01	6.0'	overcast, warm	3.4'
Length	2"							
Type	Standard							
Hammer Wt.	NA							
Fall	NA							

Remarks: Used 4.0' macrocorer in addition to standard split spoon.

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 12.07
1	M-1	3.4'				Medium brown, very fine sand, trace silt	8.67
2						Damp	
3						Light brown, very fine sand, trace to no silt	
4						W. T. @ 3.4'	
5							
6							
7						TD @ 4.0'	6.07
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP34SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP35

COORDINATES: EAST: 2495240.9792

NORTH:

361364.4289

ELEVATION: SURFACE: 16.31

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Split Spoon	Casing	Augers	Macro Tube					
Size (ID)	2'			2"	7/20/01	8.0'	partly cloudy, warm	7.3'
Length	2"			4'				
Type	Standard			acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				
Remarks: Used 4.0' macrocorer in addition to standard split spoon.								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description		Elevation (Ft. MSL)
1	S-1	2.0'				Light brownish gray with trace gravel, with trace silt		16.31
2						Orangish tan, very fine sand with trace to no silt		
3								
4	S-2	3.4'				Orangish tan, very fine sand with trace to no silt, very damp		
5								
6	M-1							
7								
8						W. T. @ 7.3'		
9						TD @ 8.0'		
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP35

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP36

COORDINATES: EAST: 2495239.5820

NORTH:

361387.3441

ELEVATION: SURFACE: 16.48

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2'			2"	7/20/01	10.0'	partly cloudy, warm	7.2'
Length	2"			4'				
Type	Standard			acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				

Remarks: Used 4.0' macrocorer in addition to standard split spoon.

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
							16.48
1	S-1	2.0'				Light gray with gravel, very fine sand, dry,	
2						dark gray, very fine sand	
3	S-2	3.4'				Light brown, very fine sand, dry with trace medium sand	
4						Orange, very fine sand, trace medium sand, tree silk, damp	
5	S-3	0.5'				Hit concrete/stone @ 4.5', went through	11.98
6						Orange, very fine sand, trace medium sand, tree silk, damp	10.48
7						Concrete/granite looking chunks @ 6'-7' coarse sand just beneath	9.48
8	M-1	3.2'				W. T. @ 7.2'	9.28
9						Light brown, very fine sand, orange striations @ 7.5'	
10						TD @ 10.0'	6.48

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP36 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP37

COORDINATES: EAST: 2495278.9562

NORTH:

361292.9401

ELEVATION SURFACE: 19.14

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	7/20/01	14.0'	breezy,	12.4'
Length	2"			4'			partly cloudy, warm	
Type	Standard			acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				
Remarks: Used 4.0' macrocorer in addition to standard split spoon.								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm ps/bg)	Visual Description	Elevation (Ft. MSL)	
1	S-1	2.0'				Dark gray, very fine sand, dry	19.14	
2						Tan, very fine sand, slightly damp		
3	S-2	2.0'						
4						Light gray, very fine sand, slightly damp		
5	S-3	1.5'						
6								
7	S-4	1.3'						
8								
9	S-5	4.0'						
10						Dark brown, very fine sand with trace gravel, dry		

DRILLING COMPANY Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP37 SHEET 1 OF 2

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Baker Site 84CTO NO.: 219BORING NO.: IR84-DP37

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
11	S-5 cont.					Orangish tan, very fine sand with trace silt and clay	8.64
12							6.74
13	S-6	2.0'					
14						W. L. @ 12.4'	5.14
15						T. D. @ 14.0'	
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
Continued from Sheet 1							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: E. HannaBORING NO.: DP37SHEET 2 OF 2

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP38

COORDINATES: EAST: 361262.8501

NORTH:

2495321.8467

ELEVATION: SURFACE: 19.90

Rig: Hand Auger					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/20/01	8'	Sunny, hot	
Length	8"							
Type	Auger							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
	S-1						19.9
1						Dark, grayish brown, fine sand with little silt, dry	19.40
2							
3							
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP38

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP39COORDINATES: EAST: 2495338.9870NORTH: 361283.6958ELEVATION: SURFACE: 21.14

Rig: <u>Hand Auger</u>					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"							
Length	8"							
Type	Auger							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 21.14
1	S-1	8"				Dark grayish brown, very fine sand with little silt, dry	
2							
3							
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP39 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP40COORDINATES: EAST: 2495139.1226NORTH: 361820.7469ELEVATION: SURFACE: 5.59

Rig: <u>Hand Auger</u>					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/20/01	8"	Hot, sunny	3"
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks: Heavily wooded area with standing water in spots.**SAMPLE TYPE**

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 5.59
1	S-1	8"				Dark grayish brown, very fine sand with little silt, wet	
2						W. T. @ 3 inches	
3						TD @ 8"	
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP40 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219

BORING NO.:

IR84-DP41COORDINATES: EAST: 2495122.8614

NORTH:

361837.0731ELEVATION: SURFACE: 5.61

Rig: <u>Hand Auger</u>					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/20/01	8"	Hot, sunny	0.0'
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks: Heavily wooded area with standing water in spots.

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.) ▼	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description		Elevation (Ft. MSL) 5.61
1	S-1	8"				Very fine sand, little silt, trace clay, dark brown, slightly greyed		
2						TD @ 8"		
3						W. T. @ 0.0"		
4								
5								
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP41

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP42COORDINATES: EAST: 2495079.1710NORTH: 361796.4477ELEVATION: SURFACE: 5.70

Rig:	Hand Auger				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/20/01	8"	Hot, sunny	2"
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks: Heavily wooded, ponded water in spots**SAMPLE TYPE**

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
							5.70
1	S-1	8"				Light brown, very fine sand with trace clay, silt, wet	
2						W. T. @ 2 inches	
3						TD @ 8 inches	
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP42 SHEET 1 OF 1



TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP43

COORDINATES: EAST: 2495081.3071

NORTH:

361737.1083

ELEVATION: SURFACE: 5.91

Rig: Hand Auger					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/20/01	8"	Hot, sunny	3"
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks: Heavily wooded

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger						SPT = Standard Penetration Test (ASTM D1586)		
T = Shelby Tube W = Wash						PID = Photo Ionization Detector Measurement		
R = Air Rotary C = Core						MSL = Mean Sea Level		
D = Denison M = Macro Tube						BG/PS = Background/Point Source		
N = No Sample						ppm = parts per million		

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
	S-1	8"					5.91
1						Dark brown, very fine sand with silt	
2						W. T. @ 3 inches	
3						TD @ 8 inches	
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP43 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219

BORING NO.:

IR84-DP44COORDINATES: EAST: 2495066.9091

NORTH:

361819.6628ELEVATION: SURFACE: 5.61

Rig:	Hand Auger				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/20/01	8"	Hot, sunny	3"
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks: Heavily wooded

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
	S-1	8"				Dark brown, very fine sand with silt	5.61
1							
2						W. T. @ 3 inches	
3						TD @ 8 inches	
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP44 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP45

COORDINATES: EAST: 2495407.9431

NORTH:

361413.3054

ELEVATION: SURFACE: 21.14

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/21/01	8'	Hot, sunny	7.5'
Length	2"							
Type	Standard							
Hammer Wt.	NA							
Fall	NA							

Remarks: Heavily wooded

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 21.14
1	S-1	1.7"				Small pieces of brick, very fine sand with little silt, medium brown to light brown	
2						Light brown, very fine sand with trace silt	
3	S-2	1.7'					
4							
5	S-3	1.3'					
6						Light gray, very fine sand with trace silt	
7	S-4	2.0'					
8						W. T. @ 7.5'	13.64
9						TD @ 8.0'	13.14
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP45

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP47COORDINATES: EAST: 2495488.0144NORTH: 361337.8133ELEVATION: SURFACE: 21.49

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	7/21/01		Hot, sunny, breezy	
Length	4"			4'				
Type	Macro.			Acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				

Remarks:

<u>SAMPLE TYPE</u>	<u>DEFINITIONS</u>
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample	SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1							21.49
2	▼	M-1	2.9'			Very fine sand with trace, medium sand, light brown, trace to no silt, damp	19.39
3						W. T. @ 2.1'	
4							17.49
5						TD @ 4.0'	
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP47 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP48

COORDINATES: EAST: 2495485.0432

NORTH:

361310.6159

ELEVATION: SURFACE: 22.20

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	7/21/01		Hot, sunny, breezy	2.65
Length	4"			4'				
Type	Macro.			acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1	M-1	2.7'				Light brown, very fine sand with trace silt brick @ the top	22.2
2						W. T. @ 2.65'	19.55
3							
4							
5						TD @ 4.0'	
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP48

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP49

COORDINATES: EAST: 2495458.9683

NORTH:

361287.0687

ELEVATION: SURFACE: 21.59

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/21/01	4.0'	Hot, sunny	3.0
Length	4'							
Type	Macro.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1	▼	M-1	3.2'				Very fine, light gray sand with trace coarse sand, dry	21.59
2							Very fine, medium brown sand with trace silt	
3							Very fine, light sand with trace silt	
4							W. T. @ 3.0'	
5							TD @ 4.0'	18.59
6								17.59
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP49

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP50

COORDINATES: EAST: 2495439.0748

NORTH:

361274.0884

ELEVATION: SURFACE: 21.42

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/21/01	4.0'	Hot, sunny	3.0
Length	4'							
Type	Macro.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
							21.42
1	S-1	3.1'				Light brown, very thin sand with trace silt, dry	18.42
2						Light brown, very fine sand with light brown in very fine sand with trace silt	
3						W. T. @ 3.0'	
4							
5						TD @ 4.0'	17.42
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP50 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219

BORING NO.:

IR84-DP51COORDINATES: EAST: 2495399.8867

NORTH:

361305.0134ELEVATION: SURFACE: 20.70

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/21/01	4.0'	Hot, sunny, breezy	3.2'
Length	4.'							
Type	Macro.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
							20.7
1						Dark brown, very fine sand with trace silt	
2						dry	
3	M-1	3.3'				damp	
4						W. T. @ 3.2'	17.50
5						Light brown, very fine sand, trace silt	16.70
6						TD @ 4.0'	
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP51 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219

BORING NO.:

IR84-DP52COORDINATES: EAST: 2495354.8867

NORTH:

361339.9829ELEVATION: SURFACE: 20.37

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/21/01	4.0'	Hot, sunny	2.8'
Length	4'							
Type	Macro.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
							20.37	
1						Very fine, grayish, dark brown, dry, sand with trace silt, gravel		
2						damp		
3	▼					W. T. @ 2.8'		17.57
4								16.37
5						TD@4'		
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP52 SHEET I OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP53COORDINATES: EAST: 2495393.1942NORTH: 361421.5177ELEVATION: SURFACE: 19.10

Rig: Hand Auger					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/21/01	8"	Hot, sunny	
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 19.1
1	S-1	8"				Light brown, very fine sand with trace silt, damp	
2						TD @ 8"	
3							
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP53 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219

BORING NO.:

IR84-DP54COORDINATES: EAST: 2495368.2070

NORTH:

361400.4450ELEVATION: SURFACE: 20.19

Rig:	Hand Auger				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/21/01	8"	Hot, sunny	
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 20.19
1	S-1	8"				Light brown/tan, very fine sand with trace silt, damp	
2						TD @ 8"	
3							
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP54 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP55COORDINATES: EAST: 2495350.0240NORTH: 361378.3935ELEVATION: SURFACE: 20.62

Rig: <u>Hand Auger</u>					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/21/01	8"	Hot, sunny	
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm ps/bg)	Visual Description	Elevation (Ft. MSL)	
1	S-I	8"				Light brown, very fine sand with trace silt, gravel	20.62	
2						TD @ 8"		
3								
4								
5								
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP55 SHEET 1 OF 1



TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP56

COORDINATES: EAST: 2495369.5322

NORTH:

361410.4369

ELEVATION: SURFACE: 19.94

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/21/01	4.0"	Hot, sunny	2.5'
Length	4'							
Type	Macro							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1	M-1	3.1'				Dark brownish gray, very fine sand	17.44
2						Light gray, very fine sand	
3						Light brown, very fine sand w/ trace silt	
4						W. T. @ 2.5'	
5						TD @ 4.0'	15.94
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP56

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219

BORING NO.:

IR84-DP57COORDINATES: EAST: 2495249.3540

NORTH:

361319.4970ELEVATION: SURFACE: 17.86

Rig: <u>Hand Auger</u>					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/21/01	8"	Hot, sunny	
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description		Elevation (Ft. MSL) 17.86
1	S-1	8"				Medium grayish brown, dry, very fine sand with little gravel, trace silt		
2						TD @ 8"		
3								
4								
5								
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP57 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219

BORING NO.:

IR84-DP58COORDINATES: EAST: 2495192.2287

NORTH:

361617.2460ELEVATION: SURFACE: 7.72

Rig: Geoprobe					Date	Progress (Ft.)	Weather Hot,	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/22/01	4'	sunny/partly cloudy	3.3
Length	4'							
Type	Macro.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1						Dark brown, very fine sand with little silt, very damp	7.72
2						Light brown, very fine sand with little silt	
3	M-1	3.6'				W. T. @ 3.3'	4.42
4							3.72
5						TD @ 4.0"	
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP58 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP59COORDINATES: EAST: 2495140.6130NORTH: 361664.6432ELEVATION: SURFACE: 6.64

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/22/01	4.0'	Hot, Partly Cloudy	3.2
Length	4'							
Type	Macro.							
Hammer Wt.	NA							
Fall	NA							
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description		Elevation (Ft. MSL)
1						Very damp, very fine sand with trace silt mottled with dark brown from 2 - 3'		6.64
2	M-1	3.0'						
3	▼					W. T. @ 3.2'		3.44
4						Black sand, petroleum		2.64
5						TD @ 4.0"		
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP59 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP60

COORDINATES: EAST: 2495090.7965

NORTH:

361690.6668

ELEVATION: SURFACE: 7.54

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/22/01	4.0'	Hot, overcast	3.2
Length	4'							
Type	Macro.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 7.54
1	M-1	2.9'				Very fine, medium to dark brown sand, trace silt	4.34
2							
3						Light brown, very fine sand with trace clay W. T. @ 3.2'	
4							
5						TD @ 4.0"	3.54
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP60 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP61

COORDINATES: EAST: 2495065.6438

NORTH:

361649.8154

ELEVATION: SURFACE: 5.81

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/22/01	4.0'	Hot, partly cloudy	3.0
Length	4'							
Type	Macro.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1	M-1	3.4'				Dark brown, very fine sand w/ little silt, little clay Light very fine sand, trace to no silt	5.81
2							
3						Light brown/orangish, very fine sand with trace to no silty, trace clay W. T. @ 3.0'	2.81
4							1.81
5						TD @ 4.0"	
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP61 SHEET 1 OF 1



TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP62

COORDINATES: EAST: 2495125.2465

NORTH:

361642.2883

ELEVATION: SURFACE: 6.83

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/22/01	4.0'	Hot, partly cloudy	3.0
Length	4'							
Type	Macro.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1	M-1	3.4'				Dark brown, silty, very fine sand	6.83
2							
3						Light brown, very fine sand, trace to no silt	4.03
4						W. T. @ 2.8'	2.83
5						TD @ 4.0"	
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP62 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP63COORDINATES: EAST: 2495158.5544NORTH: 361605.8421ELEVATION: SURFACE: 7.82

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/22/01	4.0'	Hot, partly cloudy	2.5'
Length	4'							
Type	Macro.							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1	M-1 ▼	3.3'				Dark brown, very fine sand, trace silt, trace clay	5.32
2						Light brown, very fine sand, trace silt	
3						W. T. @ 2.5'	
4							
5						TD @ 4.0"	3.82
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP63 SHEET 1 OF 1



TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.: IR84-DP64

COORDINATES: EAST: 2495165.3817

NORTH: 361575.0525

ELEVATION: SURFACE: 8.80

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Split Spoon	Casing	Augers	Macro Tube					
Size (ID)	2"				7/22/01	4.0'	Hot, partly cloudy	3.1
Length	4'							
Type	Macro.							
Hammer Wt.	NA							
Fall	NA							
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description		Elevation (Ft. MSL)
1	M-1	3.3'				Very fine, dark brown sand with trace to no silt, dry		8.8
2						Very fine, tan sand with trace silt, damp		
3						W. T. @ 3.1'		5.70
4						TD @ 4.0"		4.80
5								
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP64 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP65

COORDINATES: EAST: 2495095.9883

NORTH:

361603.0141

ELEVATION: SURFACE: 7.51

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"				7/22/01	4.0'	hot, partly cloudy	4.0'
Length	4'							
Type	Macro							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1	M-1					Dark brown, very fine sand, trace silt, trace medium sand	7.51
2							
3						Slightly damp	
4						W.T. @ 4.0'	3.51
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP65 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP66

COORDINATES: EAST: 2495271.6319

NORTH:

361494.8397

ELEVATION: SURFACE: 13.84

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	7/22/01	6.0'	hot, partly cloudy	5.5'
Length	2'			4'				
Type	std.			acetate				
Hammer Wt.	NA			NA				
Fall	NA			NA				

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 13.84
1	S-1					Light to medium brown, very fine sand with trace silt slightly damp	
2							
3	M-1					Light brown, very fine sand with trace silt	
4							
5							
6							
7						W.T. @ 5.5'	8.34
8							7.84
9						TD @ 6.0'	
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP66 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP67

COORDINATES: EAST: 2495032.4524

NORTH:

381690.4423

ELEVATION: SURFACE: 6.01

Rig:	Hand Auger				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/22/01	8"	hot, partly cloudy	2"
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
T = Shelby Tube W = Wash
R = Air Rotary C = Core
D = Denison M = Macro Tube
N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
PID = Photo Ionization Detector Measurement
MSL = Mean Sea Level
BG/PS = Background/Point Source
ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 6.01
1	S-1	8"				Dark brown, very fine sand with silt	
2						W.T. @ 2"	
3						TD @ 8"	
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP67 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP68

COORDINATES: EAST: _____

NORTH: _____

ELEVATION: SURFACE: _____

Rig: <u>Hand Auger</u>					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/22/01	8"	hot, partly cloudy	2"
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks: Heavily wooded**SAMPLE TYPE**

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1	S-1	8"				Light brown sand w/trace silt	
2						W.T. @ 2"	
3						TD @ 8"	
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP68

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP69COORDINATES: EAST: 2494909.0840NORTH: 361851.2857ELEVATION: SURFACE: 2.73

Rig:	Hand Auger				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/22/01	8"	hot, partly cloudy	4"
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks: Woody, edge of wetland area

SAMPLE TYPE					DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 2.73
1	S-1	8"				Dark brown, very fine sand with silt, trace clay	
2						W.T. @ 4"	
3						TD @ 8"	
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP69 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP70COORDINATES: EAST: 2494941.5316NORTH: 361870.4090ELEVATION: SURFACE: 3.43

Rig: <u>Hand Auger</u>					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/22/01	8"	hot, partly cloudy	4"
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks: Wooded at edge of wetland

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description		Elevation (Ft. MSL) 3.43
1	S-1	8"				Dark brown, very fine sand with trace clay, silt		
2						TD @ 8"		
3						WT @ 4"		
4								
5								
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP70 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP71

COORDINATES: EAST: 2494982.1039

NORTH:

361916.2681

ELEVATION: SURFACE: 3.61

Rig: Hand Auger					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/22/01	8"	hot, partly cloudy	4"
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks: Wooded at edge of wetland

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
	S-1	8"				Dark brown, very fine sand with silt	3.61
1						W.T. @ 4"	
2						TD @ 8"	
3							
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP71

SHEET 1 OF 1



TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

IR84-DP72

COORDINATES: EAST: 2495223.5072

NORTH:

361344.1377

ELEVATION: SURFACE: 17.10

Rig:	Hand Auger				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/23/01	8"	partly cloudy, warm	--
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE	DEFINITIONS
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample	SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
	S-1	8"					17.1
1						Very fine sand, grayish brown, trace silt with gravel	
2							
3						TD @ 8"	
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Lewis LeFever

BAKER REP.: E. Hanna

BORING NO.: IR84-DP72 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: IR84-DP73COORDINATES: EAST: 2495260.7049NORTH: 361389.9503ELEVATION: SURFACE: 16.45

Rig:	Hand Auger				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	3"				7/23/01	8"	partly cloudy, warm	--
Length	8"							
Type	Bucket							
Hammer Wt.	NA							
Fall	NA							

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 16.45
1	S-1	8"				Very fine sand, grayish brown, trace silt with gravel	
2							
3						TD @ 8"	
4							
5							
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Lewis LeFeverBAKER REP.: E. HannaBORING NO.: IR84-DP73 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: DP74COORDINATES: EAST: 2495560.308NORTH: 361331.3077ELEVATION: SURFACE: 21.11

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	8/2/01	8'	sunny, high 80s	7
Length	24"			48"				
Type	SS			Acetate				
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 21.11
1	M-1	2.7 68%		IR84-DP74-00	0.0 0.0	Fine sand, trace silt, damp, brown	
2						Red bricks, some fine sand, damp, red	19.01
3						Fine sand, trace silt, damp, brown	18.81
4						Wood debris, sewer odor, black, moist	18.61
5	M-2	1.6 40%		IR84-DP74-04	0.0 0.0	Red brick, some fine sand, moist, red	16.81
6						Fine sand, trace silt, wet, brown	16.61
7							
8							
9						End of Boring = 8.0'	13.11
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: David D. SchillingBORING NO.: DP74 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: DP74COORDINATES: EAST: 2495560.308NORTH: 361331.3077ELEVATION: SURFACE: 21.11

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	8/2/01	8'	sunny, high 80s	7
Length	24"			48"				
Type	SS			Acetate				
Hammer Wt.								
Fall								
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1						Fine sand, trace silt, damp, brown	21.11	
2	M-1	2.7 68%		IR84- DP74	0.0 0.0	Red bricks, some fine sand, damp, red	19.01	
3				-00		Fine sand, trace silt, damp, brown	18.81	
4	4.0					Wood debris, sewer odor, black, moist	18.61	
5						Red brick, some fine sand, moist, red	16.81	
6	M-2	1.6 40%		IR84- DP74	0.0 0.0	Fine sand, trace silt, wet, brown	16.61	
7				-04				
8	8.0						13.11	
9						End of Boring = 8.0'		
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: David D. SchillingBORING NO.: DP74 SHEET 1 OF 1



TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.: DP75

COORDINATES: EAST: 2495506.463

NORTH: 361317.9508

ELEVATION: SURFACE: 21.35

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Split Spoon	Casing	Augers	Macro Tube					
Size (ID)				2"	8/2/01	12'	Sunny high 80s	9
Length				48"				
Type				Acetate				
Hammer Wt.								
Fall								
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1				IR84-DP75-00		Fine sand, trace silt, moist, brown	21.35	
2	M-1	2.7			0.0			
3		67.5			0.0			
4	4.0						17.35	
5								
6	M-2	2.3			0.0			
7		57.5			0.0			
8	8.0						13.35	
9							12.35	
10	▲ M-3	3.5		IR84-DP75-05	225	Fine sand, trace silt, wet, dark gray, petroleum odor	11.15	
		87.5			0.0	Wood debris, wet, petroleum odor		

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: David D. Schilling

BORING NO.: DP75 SHEET 1 OF 2

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

CTO NO.: CTO-0219

BORING NO.: DP75

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
11	M-3					Wood debris, wet, petroleum odor	11.3 10.05
12						12.0	Fine sand, trace silt, wet, dark brown, petroleum odor
13						End of Boring = 12.0'	
14							
15							
16							
17							
18							
19							
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21							
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Match to Sheet 3

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: David D. Schilling

BORING NO.: DP75 SHEET 2 OF 2

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: DP76COORDINATES: EAST: 2495499.483NORTH: 361284.0629ELEVATION: SURFACE: 22.18

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)				2"	8/2/01	8	Sunny high 80s	8
Length				48"				
Type				Acetate				
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1	M-1	2.9 72.5%		IR84- DP76 -00	0.0 0.0	Fine sand, some gravel, trace silt, damp brown	18.18
2							
3							
4							
5	M-2	4 100.0%		IR84- DP76 -04	0.0 0.0	Fine sand, trace silt, moist, brown	14.38
6							
7							
8							
9						End of Boring = 8.0'	14.18
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: David D. SchillingBORING NO.: DP76 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

DP77

COORDINATES: EAST: 2495094.324

NORTH:

361456.1753

ELEVATION: SURFACE: 10.25

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)				2"	8/5/01	8	Partly cloudy 90's	5
Length				48"				
Type				Acetate				
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
							10.25
1				IR84-DP77-00		Fine sand, trace silt, moist, brown	
2	M-1	3.1 77.5%			0.0 0.0		
3							
4	4.0						4.0 6.25
5							4.9 5.35
6	M-2	3.6 90.0%		IR84-DP77-03	0.0 0.0	Fine sand, trace silt, wet, brown	
7							
8	8.0						8.0 2.25
9						End of Boring = 8.0'	
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: David D. Schilling

BORING NO.: DP77 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

DP78

COORDINATES: EAST: 2495042.026

NORTH:

361486.7887

ELEVATION: SURFACE: 9.36

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)				2"	8/5/01	8	Partly cloudy 90's	6
Length				48"				
Type				Acetate				
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 9.36
1	M-1	3.5 87.5%		IR84- DP78 -00	0.0 0.0	Fine sand, trace silt, moist, brown	4.0 5.36
2							
3							
4							
5	M-2	3.2 80.0%		IR84- DP78 -03	0.0 0.0	Fine sand, trace silt, wet, brown	5.7 3.66
6							
7							
8							
9						End of Boring = 8.0'	8.0 1.36
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: David D. Schilling

BORING NO.: DP78 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: DP79COORDINATES: EAST: 2495046.772NORTH: 361421.5646ELEVATION: SURFACE: 10.26

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Split Spoon	Casing	Augers	Macro Tube					
Size (ID)			2"	8/5/01	8	Partly cloudy 90's	4	
Length			48"					
Type			Acetate					
Hammer Wt.								
Fall								
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1	M-1	3.3 82.5%		IR84-DP79-00	0.0 0.0	Fine sand, trace silt, moist, brown	7.26	
2								
3								
4	M-2	3.8 95.0%		IR84-DP79-02 & 02D	0.0 0.0	Fine sand, trace silt, wet, brown	2.26	
5								
6								
7								
8								
9								
10								
End of Boring = 8.0'								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: David D. SchillingBORING NO.: DP79 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: DP80COORDINATES: EAST: 2495059.802NORTH: 361345.5071ELEVATION: SURFACE: 11.09

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)				2"	8/5/01	8	Partly cloudy 90's	4
Length				48"				
Type				Acetate				
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 11.09
1	M-1	3.6 90.0%		IR84- DP80 -00	0.0 0.0	Fine sand, trace silt, moist, light brown	7.69 7.09
2							
3							
4	M-2	3.4 85.0%		IR84- DP80 -02	0.0 0.0	Fine sand, trace silt, wet, light brown	7.69 7.09
5							
6							
7							3.09
8							
9							
10						End of Boring = 8.0'	

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: David D. SchillingBORING NO.: DP80 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.: DP81

COORDINATES: EAST: 2495281.652

NORTH:

361462.6635

ELEVATION: SURFACE: 15.16

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	Split Spoon	Casing	Augers	Macro Tube				
Length				2"	8/5/01	12'	Partly cloudy 90's	8
Type				Acetate				
Hammer Wt.								
Fall								
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1	M-1	2.9 72.50%		IR84-DP81-00	0.0 0.0	Fine sand, trace silt, damp, brown	11.16	
2								
3								
4								
4.0								
5	M-2	3.4 85.00%			0.8 0.0	Fine sand, trace silt, moist, brown	8.46	
6								
7								
8								
8.0								
9	M-3	3.5 87.50%		IR84-DP81-04	3.5 0.0	Fine sand, trace silt, wet, black	7.16	
10								
						Match to page 2		

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: David D. Schilling

BORING NO.: DP81 SHEET 1 OF 2

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationCTO NO.: CTO-0219BORING NO.: DP81**SAMPLE TYPE**

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison P = Piston N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 ps/bg = point source/background

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL) 4.66
11	M-3					Continued from page 1	3.16
12						End of Boring = 12.0'	
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30						Match to Sheet 3	

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: David D. SchillingBORING NO.: DP81 SHEET 2 OF 2

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: DP82

COORDINATES: EAST: _____

NORTH: _____

ELEVATION: SURFACE: _____

Rig: Geoprobe					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)				2"	8/5/01	12'	Partly cloudy 90's	8
Length				48"				
Type				Acetate				
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1	M-1	3.2 80.00%		IR84- DP82 -00	<u>36.6</u> 0.0	Fine sand, trace silt, trace gravel, moist, dark gray, petroleum odor	4.0
2							
3							
4							
5	M-2	4 100.0%			<u>0.9</u> 0.0	Fine sand, trace silt, moist, brown	8.0
6							
7							
8							
9	M-3	4 100.0%		IR84- DP82 -04	<u>32.7</u> 0.0	Fine sand, trace silt, wet, brown	
10							

Match to page 2

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: David D. SchillingBORING NO.: DP82 SHEET 1 OF 2



TEST BORING RECORD

PROJECT: Site 84 field investigation

CTO NO.: CTO-0219

BORING NO.: DP82

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
11	M-3					Continued from page 1	
12						12.0	
13						End of Boring = 12.0'	
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
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26							
27							
28							
29							
30							Match to Sheet 3

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: David D. Schilling

BORING NO.: DP82

SHEET 2 OF 2

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: DP83COORDINATES: EAST: 2495240.116NORTH: 361393.5959ELEVATION: SURFACE: 16.08

Rig:	Geoprobe				Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)				2"	8/5/01	8	Partly cloudy 90's	6
Length				48"				
Type				Acetate				
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
16.08								
1		M-1	3.2 80.0%		IR84-DP83-00	0.0 0.0	Fine sand, trace silt, moist, brown, red brick and gravel fragments	12.08
2								
3								
4	4.0							
5		M-2	3.4 85.0%		IR84-DP83-03	0.0 0.0	Fine sand, trace silt, moist, brown	9.58
6								
7								
8	8.0							
8.08								
End of Boring = 8.0'								
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DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: David D. SchillingBORING NO.: DP83 SHEET 1 OF 1



TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.: DP84

COORDINATES: EAST: 2494950.551

NORTH: 361926.4302

ELEVATION: SURFACE: 1.92

Rig: Hand Driven					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Split Spoon	Casing	Augers	Macro Tube					
Size (ID)			2"		8/3/01	1	Sunny high 80s	1
Length			48"					
Type			Acetate					
Hammer Wt.								
Fall								

Remarks: Location was inaccessible by rig, and soil was soft, so acetate tube was hand driven

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
							1.92	
1	M-1	1 100.0%		IR84-DP84	0.0 0.0	Fine sand, trace silt, wet, dark brown	1.0	0.92
2				-00		End of Boring = 1.0'		
3								
4								
5								
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: David D. Schilling

BORING NO.: DP84 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

MW15

COORDINATES: EAST: 2495541.202

NORTH:

361295.9998

ELEVATION: SURFACE: 21.82

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Core Barrel				
Size (ID)	2"		3.25"		7/31/01	12'	Sunny mid 80s	7.5'
Length	24"		5'					
Type	SS		S					
Hammer Wt.	140lb		NA					
Fall	30"		NA					

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison P = Piston
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1	S-1	2	4	84-		Fine sand, trace silt, damp, loose, brown	19.82
2		100%	4	MW15	0.0		
			5	-00	0.0		
3	S-2	0.8	5		0.0	Fine sand, trace silt, damp, loose, light brown	17.82
4		40%	5		0.0		
			5				
5	S-3	0.0	4		NA	No Recovery : spoon was wet and had strong petroleum odor when it was opened	15.82
6		0%	3				
			3				
7	S-4	2.0	2	84-		Fine sand, trace silt, wet, very loose, black, petroleum product, strong petroleum odor	13.82
8		100%	3	MW15	513		
			3	-04	0.0		
9	S-5	0.8	2		330	Fine sand, trace silt, wet, very loose, black, strong petroleum odor	11.82
		40%	2		0.0		
10			2				
			3			Match to Sheet 2	

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: David D. Schilling

BORING NO.: MW15 SHEET 1 OF 2

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationCTO NO.: CTO-0219BORING NO.: MW15

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background	
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
11	S-6	2.0 100%	4		<u>330</u> 0.0	Fine sand, trace silt, wet, loose, black, strong petroleum odor	12.0
12			4				
12			6				
13						End of Boring = 12.0'	9.82
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
Match to Sheet 3							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: David D. SchillingBORING NO.: MW15 SHEET 2 OF 2

Baker

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.: MW16

COORDINATES: EAST: 2495466.451

NORTH: 361519.1496

ELEVATION: SURFACE: 20.13

TOP OF PVC CASING: 19.84

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Core Barrel				
Size (ID)	2"				7/31/01	20'	Sunny mid 80s	13.5'
Length	24"							
Type	SS							
Hammer Wt.	140Lbs							
Fall	30"							

Remarks:

SAMPLE TYPE						WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
						Schedule 40 PVC casing	2"	20.13	10.13
						Schedule 40 0.010" screen	2"	10.13	0.13
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	S-1	1.4 70.0%	4 8	84- MW16	0.0 0.0	Fine sand, trace silt, loose, damp, brown			20.13
2			8	0	0.0				18.13
3	S-2	1.1 55.0%	4 6		0.0 0.0				
4			8 9						16.13
5	S-3	2.0 100.0%	7 8		0.0 0.0				15.43
6			11 12			Fine sand, trace silt, damp, medium dense light tan			14.13
7	S-4	2.0 100.0%	10 13		0.0 0.0				12.13
8			15						
9	S-5	2.0 100.0%	8 7		0.0 0.0				10.13
10			9 6						

Match to Sheet 2

DRILLING CO.: Parratt Wolff Inc.

DRILLER: Louie Lefever

BAKER REP.: David D. Schilling

BORING NO.: MW16 SHEET 1 OF 2



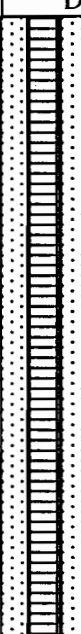
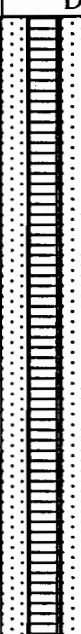
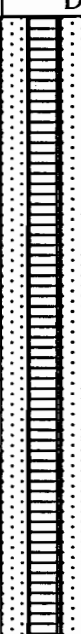
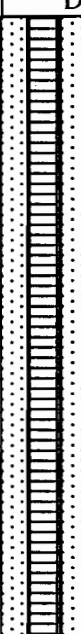
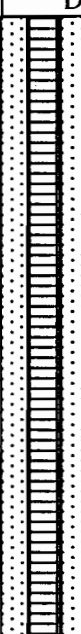
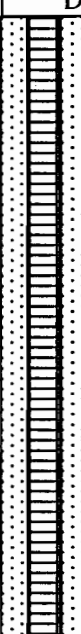
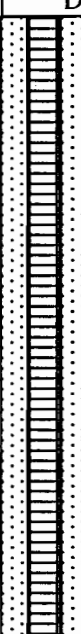
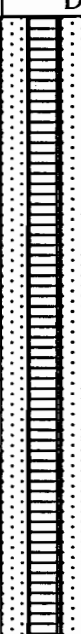
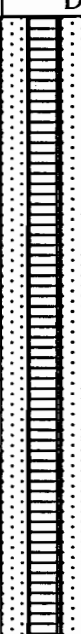
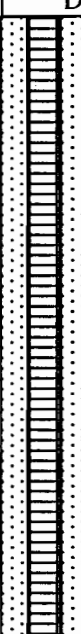
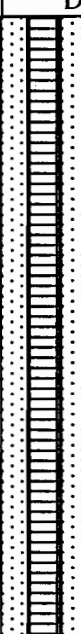
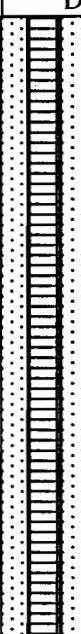
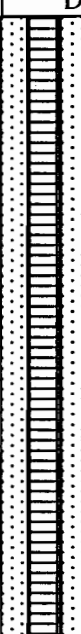
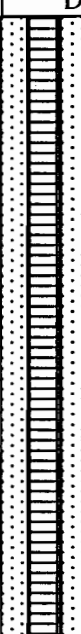
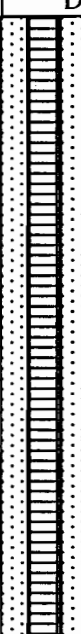
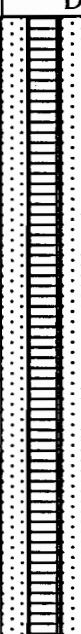
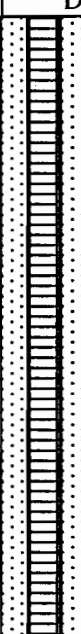
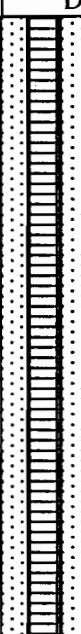
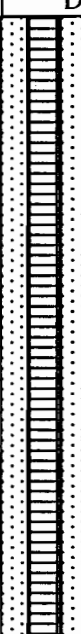
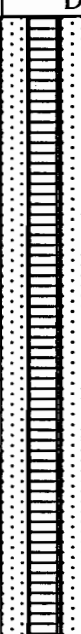
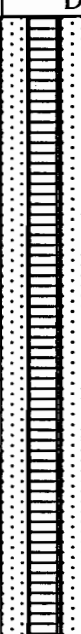
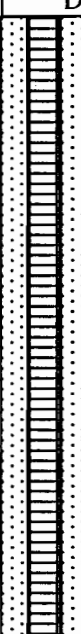
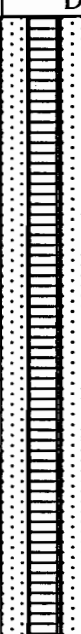
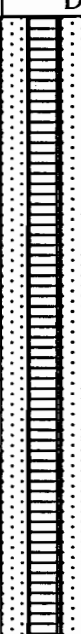
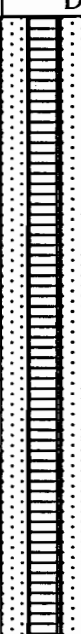
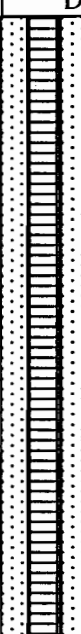
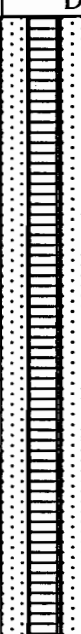
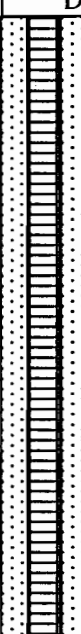
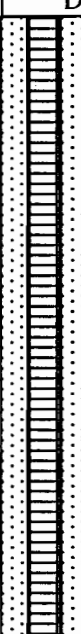
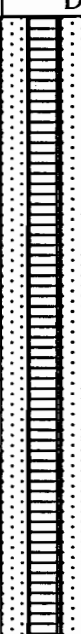
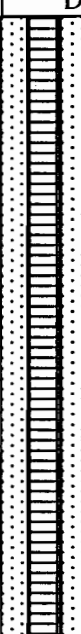
Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 84 field investigation

CTO NO.: CTO-0219

BORING NO.: MW16

SAMPLE TYPE						DEFINITIONS			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background			
Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11		S-6	1.4 70.0%	7	84-MW16	0.0	Fine sand, trace silt, moist, medium dense, light tan		9.63
12				6		0.0			8.13
13				6		0.0			6.73
13		S-7	1.8 90.0%	5	84-MW16	0.0	Fine sand, trace silt, moist, loose, light tan		6.13
14				3		0.0			5.53
15				2		0.0			4.13
16		S-8	1.5 75.0%	5	84-MW16	0.0	Fine sand, trace silt, wet, very loose, light gray		2.13
17				5		0.0			0.13
18				13		0.0			
19		S-9	2.0 100.0%	12	84-MW16	0.0	Fine sand, some clay, wet, loose, orangish brown		
20				13		0.0			
21				13		0.0			
22		S-10	1.2 60.0%	3	84-MW16	0.0	Fine sand, trace silt, wet, medium dense, light gray		
23				1		0.0			
24				4		0.0			
25		S-10	1.2 60.0%	8	84-MW16	0.0	Fine sand, trace silt, loose, wet orangish brown		
26						0.0			
27						0.0			
28		End of Boring = 20.0'							
29									
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101									
102									

Match to Sheet 3

DRILLING CO.: Parratt Wolff Inc.

DRILLER: Louie Lefever

BAKER REP.: David D. Schilling

BORING NO.: MW16 SHEET 2 OF 2

Match to Sheet 3

Baker

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.: MW17

COORDINATES: EAST: 2495308.643

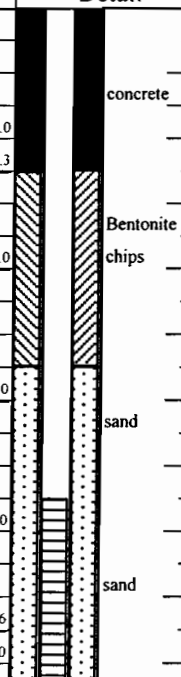
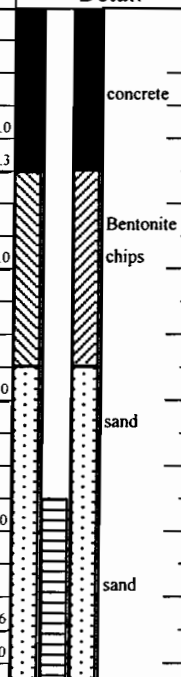
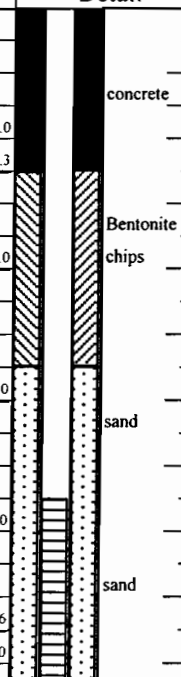
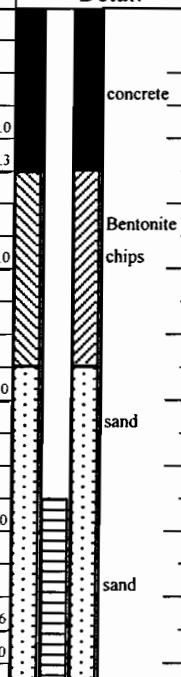
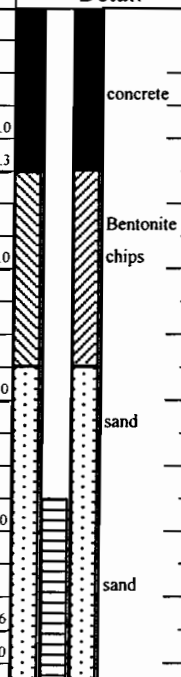
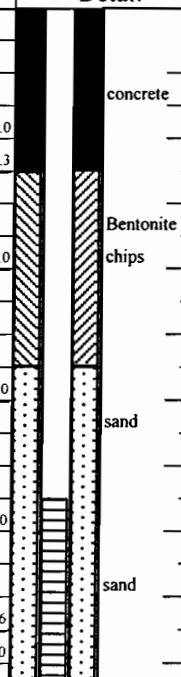
NORTH: 361448.4669

ELEVATION: SURFACE: 16.53

TOP OF PVC CASING: 18.73

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Core Barrel				
Size (ID)	2"				7/31/01	17.5	Sunny mid 80s	8.5
Length	24"							
Type	SS							
Hammer Wt.	140Lbs							
Fall	30"							

Remarks:

SAMPLE TYPE						WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
						Schedule 40 PVC casing	2"	20.13	10.13
						Schedule 40 0.010" screen	2"	10.13	0.13
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	S-1	1.6 80.0%	2	84-	MW17 -00 0.0 0.0	Fine sand, trace silt, damp, loose brown, coal fragments			14.53 14.23
2			3	MW17					
3			4	84-					
4	S-2	0.9 45.0%	4	MW17	-02 0.0 0.0	Fine sand, trace silt, wet, very loose, brown			12.53
5			3						
6			3						
7	S-3	2.0 100.0%	2		0.0 0.0	Fine sand, trace silt, wet, very loose, orangish brown			10.53
8			2						
9			3						
10	S-4	1.1 55.0%	3		0.0 0.0	Fine sand, trace silt, moist, loose, orangish brown			8.53
11			5						
12			5						
13	S-5	1.7 85.0%	3		0.0 0.0	Fine sand, trace silt, moist, loose, orangish brown			6.93
14			3						
15			4						
16	S-5	1.7 85.0%	4		0.0 0.0	Fine sand, trace silt, wet, loose, orangish brown			6.53
17			5						
18			6						

DRILLING CO.: Parratt Wolff Inc.

DRILLER: Louie Lefever

BAKER REP.: David D. Schilling

BORING NO.: MW17 SHEET 1 OF 2



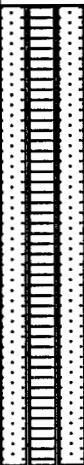
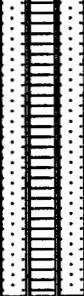
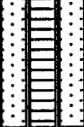
TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 84 field investigation

CTO NO.: CTO-0219

BORING NO.:

MW17

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-6	1.1 55.0%	6		0.0 0.0	Fine sand, trace silt, wet, loose, orangish brown, to tan		6.03
12			6					4.53
13	S-7	2.0 100.0%	7	84- MW17	80.2 0.0	Fine sand, little silt, wet, loose tan, petroleum odor		3.53
14			7					2.53
15	S-8	2.0 100.0%	5	-07	153.0 0.0	Fine sand, trace silt, wet, loose, gray		0.53
16			5					-0.97
17	AN							
18						End of Boring = 17.5'		
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

Match to Sheet 3

DRILLING CO.: Parratt Wolff Inc.

DRILLER: Louie Lefever

BAKER REP.: David D. Schilling

BORING NO.: MW17

SHEET 2 OF 2



TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 84 field investigation
 PROJ. NO.: CTO-0219 BORING NO.: MW18
 COORDINATES: EAST: 2495589.981 NORTH: 361204.2411
 ELEVATION: SURFACE: 22.75 TOP OF PVC CASING: 22.56

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Split Spoon	Casing	Augers	Core Barrel					
Size (ID)	2"		6.25"		8/1/01	15.0	Sunny mid 80s	8.0
Length	24"		5'					
Type	SS		S					
Hammer Wt.	140Lbs							
Fall	30"							
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample					WELL INFORMATION			
					Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
					Schedule 40 PVC casing	2"	22.56	17.56
					Schedule 40 0.010" screen	2"	17.56	7.56
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1	S-1	1.6 80.0%	11 13	84- MW18 -00	0.0 0.0	Fine sand, trace silt, medium dense, damp, brown		20.75
2			12					2.0
3	S-2	1 50.0%	8 10		0.0 0.0			
4			7					4.0
5	S-3	0.8 40.0%	5 2		0.0 0.0	Fine sand, trace silt, damp, loose, brown		4.7
6			3			Fine sand, trace silt, wet, very loose, dark brown		6.0
7	S-4	1.5 75.0%	4 4		0.0 0.0	Fine sand, some silt, moist, loose, gray		
8			5	84-				8.0
9	S-5	1.2 60.0%	12 13	MW18 -04	0.0 0.0	Fine sand, trace silt, wet, loose, light gray		8.3
10			17			Fine sand, trace silt, wet, loose orangish brown		10.0
			2					

DRILLING CO.: Parratt Wolff Inc.
 DRILLER: Louie Lefever

BAKER REP.: David D. Schilling
 BORING NO.: MW18 SHEET 1 OF 2



TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 84 field investigation
CTO NO.: CTO-0219

BORING NO.: MW18

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-6	1.7 85.0%	4		0.0	Fine sand, trace silt, wet, loose, ^{11.1} orangish brown		12.25
			6		0.0			11.65
12			10			Fine sand, trace silt, loose wet, light gray		10.75
13			6		0.0	Fine sand trace silt, loose wet, light brown		9.45
14	S-7	1.7 85.0%	6		0.0		screen	8.75
			2			Fine sand, trace silt, wet, very loose, gray		7.75
15	AN					End of Boring = 15.0'	sand	
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

Match to Sheet 3

DRILLING CO.: Parratt Wolff Inc.
DRILLER: Louie Lefever

BAKER REP.: David D. Schilling
BORING NO.: MW18 SHEET 2 OF 2



Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.: MW19

COORDINATES: EAST: 2495250.629

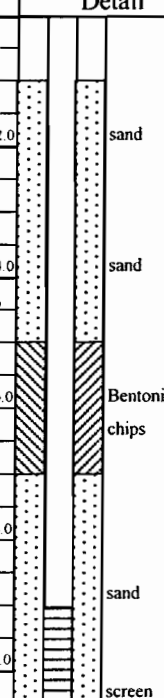
NORTH: 361296.4235

ELEVATION: SURFACE: 18.26

TOP OF PVC CASING: 18.00

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Core Barrel				
Size (ID)	2"		6.25"		8/1/01	19.0	Sunny mid 80s	12.0
Length	24"		5'					
Type	SS		S					
Hammer Wt.	140Lbs							
Fall	30"							

Remarks:

SAMPLE TYPE						WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
						Schedule 40 PVC casing	2"	18.00	9.00
						Schedule 40 0.010" screen	2"	9.00	-1.00
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	S-1	1.3 65.0%	12 20 26 30	84- MW19 -00	0.0 0.0	Fine sand, trace silt, damp, dense, brown, gravel fragments			18.26
2									16.26
3	S-2	1.1 55.0%	12 16 16 15		0.0 0.0	Fine sand, trace silt, damp, medium dense, orangish brown			14.26
4									
5	S-3	0.9 45.0%	3 3 3 3		0.0 0.0	Fine sand, trace silt, moist, loose, orangish brown			12.26
6									
7	S-4	1.6 80.0%	4 3 3 3		0.0 0.0				10.26
8									
9	S-5	1.2 60.0%	3 4 4 6 3		0.0 0.0				8.26
10									

DRILLING CO.: Parratt Wolff Inc.

DRILLER: Louie Lefever

BAKER REP.: David D. Schilling

BORING NO.: MW19

SHEET 1 OF 2



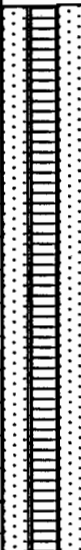
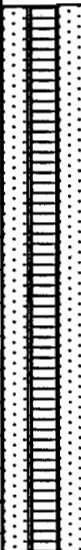
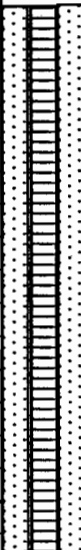
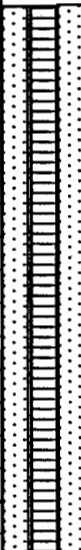
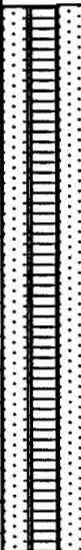
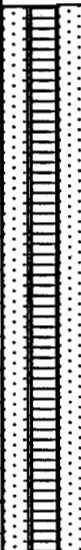
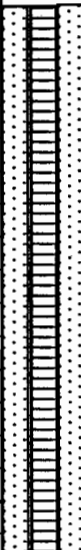
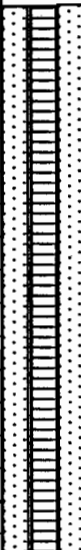
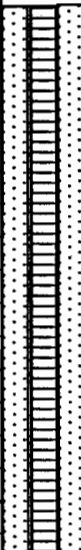
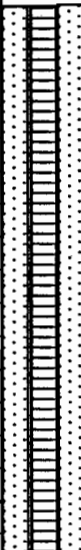
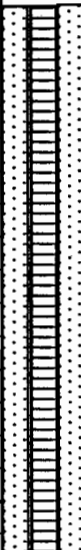
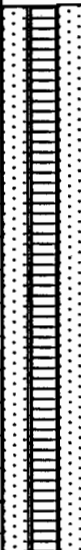
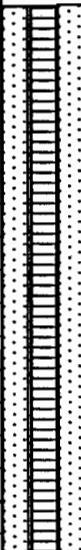
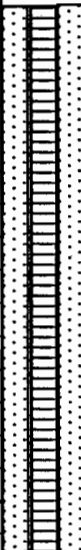
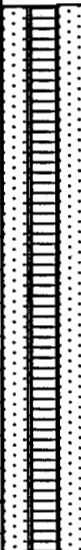
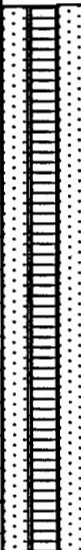
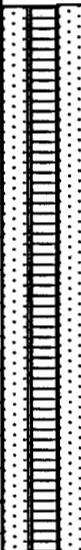
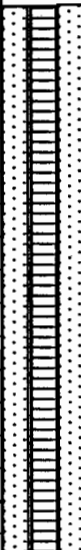
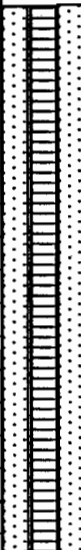
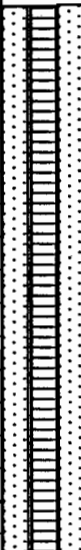
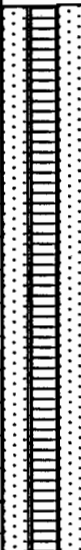
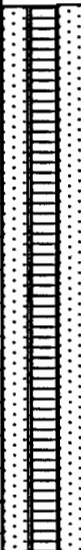
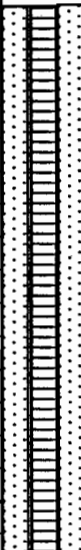
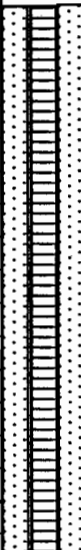
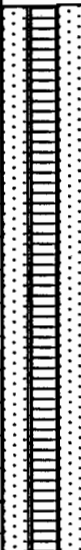
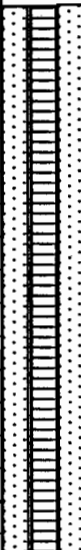
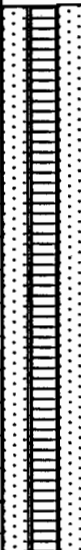
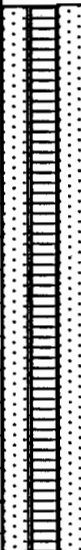
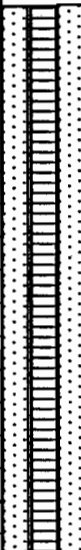
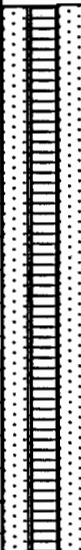
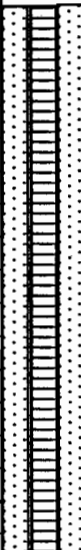
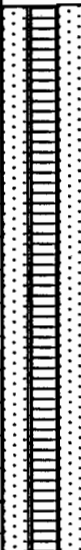
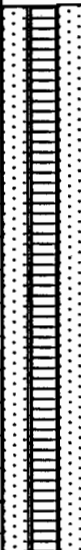
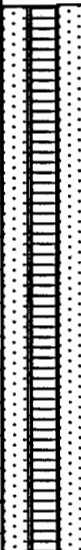
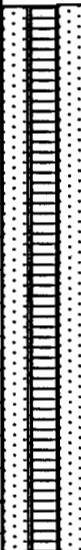
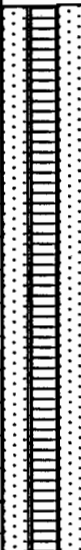
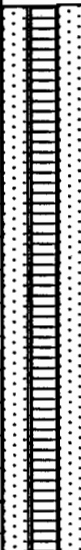
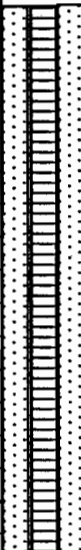
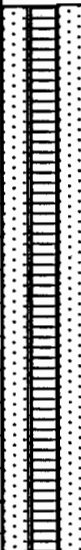
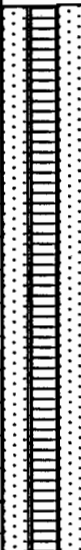
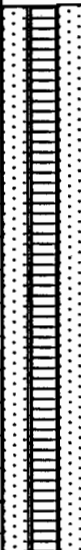
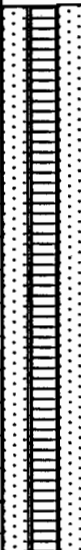
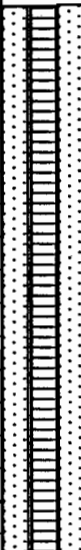
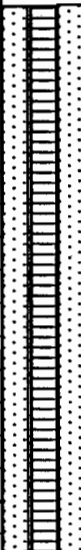
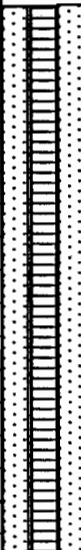
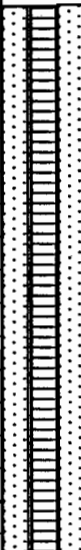
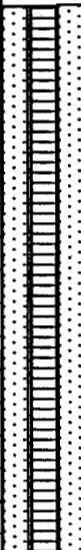
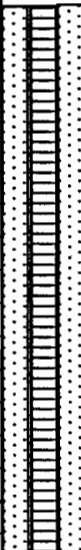
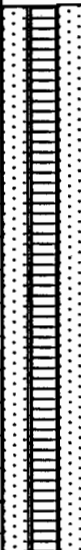
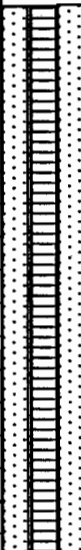
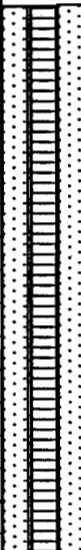
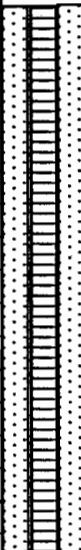
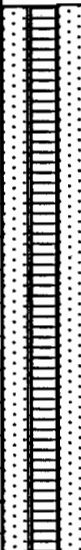
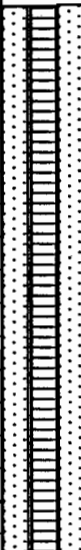
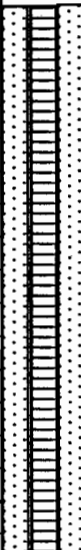
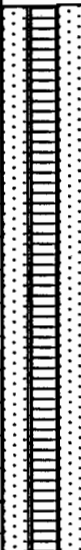
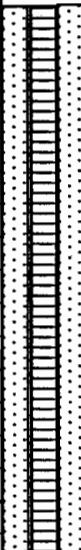
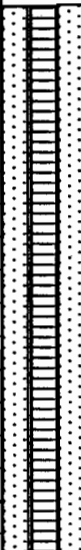
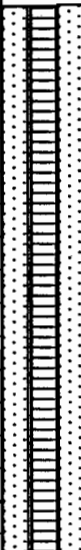
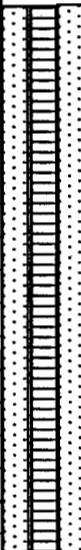
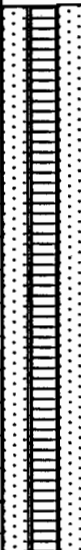
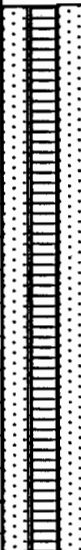
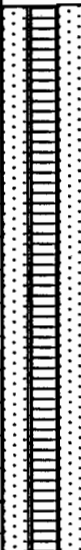
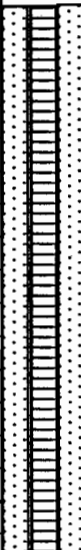
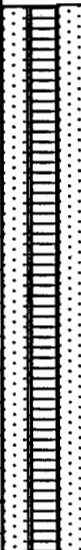
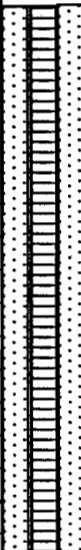
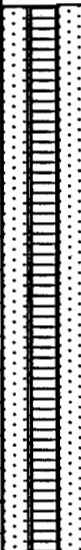
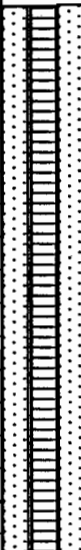
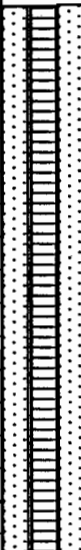
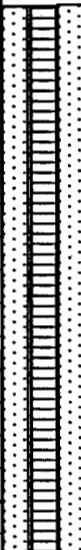
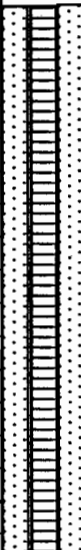
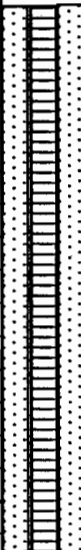
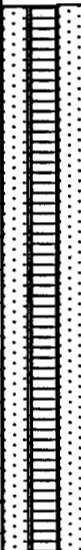
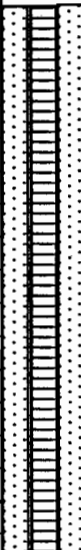
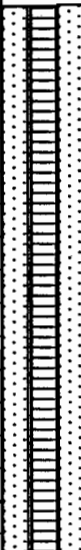
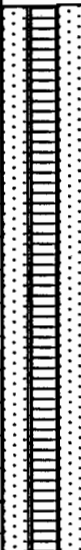
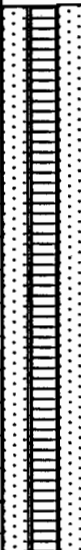
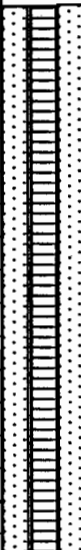
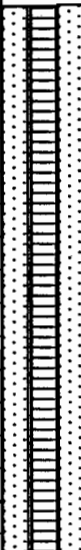
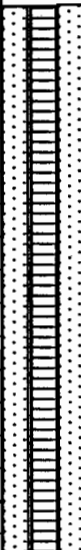
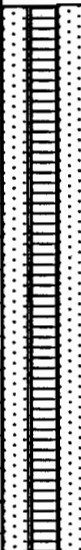
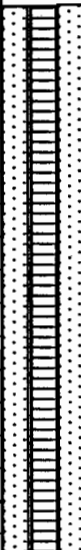
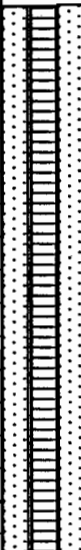
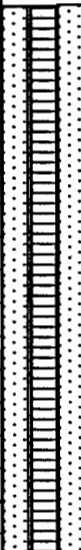
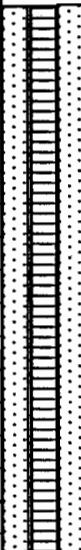
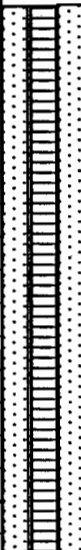
TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental

PROJECT: Site 84 field investigation

CTO NO.: CTO-0219

BORING NO.: MW19

SAMPLE TYPE						DEFINITIONS			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background			
Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11		S-6	1.6 80.0%	5	84-	0.0	Fine sand, trace silt, moist, medium dense, orangish brown		7.76
				10		0.0			
12				15		0.0			
13		S-7	1.2 60.0%	10	MW19-06	0.0	Fine sand, trace silt, wet, medium dense, orangish brown		6.26
14				16		0.0			
				20		0.0			
15		S-8	1.4 70.0%	7		0.0	Fine sand, trace silt, wet, dense gray		5.36
16				7		0.0			
				12		0.0			
17		S-9	1.8 90.0%	8		0.0	Fine sand, trace silt, wet, loose gray, orange staining		4.26
18				8		0.0			
				8		0.0			
19		AN		4					2.26
20									
21		AN							0.26
22									
23		AN							-0.74
24									
25		AN							
26									
27		AN							
28									
29		AN							
30									
31		AN							
32									
33		AN							
34									
35		AN							
36									
37		AN							
38									
39		AN							
40									
41		AN							
42									
43		AN							
44									
45		AN							
46									
47		AN							
48									
49		AN							
50									
51		AN							
52									
53		AN							
54									
55		AN							
56									
57		AN							
58									
59		AN							
60									
61		AN							
62									
63		AN							
64									
65		AN							
66									
67		AN							
68									
69		AN							
70									
71		AN							
72									
73		AN							
74									
75		AN							
76									
77		AN							
78									
79		AN							
80									
81		AN							
82									
83		AN							
84									
85		AN							
86									
87		AN							
88									
89		AN							
90									
91		AN							
92									
93		AN							
94									
95		AN							
96									
97		AN							
98									
99		AN							
100									
101		AN							
102									
103		AN							
104									
105		AN							
106									
107		AN							
108									
109		AN							
110									
111		AN							
112									
113		AN							
114									
115		AN							
116									
117		AN							
118									
119		AN							
120									
121		AN							
122									
123		AN							
124									
125		AN							
126									
127		AN							
128									
129		AN							
130									
131		AN							
132									
133		AN							
134									
135		AN							
136									
137		AN							
138									
139		AN							
140									
141		AN							
142									
143		AN							
144									
145		AN							
146									
147		AN							
148									
149		AN							
150									
151		AN							
152									
153		AN							
154									
155		AN							
156									
157		AN							
158									
159		AN							
160									
161		AN							
162									
163		AN							
164									
165		AN							
166									
167		AN							
168									
169		AN							
170									
171		AN							
172									
173		AN							
174									
175		AN							
176									
177		AN							
178									
179		AN							
180									
181		AN							
182									

Match to Sheet 3

DRILLING CO.: Parratt Wolff Inc.

DRILLER: Louie Lefever

BAKER REP.: David D. Schilling

BORING NO.: MW19 SHEET 2 OF 2

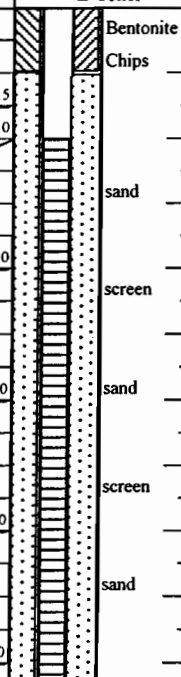
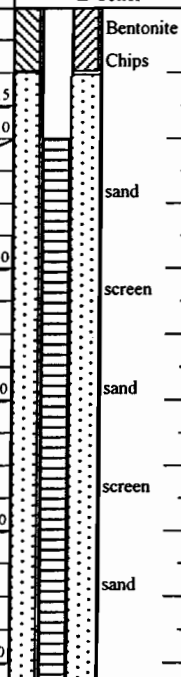
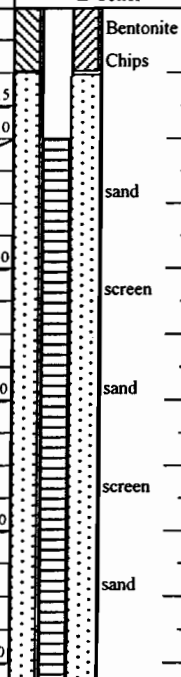
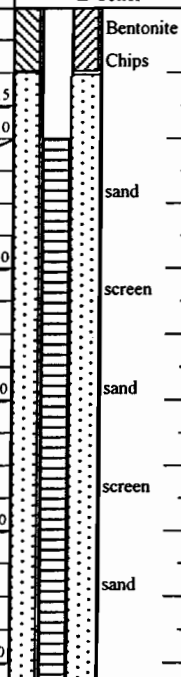
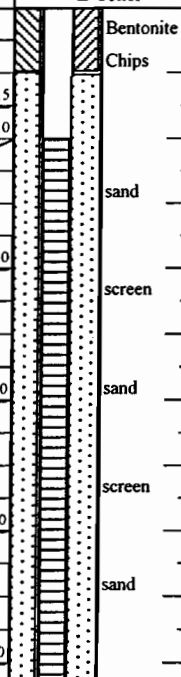
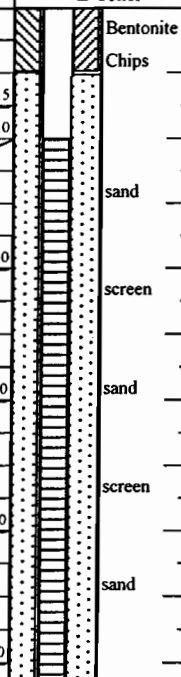
Baker

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: MW20COORDINATES: EAST: 2495130.973NORTH: 361583.9157ELEVATION: SURFACE: 8.61TOP OF PVC CASING: 11.41

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Core Barrel				
Size (ID)	2"		6.25"		8/1/01	12.0	Sunny mid 80s	2.0
Length	24"		5'					
Type	SS		S					
Hammer Wt.	140Lbs							
Fall	30"							

Remarks:

SAMPLE TYPE						WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
						Schedule 40 PVC casing	2"	11.41	6.61
						Schedule 40 0.010" screen	2"	6.61	-3.39
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail		Elevation (Ft. MSL)
1	S-1	1.7 85.0%	2	84-MW20	0.5	Fine sand, trace silt, moist, loose brown			7.11
2			2	-00 & -00D	0.0	Fine sand, trace silt, wet, loose dark gray			6.61
3	S-2	0.8 40.0%	7		0.2	Fine sand trace silt, wet, loose gray			4.61
4			7		0.0	Fine sand, trace silt, wet, very loose, gray			2.61
5	S-3	0.8 40.0%	1		1.0	Fine sand, trace silt, wet, loose, brown			0.61
6			1		0.0	Fine sand, trace silt, wet, loose, brown			-1.39
7	S-4	1.8 90.0%	6		0.2	Fine sand, trace silt, wet, loose, brown			
8			6		0.0	Fine sand, trace silt, wet, loose, grayish brown			
9	S-5	2.0 100.0%	4		0.0	Fine sand, trace silt, wet, loose, grayish brown			
10			4		0.0				
			4						

DRILLING CO.: Parratt Wolff Inc.DRILLER: Louie LefeverBAKER REP.: David D. SchillingBORING NO.: MW20 SHEET 1 OF 2

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 84 field investigation

CTO NO.: CTO-0219

BORING NO.: MW20

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	S-6	1.9	5		0.0	Fine sand, trace silt, wet, loose, grayish brown		-1.89
		95.0%	4		0.0			
12			3					-3.39
13						End of Boring = 12.0		
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30								

Match to Sheet 3

DRILLING CO.: Parratt Wolff Inc.

DRILLER: Louie Lefever

BAKER REP.: David D. Schilling

BORING NO.: MW20

SHEET 2 OF 2



TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 84 field investigation
 PROJ. NO.: CTO-0219 BORING NO.: MW21
 COORDINATES: EAST: 2495406.375 NORTH: 361257.5801
 ELEVATION: SURFACE: 21.44 TOP OF PVC CASING: 21.05

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	Split Spoon	Casing	Augers	Core Barrel				
Length	2"		6.25"		8/2/01	15.0	Sunny mid 80s	7.0
Type	24"		5'					
Hammer Wt.	SS		S					
Fall	140Lbs							
	30"							
Remarks:								
SAMPLE TYPE						WELL INFORMATION		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						Type	Diam.	Top Depth (Ft.) Bottom Depth (Ft.)
						Schedule 40 PVC casing	2"	21.05 16.05
						Schedule 40 0.010" screen	2"	16.05 6.05
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
1	S-1	1.1 55.0%	2 5 12		0.0 0.0	Fine sand, trace silt, damp, loose gray		
2			11					19.44
3	S-2	1.6 80.0%	7 8 8		0.0 0.0			17.44
4			7					
5	S-3	1.5 75.0%	4 5 4		0.0 0.0	Fine sand, trace silt, moist, loose grayish brown		15.44
6			4					15.04
7	S-4	1.5 75.0%	2 1 2		0.0 0.0	Fine sand, trace silt, moist, very loose, light brown		13.44
8			2	84-		Fine sand, trace silt, wet, very loose, black		
9	S-5	1.0 50.0%	27 36 31	MW21 -04	0.0 0.0	Fine sand and gravel, trace silt, wet, very dense, reddish brown		11.44
10			31 4					

DRILLING CO.: Parratt Wolff Inc.
 DRILLER: Louie Lefever

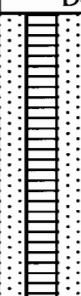
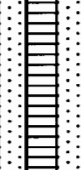
BAKER REP.: David D. Schilling
 BORING NO.: MW21 SHEET 1 OF 2



TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 84 field investigation
 CTO NO.: CTO-0219

BORING NO.: MW21

SAMPLE TYPE						DEFINITIONS			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)	
11	S-6	2.0 100.0%	10		2.2	Fine sand, trace silt, wet, medium dense, dark brown		9.44	
12			16		0.0				
13			10		0.0				
14	S-7	1.6 80.0%	11		0.0	Fine sand, trace silt, wet, medium dense, brown		7.44	
15			12		0.0				
16	AN		8			End of Boring = 15.0'		6.44	
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

Match to Sheet 3

Match to Sheet 3

DRILLING CO.: Parratt Wolff Inc.
 DRILLER: Louie Lefever

BAKER REP.: David D. Schilling
 BORING NO.: MW21 SHEET 2 OF 2

Baker

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.: MW22

COORDINATES: EAST: 2495374.167

NORTH: 361413.6927

ELEVATION: SURFACE: 19.91

TOP OF PVC CASING: 19.52

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Core Barrel				
Size (ID)	2"		6.25"		8/3/01	22.0	Sunny mid 80s	15.0
Length	24"		5'					
Type	SS		S					
Hammer Wt.	140Lbs							
Fall	30"							

Remarks:

SAMPLE TYPE						WELL INFORMATION			
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)
						Schedule 40 PVC casing	2"	19.52	7.52
						Schedule 40 0.010" screen	2"	7.52	-2.48
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft., %)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)	
1	S-1	0.4 20.0%	4		0.0 0.0	Fine sand, trace silt, damp, loose brown, red brick fragments		17.91	
2			3						
3			4						
4	S-2	0.9 45.0%	4	84-	0.0 0.0	Fine sand, trace silt, moist, loose brown		15.91	
5			3						
6			4						
7	S-3	1.7 85.0%	4	MW22 -02	0.0 0.0	Fine sand, trace silt, wet, loose, brown		13.91	
8			3						
9			4						
10	S-4	0.8 40.0%	8		0.0 0.0	Fine sand, trace silt, moist, medium dense, marbled white & brown		11.91	
11			10						
12			11						
13	S-5	1.2 60.0%	6		0.0 0.0	Fine sand, trace silt, moist medium dense, brown		11.71	
14			10						
15			13						
16			21			Fine sand, trace silt, wet medium dense, brown		9.91	
17			10						
18									

DRILLING CO.: Parratt Wolff Inc.

DRILLER: Louie Lefever

BAKER REP.: David D. Schilling

BORING NO.: MW22 SHEET 1 OF 2



TEST BORING AND WELL CONSTRUCTION RECORD

Baker Environmental

PROJECT: Site 84 field investigation

CTO NO.: CTO-0219

BORING NO.: MW22

SAMPLE TYPE						DEFINITIONS				
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background				
Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)	
9.41										
11		S-6	1.8 90.0%	12 17 20		0.0 0.0	Fine sand, trace silt, moist, medium dense, light gray		7.91	
12		S-7	1.3 65.0%	12 15 16 19		0.0 0.0	Fine sand, trace silt, moist, medium dense, light gray, orange staining		5.91	
13				14.0	5.51					
14				14.4	5.51					
15	▲	S-8	1.3 65.0%	9 13 16 14		0.0 0.0	Fine sand, trace silt, wet, medium dense, orangish brown, orange staining		3.91	
16		S-9	1.6 80.0%	6 6 11 18		0.0 0.0	Fine sand, trace silt, wet, medium dense, orangish brown		1.91	
17				18.0	1.91					
18				20.0	-0.09					
19		S-10	1.2 60.0%	4 8 8 4		0.0 0.0			-0.09	
20		AN							screen	-2.09
21				22.0	-2.09					
22										
23							End of Boring = 22.0'			
24										
25										
26										
27										
28										
29										
30										
Match to Sheet 3										

DRILLING CO.: Parratt Wolff Inc.

DRILLER: Louie Lefever

BAKER REP.: David D. Schilling

BORING NO.: MW22

SHEET 2 OF 2



PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.: MW23

COORDINATES: EAST: 2494960.047

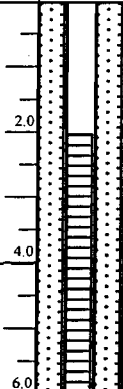
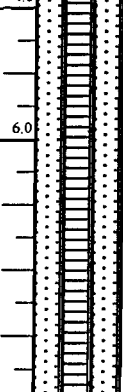
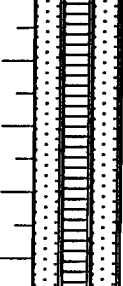
NORTH: 361951.2888

ELEVATION: SURFACE: 5.34

TOP OF PVC CASING: 8.52

Rig: Tripod					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Core Barrel				
Size (ID)	2"	3"	6.25"		8/3/01	12.0	Sunny mid 80s	4.0
Length	24"	4'	5'					
Type	SS	S	S					
Hammer Wt.	140Lbs	140Lbs						
Fall	30"	30"						

Remarks:	A tripod was used to install MW23

SAMPLE TYPE						WELL INFORMATION					
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison P = Piston M = Macro Core N = No Sample						Type	Diam.	Top Depth (Ft.)	Bottom Depth (Ft.)		
						Schedule 40 PVC casing	2"	8.52	3.34		
						Schedule 40 0.010" screen	2"	3.34	-6.66		
Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)		
1		S-1	0 0.0%	3	84-	0.0 0.0	Fine sand, trace silt, moist, loose, dark gray		3.34		
2				4							
3				5							
4		S-2	0.6 30.0%	4	MW23 -01	0.0 0.0			Fine sand, trace silt, wet, loose dark gray, petroleum odor		1.34
5				5							
6				6							
7		S-3	1.3 65.0%	4		3.5 0.0		-0.66			
8				3							
9				6							
10		MN									
		MN									

DRILLING CO.: Parratt Wolff Inc.

DRILLER: Louie Lefever

BAKER REP.: David D. Schilling

BORING NO.: MW23 SHEET 1 OF 2

Baker

Baker Environmental

TEST BORING AND WELL CONSTRUCTION RECORDPROJECT: Site 84 field investigationCTO NO.: CTO-0219BORING NO.: MW23

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash M = Macro Core R = Air Rotary C = Core D = Denison P = Piston N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level ps/bg = point source/background		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Well Installation Detail	Elevation (Ft. MSL)
11	MN							-5.16
12								-6.66
13						End of Macro Core = 12.0'		
14								
15								
16								
17								
18								
19								
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21								
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24								
25								
26								
27								
28								
29								
30								
						Match to Sheet 3		

DRILLING CO.: Parratt Wolff Inc.DRILLER: Louie LefeverBAKER REP.: David D. SchillingBORING NO.: MW23 SHEET 2 OF 2

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

SB01

COORDINATES: EAST: 2495403.418

NORTH:

361254.0209

ELEVATION: SURFACE: 21.31

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Split Spoon	Casing	Augers	Macro Tube					
Size (ID)	2"			2"	8/2/01	6'	Cloudy high 80s	NA
Length	24"			48"				
Type	SS			Acetate				
Hammer Wt.								
Fall								
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1	S-1	1.4 70%			0.0 0.0	Fine sand, trace silt, moist, dark brown, wood fragments	21.31	
2							19.31	
3								
4	M-1	3.4 85%		IR84- SB01- 02	0.0 0.0	Fine sand, trace silt, moist, brown		
5								
6							15.31	
7						End of Boring = 6.0'		
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: David D. Schilling

BORING NO.: SB01 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

SB02

COORDINATES: EAST: 2495404.290

NORTH:

361260.3094

ELEVATION: SURFACE: 21.44

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	8/2/01	6'	Cloudy high 80s	NA
Length	24"			48"				
Type	SS			Acetate				
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description		Elevation (Ft. MSL)
								21.44
1	S-1	1.6 80%			0.0 0.0	Fine sand, trace silt, concrete fragments, damp, dark brown	1.0	20.44
2						Fine sand, trace silt, moist, brown	2.0	19.44
3						Fine sand, trace silt, moist, brown		
4	M-1	4.0 100%		IR84- SB02- 02	0.0 0.0			
5								
6							6.0	15.44
7						End of Boring = 6.0'		
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: David D. Schilling

BORING NO.: SB02 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: SB03COORDINATES: EAST: 2495409.313NORTH: 361261.1316ELEVATION: SURFACE: 21.55

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	8/2/01	6'	Cloudy high 80s	NA
Length	24"			48"				
Type	SS			Acetate				
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)		Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
								21.55
1		S-1	1.7 85%			0.0 0.0	Fine sand, trace silt, trace fine gravel, damp, gray	
2	2.0						concrete	20.05 19.55
3		M-1	1.1 28%		IR84-SB03-02	0.0 0.0	Fine sand, trace silt, damp, gray	18.55
4							concrete	18.45
5								
6	6.0							15.55
7							Macro Tube Refusal @ 3.1'	
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: David D. SchillingBORING NO.: SB03 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: SB04COORDINATES: EAST: 2495409.094NORTH: 361256.1613ELEVATION: SURFACE: 21.46

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	8/2/01	6'	Cloudy high 80s	NA
Length	24"			48"				
Type	SS			Acetate				
Hammer Wt.								
Fall								
Remarks:								
SAMPLE TYPE S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample					DEFINITIONS SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million			
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)	
1	S-1	2.0 100%			0.0 0.0	Fine sand, trace silt, moist, dark brown, red brick	20.16	
2	2.0					Fine sand, trace silt, moist, brown	19.46	
3						Fine sand, trace silt, moist, brown		
4	M-1	3.1 78%		IR84-SB04-02	0.0 0.0			
5								
6	6.0						15.46	
7						End of Boring = 6.0'		
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: David D. SchillingBORING NO.: SB04 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: SB05COORDINATES: EAST: 2495377.042NORTH: 361411.3618ELEVATION: SURFACE: 19.91

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)			3"		8/3/01	2.5'	sunny, high 80s	NA
Length			12"					
Type			SS					
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE						DEFINITIONS		
S = Split Spoon HA = Hand Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million		
Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description		Elevation (Ft. MSL)
1	HA - 1	2.5		IR84-		Fine sand, trace silt, moist, brown		19.91
2		100%		SB05-01	0.0			
3				MS		End of Boring = 2.5'		17.41
4				MSD				
5								
6								
7								
8								
9								
10								

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: David D. SchillingBORING NO.: SB05

SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.:

SB06

COORDINATES: EAST: 2495370.618

NORTH:

361411.4487

ELEVATION: SURFACE: 19.94

Rig:	Split Spoon	Casing	Augers	Macro Tube	Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
Size (ID)	2"			2"	8/2/01	4'	sunny, high 80s	NA
Length	24"			48"				
Type	SS			Acetate				
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1				IR84-SB06-01		Fine sand, trace silt, moist, brown	19.94
2	M-1	3.1		& IR84-SB06-01D	0.0		
3		78%			0.0		
4	4.0						4.0 15.94
5						End of Boring = 4.0'	
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: David D. Schilling

BORING NO.: SB06 SHEET 1 OF 1

Baker

Baker Environmental

TEST BORING RECORDPROJECT: Site 84 field investigationPROJ. NO.: CTO-0219BORING NO.: SB07COORDINATES: EAST: 2495370.348NORTH: 361416.33ELEVATION: SURFACE: 19.78

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	8/2/01	4'	sunny, high 80s	NA
Length	24"			48"				
Type	SS			Acetate				
Hammer Wt.								
Fall								

Remarks:**SAMPLE TYPE**

S = Split Spoon A = Auger
 T = Shelby Tube W = Wash
 R = Air Rotary C = Core
 D = Denison M = Macro Tube
 N = No Sample

DEFINITIONS

SPT = Standard Penetration Test (ASTM D1586)
 PID = Photo Ionization Detector Measurement
 MSL = Mean Sea Level
 BG/PS = Background/Point Source
 ppm = parts per million

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1						Fine sand, trace silt, moist, brown	19.78
2	M-1	2.9 73%		IR84-SB07-01	0.0		
3					0.0		
4							
4.0							4.0 15.78
5						End of Boring = 4.0'	
6							
7							
8							
9							
10							

DRILLING COMPANY: Parratt Wolff Inc.DRILLER: Louie LeFeverBAKER REP.: David D. SchillingBORING NO.: SB07 SHEET 1 OF 1



TEST BORING RECORD

PROJECT: Site 84 field investigation

PROJ. NO.: CTO-0219

BORING NO.: SB08

COORDINATES: EAST: 2495375.097

NORTH: 361416.6665

ELEVATION: SURFACE: 19.77

Rig:					Date	Progress (Ft.)	Weather	Depth to Water (Ft.)
	Split Spoon	Casing	Augers	Macro Tube				
Size (ID)	2"			2"	8/2/01	4'	sunny, high 80s	NA
Length	24"			48"				
Type	SS			Acetate				
Hammer Wt.								
Fall								

Remarks:

SAMPLE TYPE						DEFINITIONS	
S = Split Spoon A = Auger T = Shelby Tube W = Wash R = Air Rotary C = Core D = Denison M = Macro Tube N = No Sample						SPT = Standard Penetration Test (ASTM D1586) PID = Photo Ionization Detector Measurement MSL = Mean Sea Level BG/PS = Background/Point Source ppm = parts per million	

Depth (Ft.)	Sample Type & No.	Sample Rec. (Ft.,%)	SPT	Lab ID	PID (ppm) ps/bg	Visual Description	Elevation (Ft. MSL)
1						Fine sand, trace silt, moist, brown	19.77
2	M-1	3.2 80%		IR84-SB08-01	0.0 0.0		
3							
4	4.0						4.0 19.77
5						End of Boring = 4.0'	
6							
7							
8							
9							
10							

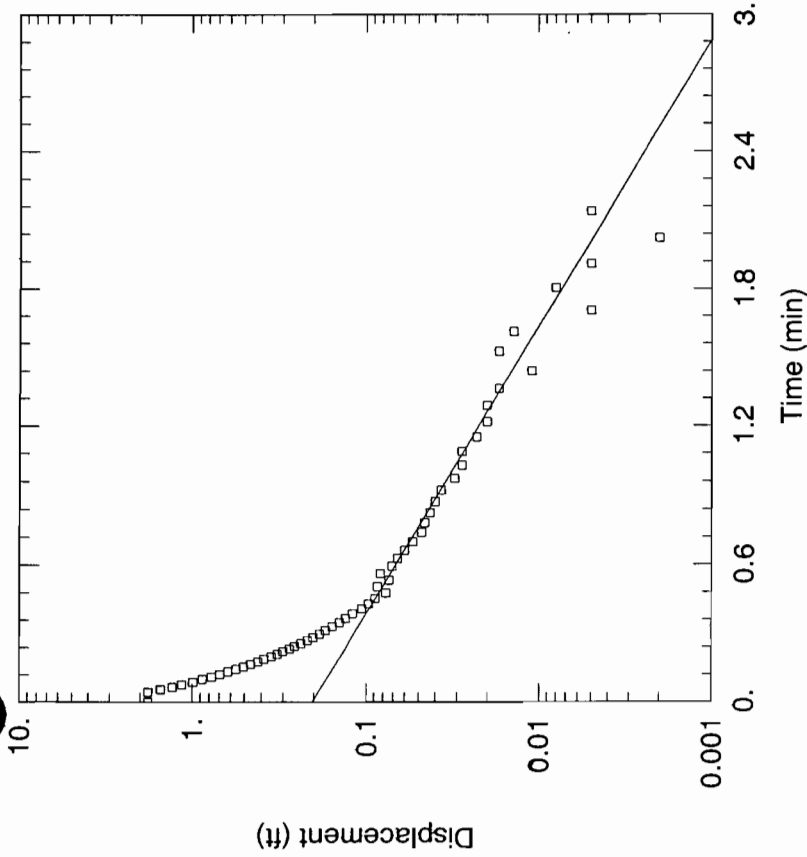
DRILLING COMPANY: Parratt Wolff Inc.

DRILLER: Louie LeFever

BAKER REP.: David D. Schilling

BORING NO.: SB08 SHEET 1 OF 1

APPENDIX C
SLUG TEST DATA AND GROUNDWATER VELOCITY
CALCULATIONS



WELL TEST ANALYSIS

Data Set: C:\SITE84~1\MW07R.AQT
Date: 12/11/01 Time: 13:02:25

PROJECT INFORMATION

Company: Baker Environmental, Inc.
Client: LANTDIV
Project: 26007-219-0000-184ZZ
Test Location: Camp Lejeune - Site 84
Test Well: MW07 (Rising Head Test)
Test Date: August 7, 2001

SOLUTION

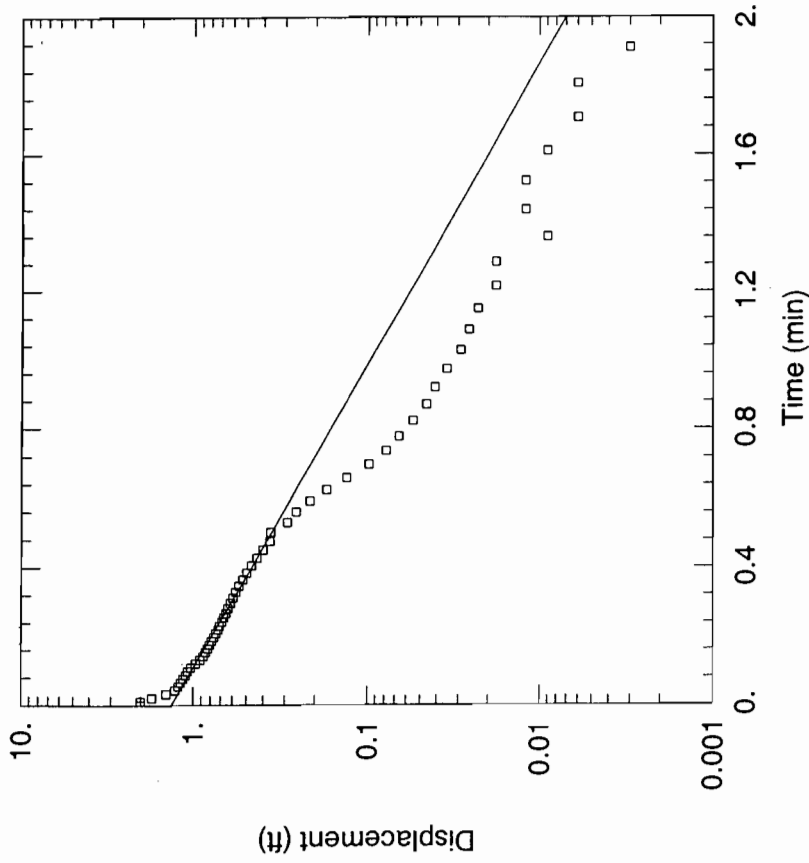
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
 $K = 11.2 \text{ ft/day}$
 $y0 = 0.204 \text{ ft}$

AQUIFER DATA

Saturated Thickness: 40. ft
Anisotropy Ratio (K_z/K_r): 1.

WELL DATA

Initial Displacement: 1.792 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 10. ft
Wellbore Radius: 0.34 ft
Gravel Pack Porosity: 0.3



WELL TEST ANALYSIS

Data Set: C:\SITE84~1\MW09R.AQT
Date: 12/11/01 Time: 13:01:36

PROJECT INFORMATION

Company: Baker Environmental, Inc.
Client: LANTDIV
Project: 26007-219-0000-184ZZ
Test Location: Camp Lejeune - Site 84
Test Well: MW09 (Rising Head Test)
Test Date: August 7, 2001

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
 $K = 15.96 \text{ ft/day}$
 $y_0 = 1.339 \text{ ft}$

AQUIFER DATA

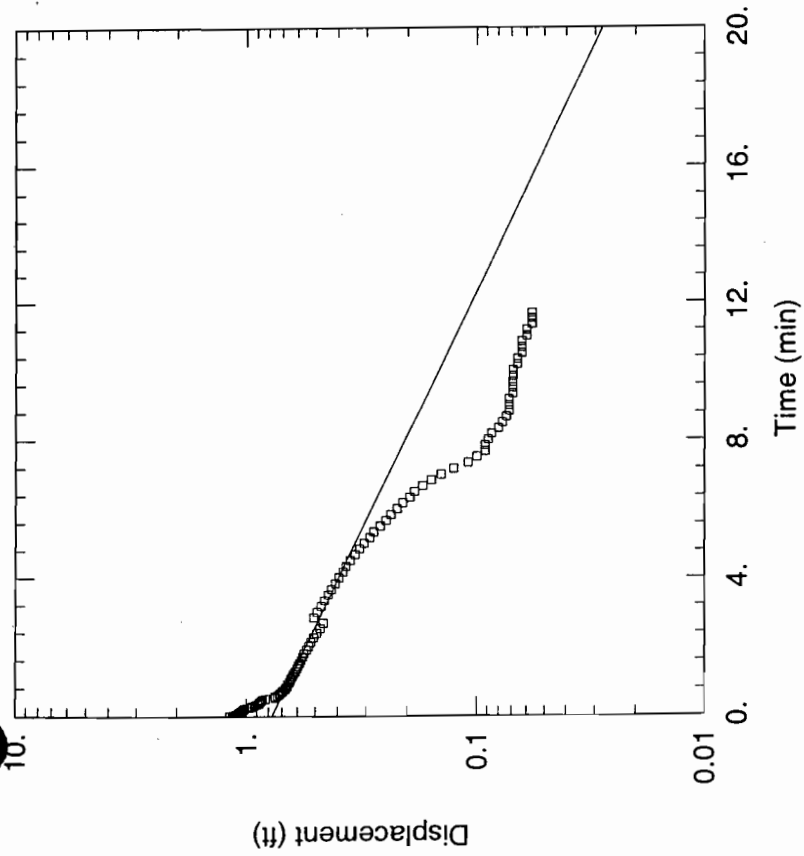
Anisotropy Ratio (K_z/K_r): 1.

Saturated Thickness: 40. ft

WELL DATA

Water Column Height: 10. ft
Wellbore Radius: 0.34 ft
Gravel Pack Porosity: 0.3

Initial Displacement: 2.009 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft



WELL TEST ANALYSIS

Data Set: C:\SITE84~1\MW16R.AQT
Date: 12/11/01 Time: 13:03:54

PROJECT INFORMATION

Company: Baker Environmental Inc.
Client: LANTDIV
Project: 26007-219-0000-184ZZ
Test Location: Camp Lejeune - Site 84
Test Well: MW16 (Rising head test)
Test Date: August 7, 2001

SOLUTION

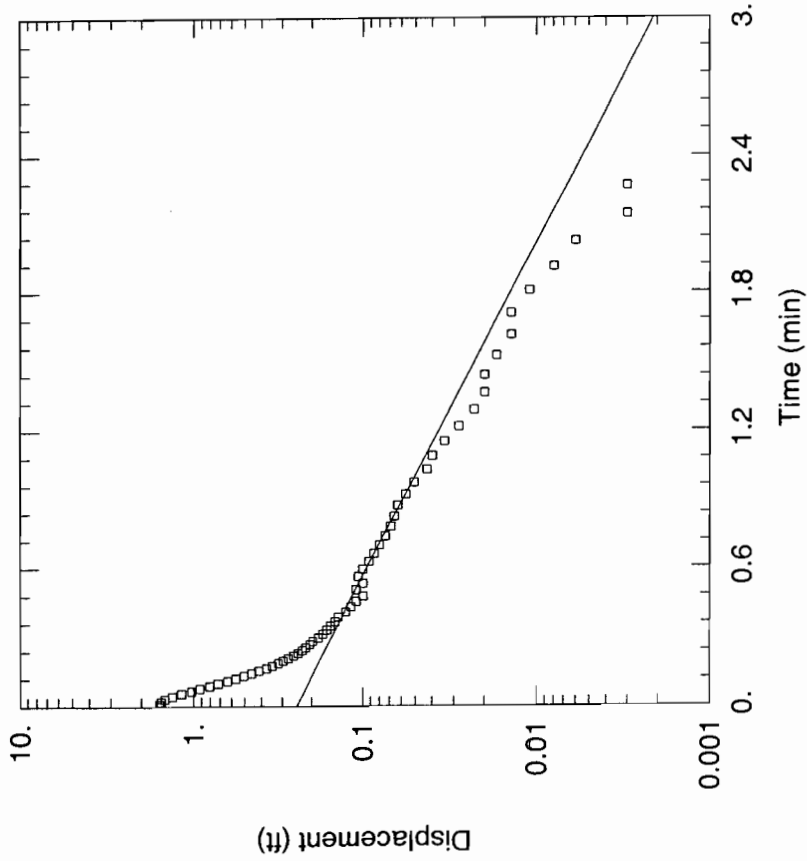
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
 $K = 1.01 \text{ ft/day}$
 $y0 = 0.7725 \text{ ft}$

AQUIFER DATA

Saturated Thickness: 40. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.177 ft Water Column Height: 10. ft
Casing Radius: 0.083 ft Wellbore Radius: 0.34 ft
Screen Length: 10. ft Gravel Pack Porosity: 0.3



WELL TEST ANALYSIS

Data Set: C:\SITE84~1\MW17R.AQT
Date: 12/11/01 Time: 13:05:04

PROJECT INFORMATION

Company: Baker Environmental, Inc.
Client: LANTDIV
Project: 26007-219-0000-184ZZ
Test Location: Camp Lejeune - Site 84
Test Well: MW17 (Rising Head Test)
Test Date: August 7, 2001

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 9.649 ft/day
y0 = 0.2464 ft

AQUIFER DATA

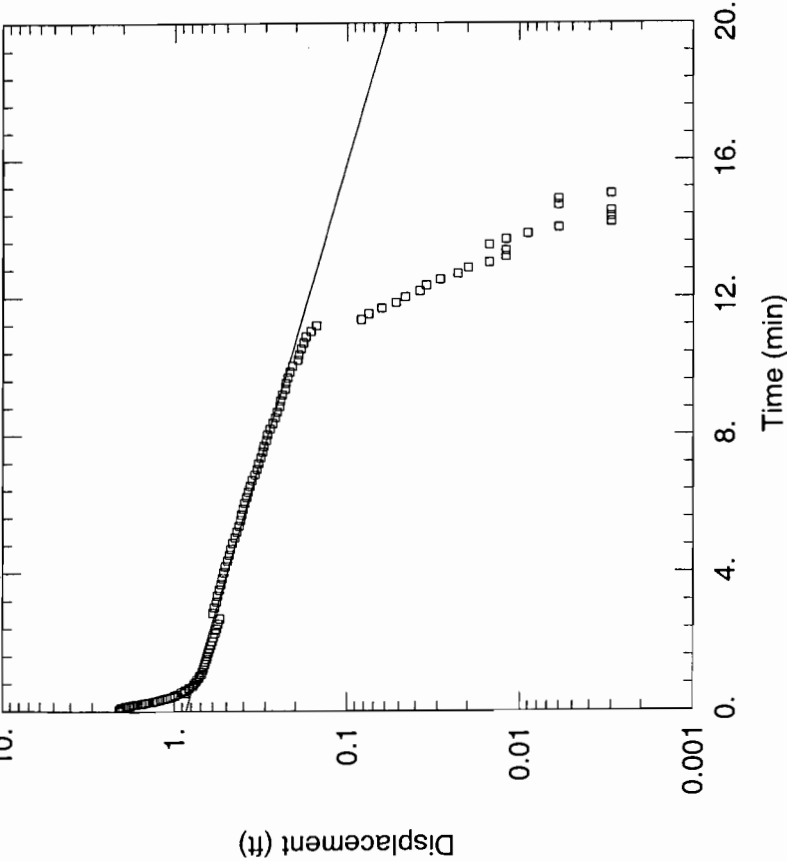
Saturated Thickness: 40. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.572 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft

Water Column Height: 10. ft
Wellbore Radius: 0.34 ft
Gravel Pack Porosity: 0.3



WELL TEST ANALYSIS
Data Set: C:\SITE84~1\MW18R.AQT
Date: 12/11/01 Time: 13:06:05

PROJECT INFORMATION

Company: Baker Environmental, Inc.
Client: LANTDIV
Project: 26007-219-0000-184ZZ
Test Location: Camp Lejeune - Site 84
Test Well: MW18 (Rising Head Test)
Test Date: August 7, 2001

SOLUTION

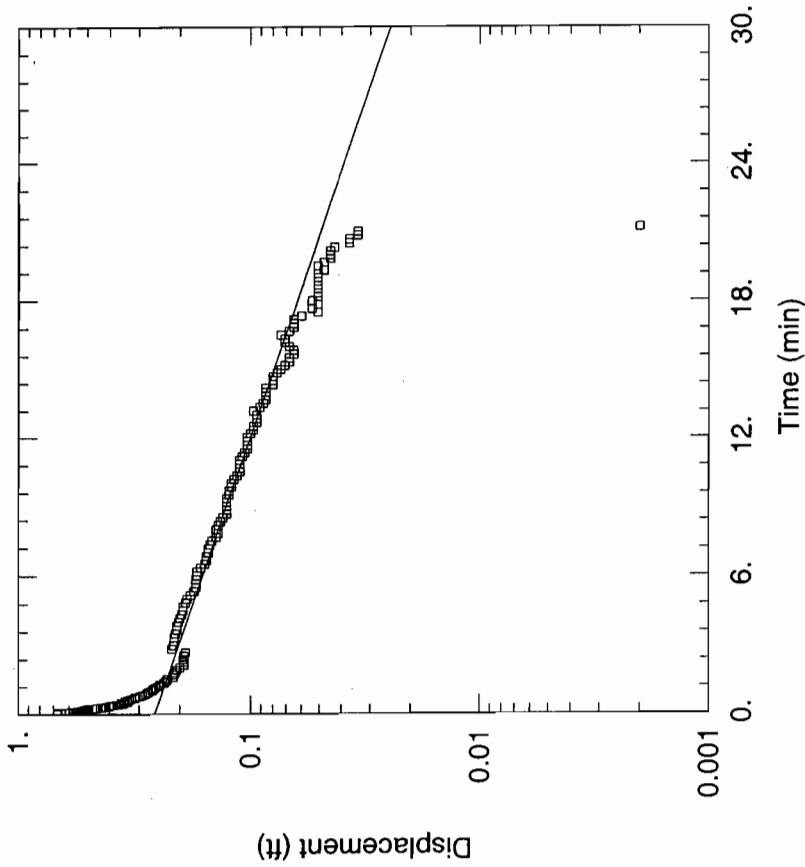
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
 $K = 0.8202 \text{ ft/day}$
 $y_0 = 0.857 \text{ ft}$

AQUIFER DATA

Saturated Thickness: 40. ft Anisotropy Ratio (K_z/K_r): 1.

WELL DATA

Initial Displacement: 2.118 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft
Water Column Height: 10. ft
Wellbore Radius: 0.34 ft
Gravel Pack Porosity: 0.3



WELL TEST ANALYSIS

Data Set: C:\SITE84~1\MW19R.AQT
Date: 12/11/01 Time: 13:08:58

PROJECT INFORMATION

Company: Baker Environmental, Inc.
Client: LANTDIV
Project: 26007-219-0000-184ZZ
Test Location: Camp Lejeune - Site 84
Test Well: MW19 (Rising Head Test)
Test Date: August 7, 2001

SOLUTION

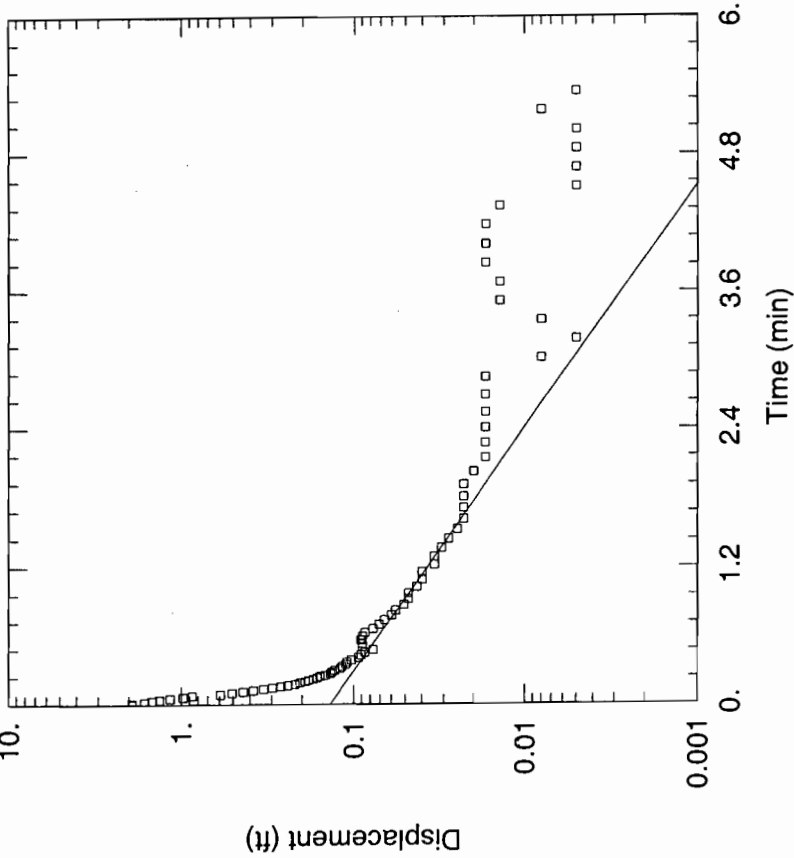
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
 $K = 0.4757$ ft/day
 $y0 = 0.2563$ ft

AQUIFER DATA

Saturated Thickness: 40. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 0.67 ft Water Column Height: 10. ft
Casing Radius: 0.083 ft Wellbore Radius: 0.34 ft
Screen Length: 10. ft Gravel Pack Porosity: 0.3



WELL TEST ANALYSIS

Data Set: C:\SITE84~1\MW20R.AQT
Date: 12/11/01 Time: 13:10:11

PROJECT INFORMATION

Company: Baker Environmental, Inc.
Client: LANTDIV
Project: 26007-219-0000-184ZZ
Test Location: Camp Lejeune - Site 84
Test Well: MW20 (Rising Head Test)
Test Date: August 7, 2001

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.614 ft/day
y0 = 0.137 ft

AQUIFER DATA

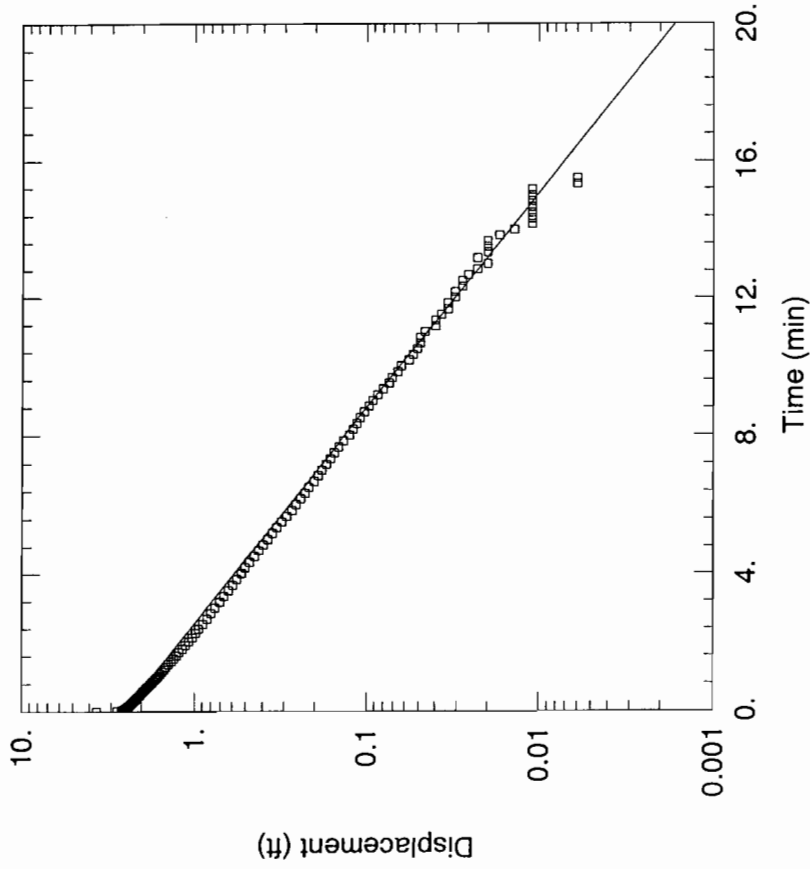
Saturated Thickness: 40. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.914 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft

Water Column Height: 10. ft
Wellbore Radius: 0.34 ft
Gravel Pack Porosity: 0.3



WELL TEST ANALYSIS

Data Set: C:\SITE84-1\MW23R.AQT
Date: 12/11/01 Time: 13:11:14

PROJECT INFORMATION

Company: Baker Environmental, Inc.
Client: LANTDIV
Project: 26007-219-0000-184ZZ
Test Location: Camp Lejeune - Site 84
Test Well: MW23 (Rising Head Test)
Test Date: August 7, 2001

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
 $K = 2.234$ ft/day
 $y0 = 2.552$ ft

AQUIFER DATA

Anisotropy Ratio (K_z/K_r): 1.

Saturated Thickness: 40. ft

WELL DATA

Water Column Height: 10. ft
Wellbore Radius: 0.34 ft
Gravel Pack Porosity: 0.3

Initial Displacement: 3.633 ft
Casing Radius: 0.083 ft
Screen Length: 10. ft

S.O. No. 26007-219

Subject: Site 84 Velocity Calculations

Baker

Sheet No. _____ of _____

Drawing No. _____

Computed by DMG Checked By _____ Date 12/7/01

Building 45 Vicinity

Gradient between Wells $MW-18 + MW-22 = \underline{0.034}$

Average Hydraulic Cond. between Wells $MW18, MW19, MW16$

$MW18 - 0.8202$

$MW19 - 0.4757$

$MW16 - 1.01$

Avg. - 0.769

$$V = \frac{0.034 \times 0.769}{0.20 \text{ (effective porosity)}} = \underline{\underline{0.131 \text{ ft./day}}}$$

Area West of Building 45

Gradient between Wells $MW22 + MW20 = \underline{0.005}$

Average Hydraulic Cond. between wells $MW17 + MW20$

$MW17 - 9.649$

$MW20 - 6.614$

Avg. - 8.13

$$V = \frac{0.005 \times 8.13}{0.20} = \underline{\underline{0.2 \text{ ft./day}}}$$

APPENDIX E
TECHNICAL MEMORANDUM
SUMMARY OF GROUNDWATER DATA AND AQUIFER
CHARACTERISTICS

**SUMMARY OF GROUNDWATER DATA AND AQUIFER CHARACTERISTICS
MARINE CORPS BASE, CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA**

SUMMARY

This study examines the utility of exploratory aquifer tests (pump tests) at investigation sites across Marine Corps Base, Camp Lejeune (MCB-CL). The study reviews the available information on the relevant water-bearing layers, considers the general characteristics and applicability of aquifer tests, and concludes:

- That available information is satisfactorily complete to allow appropriate designs of groundwater systems in the main operating areas of MCB-CL;
- That quantified characterization of the water-bearing layers in explored areas of MCB-CL can be extended to other areas having similar geologic terrane;
- That exploratory tests are no longer routinely required or advisable;
- That reconnaissance testing (well-head tests or slug tests) of each newly installed or otherwise uncharacterized data station is highly advisable; and,
- That performance testing of groundwater extraction systems should be the recommended form of evaluating and adjusting withdrawal systems.

BACKGROUND

This study considers the aquifer characteristics (especially, the Coefficient of Transmissivity) and the production capacities (available discharge rates) of the two water-bearing layers relevant to the studies at MCB-CL. These water-bearing layers are the (shallow or surficial) water table and the Upper Castle Hayne Aquifer.

The water table at MCB-CL occupies the water-bearing zone within 25 to 35 feet of the surface; the Castle Hayne, immediately below this. However, the separation of the water table and the Castle Hayne is not always obvious. Usually, this separation is effected only by the low permeability material of the water table transiting to the significantly more permeable material of the Upper Castle Hayne; there is rarely an aquiclude or aquitard of vertically extensive clay separating the water table from the Castle Hayne.

The data available for this summary derive from three main sources:

- Assessment of Hydrologic and Hydrogeologic Data at Camp Lejeune Marine Corps Base, North Carolina; U.S. Geological Survey, Water-Resources Investigation Report 89-4096; 1989
- Wellhead Management Program Engineering Study 91-36; Geophex, Ltd.; 22Jan91
- Various site investigations by Baker Environmental, Inc., and reported to LANTDIV and MCB-CL

DISTRIBUTION OF DATA

The data available from the various sources have been compiled on Tables 1, 2 and 3, with Table 3 summarizing the relevant flow information. The accompanying map indicates the distribution of stations from which data are available.

The tabulated data indicate the main characteristics of each water-bearing layer:

- There is low available production from the water table.
- There is an excessive availability of production from the Castle Hayne compared to the probably acceptable levels of treatment volumes foreseeable in groundwater remediation systems.

The water table had production capacities of less than 5 gallons per minute (gpm) in all cases tested. The specific capacities of the discharge wells were always less than 1 gallon per minute per foot of drawdown (gpm/ft). The transmissivities calculated were generally near or below 1000 gallons per day per foot of drawdown (gpd/ft); only the deeper wells, which intercepted at least part of the Castle Hayne, had transmissivities in a range indicative of an acceptably producing zone. The hydraulic conductivity values were commonly in the range of tenths of feet per day (ft/d). The low production rates, low transmissivities and low hydraulic conductivities indicate that the water table is only marginally, at best, under Darcian conditions. Calculations based on these data would, therefore, be highly unreliable. However, the available information all indicate an expectably low rate of groundwater discharge, which in turn would produce only a narrow radius of effect around an individual production well:

The standard equation for calculation of the radius of capture around an individual well is $r_c = 720Q/\pi T_i$. With a discharge rate (Q) of 3 gpm, a transmissivity (T) of 500 gpd/ft and a representative gradient of 0.005, the radius of capture would be 275 ft. However, this calculation applies only to Darcian conditions in a homogeneous medium; the water table at MCB-CL is marginally Darcian and is highly non-homogeneous. The calculation of radius must, therefore, be in some degree of error, with no more usable data or calculation possible.

The Castle Hayne has production capacities generally ranging above 200 gpm. The estimated transmissivities are at least in the range of several tens of thousands gpd/ft, with specific capacities usually about 5 to 10 gpm/ft. The calculated hydraulic conductivities are usually in the scores of feet per day. The available discharge from the Castle Hayne is, therefore, much greater than that from the water table. The limiting factor in remediation schemes for the Castle Hayne then becomes the amount of water that can be treated by an affordable system, usually less than 500 gpm; this value of 500 gpm would be available from one or two wells in the Castle Hayne. The high values of aquifer parameters, the relatively low total discharge and the low number of production wells would conspire to limit the radius of effect available to a remediation scheme:

The standard equation for calculation of the radius of capture around an individual well is $r_c = 720Q/\pi T_i$. With a Q of 500 gpm, a T of 50000 gpd/ft and a representative gradient of 0.005, the radius of capture would be only 460 ft.

COMPARABILITY OF DATA ACROSS MCB-CL

The stratigraphic sequences of MCB-CL containing the water table and the Upper Castle Hayne have been well characterized. The available information indicates that the lithology and the hydrologic conditions can be correlated stratigraphically across the base (Tables 1 and 2). From these correlations, aquifer performance can be predicted sufficiently for an engineering design whose final criteria for suitability are performance-based.

The upper water-bearing zone is a highly variable layering and intercalation of clay, silt and sand. This variability, however, is found within recognizable limits. These limits correspond to the range of hydrologic characteristics described previously. Similar correlation is available for the lithology and hydrology of the Upper Castle Hayne.

In areas not near stations catalogued in Tables 1, 2 and 3, a reconnaissance comparison of well-head tests (slug tests) and an examination of lithologic descriptions will likely be sufficient to support the engineering evaluation of the site. There is ample demonstration that lithology has a significant influence on the hydrology of a site, and that, for a given geologic terrane, the influence is fairly consistent. The geologic terrane of MCB-CL has been broadly characterized and correlated between lithologic (stratigraphic descriptions) and hydrologic (aquifer tests and well-head tests) sequences. Lithologic descriptions can now provide a good indication of hydrologic conditions at MCB-CL in areas of similar terrane.

GENERAL APPLICABILITY OF AQUIFER TESTS

Aquifer (pump) tests are an extremely dangerous activity at contamination sites. While the information available from aquifer tests is required for engineering design of withdrawal systems, aquifer tests should not be a reconnaissance or an initial step in the investigation. Full consideration must be made of the redistribution of contaminants expectable from the test, of the change in structural support of disposal features by relaxation or increase of hydrostatic loading, and so forth.

Consideration must also be made of alternative sources of acceptable data on the aquifer. In the case of MCB-CL, alternatives to exploratory aquifer tests are available from the tabulation and correlation of aquifer characteristics, production performance and geologic terrane presently available.

From the available information and in light of the relative consistency of the geologic terrane of MCB-CL, exploratory tests at MCB-CL are not generally required. Therefore, exploratory tests are not advisable and should not form part of the initial investigation of a site. While they may be useful in certain circumstances after the initial investigation of a site, they should not, in the general case, be part of the investigation. Sufficiently satisfactory information is presently available to allow the initial engineering design of a groundwater response.

While exploratory aquifer tests are not advisable, performance tests of a newly installed system are highly recommended. These tests, to some extent, are a normal part of the initial operation of a system. Only minor additional monitoring and modification of the system during operation would provide data directly relevant to the long-term operation of that system.

In the Coastal Plain of MCB-CL, the information from an exploratory data station not coincident with the long-term extraction system is not fully transferable. That is, if the test station and the

recovery station are not the same, the aquifer parameters and calculations based on those parameters will differ. This means that data from an exploratory station are no more reliably usable than the data presently available, unless the exploratory station is collocated with the recovery system. However, if the exploratory and recovery stations are identical, and considering that alternative sources of acceptable data on the aquifer are available and that a performance test must be run as part of the initial operation of a recovery system, the exploratory test represents a superfluous duplication of effort.

TABLE 1
CAMP LEJEUNE PUMP TEST DATA

Well Number	Well Depth (ft.BGS)	Well Diameter (in)	Total Aquifer Thickness (ft)	Screened Length (ft)	Screened Interval (ft.BGS)	Water-level Drawdown During Pumping (ft.BGS)	Pumping Rate (Recovery wells) GPM	Duration of Pumping (min)	Specific Capacity (pumping rate/drawdown)	T (square ft/day)	K (ft/day)	S	Soils (ft.BGS)
013RW-01*	23	2	15	20	3-23	8.773	1	480	0.11	7.17	0.48	NA	0-10 silt/clay, 10-23 sand.
013RW-18	13	2	15	10	3-13	0.297	NA	480	NA	105.98	7.06	1.40E-02	0-7 silt/clay, 7-13 sand.
013RW-21	14	2	15	10	4-14	0.31	NA	480	NA	82.27	5.48	2.77E-02	0-4 silt/sand, 0-14 clay/silt
108RW-01*	15	2	9	9.1	2.45-11.55	6.38	0.5	485	0.08	5.30	0.59	NA	very fine sand
108MW-04		2	9				NA	485	NA	118.63	13.18	1.33E-02	
108MW-15	12.5	2	9	9.03	2.79-11.82		NA	485	NA	56.78	6.31	7.33E-03	0-8 sand/silt, 8-10 silt/clay
109MW-15		2	15			0.939	NA	460	NA	76.26	5.08	1.11E-02	
109MW-17	14.5	2	15	10	4.5-14.5	0.545	NA	460	NA	163.10	10.87	7.50E-03	0-15 fine sand
109RW-01*	15	2	15	9.5	2-11.5	6.265	3	460	0.48	7.80	0.52	NA	0-4 sand, 4-8 silt, 8-15 sand
ORW-01* (Drawdown, Theis)	21.8	2	50	19.2	2-21.2	9.53	3	475	0.31	200.02	4.00	NA	0-10.5 sand/silt, 10.5-15 sand/clay, 15-21.5 sand/clay, 21.5- sand
ORW-01* (Drawdown, Cooper)										161.86	3.24	NA	
ORW-01* Recovery (Theis)										106.06	2.12	NA	
100W-01 (Drawdown, Theis)	30.3	2	50	4.8	24.9-29.7	0.02	3	475	NA	7080.48	142.00	4.52E-03	0-4 sand/silt, 4-10.5 clay, 10.5-15.5 sand/silt, 15.5-20.5 clay, 20.5-on sand
100W-01 (Drawdown, Cooper)									NA	7099.20	142	4.51E-03	
100W-02 (Drawdown, Theis)	30	2	50	4.7	24.7-29.4	0.52	NA	475	NA	5398.56	108.00	1.51E-03	0-3 sand and silt with clay layers, 3-11 sand and silt, 11-30 sand with some limited clay layers
100W-02 (Drawdown, Cooper)									NA	5400.00	108	1.51E-03	
100W-03 (Drawdown, Theis)	30	2	50	4.9	24.5-29.4	0.47	NA	475	NA	2992.00	59.00	7.48E-02	0-6 sand and silt, 6-12 sand, 12-23 sand/clay, 23-30 sand
100W-03 (Drawdown, Cooper)									NA	3225.60	64	5.85E-02	

* Transmissivity
 * Hydraulic Conductivity
 * Storage
 * Pumping well
 * * Not applicable

TABLE 2
HYDRAULIC CONDUCTIVITY TEST RESULTS (SLUG TEST)

Well Number	Well Depth (ft,BGS)	Well Diameter (in)	Saturated Aquifer Thickness* (ft)	Screened Length (ft)	Screened Interval (ft,BGS)	K Rising (ft/day)	Soils (ft,BGS)
013MW-03	14	2	1	9.8	4-13.8	0.75	0-6 clay, 6-14 silt
013MW-04	14	2	8.13	9.8	4-13.8	0.27	0-8 clay, 8-14 silt
013MW-11	16	2	9.14	10	6-16	0.37	0-4 sand/silt, 4-14 clay, 14-16 sand
013MW-21	14	2	9.2	10	4-14	0.46	0-4 silt/sand, 4-14 clay
108MW-08	12.8	2	8.83	9.7	2.7-12.4	0.59	0-8 very fine sand, 8-12 clayey peat, 12-13 sandy clay
108MW-09	12.8	2	7.81	9.7	2.8-12.5	0.53	0-13 silt/sand
108MW-13	10.8	2	NA	9.02	0.69-9.71	0.061	0-2 very fine sand, 8-9.5 sandy clay
108MW-17	13.1	2	NA	9.03	3.39-12.42	0.59	0-8 fine grained sand, 8-9 clayey peat, 9-12.5 sandy clay
109MW-17	14.5	2	9.04	10	4.5-14.5	9.00	0-15 fine sand
109MW-18	14	2	10.19	10	4.5-14.5	5.70	0-3 sand, 3-10 silt, 10-14 sand
110MW-07	11.96	2	9	9.8	1.5-11.3	0.0115	0-2 clay/silt, 2-4 clay/sand, 4-6 sand, 6-10 silt/clay, 10-14 silt /sand
110MW-09	14.2	2	9.47	9.8	3.8-13.6	0.16	0-6 sand/silt, 6-9 clay/silt, 9-12 sand/silt, 12-14 clay
110DW-03	30	6	22.04	4.9	24.5-29.4	1.07	0-3 sand, 3-4 clay, 4-10 sand/silt, 10-12 sand, 12-13 clay, 13-22 silt/clay, 22-30 sand
41GW-07	20.5	2	12.03	10	10.5-20.5	1.15	1-5 silty sand, 5-9 clay, 9-10 silty sand, 10-12 fill, 12-16 silty sand with 1 ft clay layer, 16-21 sand
41GW-08	15	2	9.48	10	5-15	0.14	0-1 silty sand, 1-6 sand, 6-14 clay with sand and silt, 14-16 silty sand
41GW-09	21	2	11.89	10	11-21	3.67	0-5 clay and sand, 5-21 silty sand
41GW-10	13	2	8.59	10	3-13	0.94	0-2 silty sand, 2-7 sand, 7-9 silty sand and clay, 9-12 lithified sandstone, 12-13 sand, 13-14 lithified sandstone
41GW-12	16	2	12.45	10	6-16	4.57	0-4 silty sand, 4-14 sand, 14-17 lithified sandstone
69GW-09	20.5	2	14.22	10	10.5-20.5	1.7	1-4 Sand/silt, 4-10 clay some sand, 10-21 sand/silt
69GW-10	16	2	10.5	10	6-16	0.17	1-17 sand/silt
69GW-12	12.5	2	11.27	10.5	2-12.5	0.12	0-13.5 sand/silt
69GW-02D	12.5	2	22.1	10	40-50	0.29	0-125 silty sand **
69GW-12D	58	2	53.83	10	48-58	6.66	0-58 silty sand **
74GW-03A	18	2	13.58	10	8-18	0.59	0-17 silty sand, 17-18.5 sandy clay
74GW-06	16.5	2	8.18	9.74	15.5-26	6.33	1-26 sand/silt
74GW-08	23	2	10.51	10	13-23	3.55	0-1 silty sand, 1-24 sand

* Values taken from AQTESOL results. (Bottom of screened interval- water level)

** Due to depth, soils were very generally described.

K = Hydraulic Conductivity

TABLE 3

BARONE:8SEP94:CL5-1A1:1/5

3-CL5 CTO-232 CL5-1B1.wks 8SEP94 MCB-CAMP LEJEUNE

STATION	b ft	Q gpm	Sc gpm/ft	T ft-sq/d	T gpd/ft	K ft/d
013RW-01	15	1.0	0.11	7.2	54	0.5
013MW-1	15			106.0	793	7.1
013MW-2	15			82.3	615	5.5
013MW-03	1					0.8
013MW-04	8					0.3
013MW-11	9					0.4
013MW-21	8					0.5
41GW-07						1.2
41GW-08						0.1
41GW-09						3.7
41GW-10						0.9
41GW-12						4.6
69GW-09						1.7
69GW-10						0.2
69GW-12						0.1
69GW-02DW						0.3
69GW-12DW						6.7
74GW-03A						0.6
74GW-06						6.3
74GW-08						3.6
108RW-01	9	0.5	0.08	5.3	40	0.6
108MW-0	9			118.6	887	13.2
108MW-1	9			56.8	425	6.3
108MW-08	9					0.6
108MW-09	8					0.5
108MW-13	8					0.1
108MW-17	8					0.6
109MW-1	15			76.3	570	5.1
109MW-1	15			163.1	1220	10.9
109RW-01	15	3.0	0.48	7.8	58	0.5
109MW-17	15					9.0
109MW-18	15					5.7
110RW-01	50	3.0	0.31	200.0	1496	4.0
110RW-01	50	3.0	0.31	161.9	1211	3.2
110RW-01	50	3.0		106.1	793	2.1
110DW-01	50			7080	52962	142.0
110DW-01	50			7099	53102	142.0
110DW-02	50			5399	40381	108.0
110DW-02	50			5400	40392	108.0
110DW-03	50			2952	22081	59.0
110DW-03	50			3226	24127	64.0
110MW-07	9					0.1
110MW-09	9					0.2
110DW-03	22					5.8

BARONE:8SEP94:CL5-1A1:1/5

STATION	b ft	Q gpm	Sc gpm/ft	T ft-sq/d	T gpd/ft	K ft/d
BB-43	275	170	5.0	8900	66572	32.4
BB-44	275	450	10.0	17900	133892	65.1
BB-222	275	329	9.4	10600	79288	38.5
HP-612	285	275	5.4	7900	59092	27.7
HP-614	285	323	4.9	6600	49368	23.2
HP-621	300	200	9.1	24500	183260	81.7
HP-628	320	160	3.4	6400	47872	20.0
HP-629	300	210	5.7	7900	59092	26.3
HP-634	300	163	4.5	4300	32164	14.3
HP-636	300	211	6.8	6900	51612	23.0
HP-643	295	278	5.3	9700	72556	32.9
HP-644	300	246	4.3	8100	60588	27.0
HP-646	305	304	10.6	20200	151096	66.2
HP-647	305	500	9.8	18700	139876	61.3
HP-648	310	250	2.9	5600	41888	18.1
HP-649	310	257	2.6	5000	37400	16.1
HP-651	305	270	3.8	7300	54604	23.9
HP-652	320	218	2.2	4400	32912	13.8
HP-663	325	350	4.8	6400	47872	19.7
HP-699	275	250	5.7	7700	57596	28.0
HP-700	270	250	6.8	11500	86020	42.6
HP-701	275	250	7.2	12400	92752	45.1
HP-705	295	250	9.0	13100	97988	44.4
HP-706	300	250	3.8	4700	35156	15.7
HP-709	310	200	4.4	8500	63580	27.4
HP-710	310	200	5.1	9900	74052	31.9
HP-711	320	200	6.8	10700	80036	33.4
LCH-4006	295	540	10.0	14500	108460	49.2
LCH-4007	295	275	11.8	13700	102476	46.4
M-267	260	170	7.7	10300	77044	39.6
M-628	260	70	3.0	6100	45628	23.5
RR-229	290	429	12.2	19400	145112	66.9
TT-25	280	150	5.0	7200	53856	25.7

STATION	PUMPING LEVEL	Q gpm	Sc gpm/ft
HP-602	44	154	3.5
HP-603	30	129	4.3
HP-606	38	267	7.0
HP-607	46	246	5.3
HP-608	21	208	9.9
HP-609	45	199	4.4
HP-610	14	214	15.3
HP-613	17	157	9.2
HP-616	15	178	11.9
HP-620	9	224	24.9
HP-622	55	330	6.0
HP-623	30	210	7.0
HP-628	45	172	3.8
HP-629	45	216	4.8
HP-632	21	224	10.7
HP-633	18	205	11.4
HP-634	36	219	6.1
HP-635	33	151	4.6
HP-636	35	149	4.3
HP-637	40	130	3.3
HP-638	84	201	2.4
HP-639	52	[--]	0.0
HP-640	28	210	7.5
HP-641	44	351	8.0
HP-642	32	[--]	0.0
HP-643	35	269	7.7
HP-644	52	230	4.4
HP-645	40	192	4.8
HP-646	11	154	14.0
HP-647	26	302	11.6
HP-648	84	263	3.1
HP-649	80	100	1.3
HP-650	75	480	6.4
HP-651	69	242	3.5
HP-652	82	216	2.6
HP-653	29	197	6.8
HP-654	30	175	5.8
HP-655		[--]	ERR
HP-660		150	ERR
HP-661	37	275	7.4
HP-662	53	148	2.8
HP-663	23	100	4.3
HP-698	33	216	6.5
HP-699	21	140	6.7

STATION	PUMPING LEVEL	Q gpm	Sc gpm/ft
HP-700	39	192	4.9
HP-701	36	236	6.6
HP-703	33	293	8.9
HP-704	38	159	4.2
HP-705	25	214	8.6
HP-706	33	214	6.5
HP-707	51	50	1.0
HP-708	42	219	5.2
HP-709	52	239	4.6
HP-710	29	115	4.0
HP-711	56	235	4.2
HP-5186	38	336	8.8
LCH-4007	34	150	4.4
LCH-4009	22	349	15.9
TT-23	36	160	4.4
TT-25	22	130	5.9
TT-26	32	127	4.0
TT-31	28	111	4.0
TT-52	18	236	13.1
TT-54	20	119	6.0
TT-67	29	119	4.1
RR-45	11	192	17.5
RR-47	5	140	28.0
RR-97	14	170	12.1
RR-229	35	[--]	0.0
BB-44	11	125	11.4
BB-47	6	341	56.8
BB-218	17	192	11.3
BB-220	13	119	9.2
BB-221	19	230	12.1
TC-325	8	100	12.5
TC-502	1	180	180.0
TC-504	35	203	5.8
TC-600	32	172	5.4
TC-604	16	137	8.6
TC-700	28	125	4.5
TC-901	37	[--]	0.0
TC-1000	25	110	4.4
TC-1001	16	160	10.0
TC-1251	6	150	25.0
TC-1253	5	128	25.6
TC-1254	3	122	40.7
TC-1255	36	104	2.9
TC-1256	48	108	2.3

STATION	PUMPING LEVEL	Q gpm	Sc gpm/ft
AS-108	8	226	28.3
AS-131	11	310	28.2
AS-190	60	220	3.7
AS-191	16	220	13.8
AS-203	19	220	11.6
AS-4140	6	110	18.3
AS-4150	10	128	12.8
AS-5001	27	185	6.9
AS-5009	53	111	2.1
BA-164	21	214	10.2
BA-190	17	303	17.8



APPENDIX I
RAGS PART D TABLES



TABLE 1A
SELECTION OF EXPOSURE PATHWAYS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Surface Soil	Surface Soil	Surface Soil	Military Base Personnel	Adult	Ingestion Dermal	On-site	Quant	Personnel may access site for work/training related activities
				Recreational Users	Adult and Adolescent	Ingestion Dermal	On-site	Quant	Visiting park area.
				Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.
		Air	Fugitive Dusts	Military Base Personnel	Adult	Inhalation	On-site	Quant	Personnel may access site for work/training related activities
				Recreational Users	Adult and Adolescent	Inhalation	On-site	Quant	Visiting park area.
				Residents	Adult and Young Child	Inhalation	On-site	Quant	Potential future residential development.
	Groundwater	Groundwater	Groundwater	Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.
				Residents	Adult	Inhalation	On-site	Quant	Potential future residential development.
	Surface Water	Surface Water	Surface Water	Military Base Personnel	Adult	Ingestion Dermal	On-site	Quant	Personnel may access site for work/training related activities
				Recreational Users	Adult and Adolescent	Ingestion Dermal	On-site	Quant	Visiting park area.
				Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.
	Sediment	Sediment	Sediment	Construction Workers	Adult	Ingestion Dermal	On-site	Quant	Excavation, construction activities for potential future development.
				Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.

TABLE 1A (Continued)
SELECTION OF EXPOSURE PATHWAYS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Surface Soil	Surface Soil	Surface Soil	Industrial / Commercial Workers	Adult	Ingestion Dermal	On-site	Quant	Groundskeeping activities
				Construction Workers	Adult	Ingestion Dermal	On-site	Quant	Excavation, construction activities for potential future development.
				Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.
		Air	Fugitive Dusts	Industrial / Commercial Workers	Adult	Inhalation	On-site	Quant	Groundskeeping activities
				Construction Workers	Adult	Inhalation	On-site	Quant	Excavation, construction activities for potential future development.
				Residents	Adult and Young Child	Inhalation	On-site	Quant	Potential future residential development.
	Subsurface Soil	Subsurface Soil	Subsurface Soil	Construction Workers	Adult	Ingestion Dermal	On-site	Quant	Excavation, construction activities for potential future development.
					Adult	Inhalation	On-site	Quant	Excavation, construction activities for potential future development.
	Groundwater	Groundwater	Groundwater	Industrial / Commercial Workers	Adult	Ingestion Dermal	On-site	Quant	Groundskeeping activities
				Construction Workers	Adult	Dermal	On-site	Quant	Excavation, construction activities for potential future development.
				Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.
		Air	Volatiles in groundwater	Industrial / Commercial Workers	Adult	Inhalation	On-site	Quant	Groundskeeping activities
				Residents	Adult	Inhalation	On-site	Quant	Potential future residential development.
					Adult	Dermal	On-site	Quant	Excavation, construction activities for potential future development.
	Surface Water	Surface Water	Surface Water	Construction Workers	Adult	Dermal	On-site	Quant	Excavation, construction activities for potential future development.
				Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.
	Sediment	Sediment	Sediment	Construction Workers	Adult	Dermal	On-site	Quant	Excavation, construction activities for potential future development.
				Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.

TABLE 1B
SELECTION OF EXPOSURE PATHWAYS
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Surface Soil	Surface Soil	Surface Soil	Military Base Personnel	Adult	Ingestion Dermal	On-site	Quant	Personnel may access site for work/training related activities
				Recreational Users	Adult and Adolescent	Ingestion Dermal	On-site	Quant	Visiting park area.
				Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.
		Air	Fugitive Dusts	Military Base Personnel	Adult	Inhalation	On-site	Quant	Personnel may access site for work/training related activities
				Recreational Users	Adult and Adolescent	Inhalation	On-site	Quant	Visiting park area.
				Residents	Adult and Young Child	Inhalation	On-site	Quant	Potential future residential development.
	Groundwater	Groundwater	Groundwater	Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.
					Adult	Inhalation	On-site	Quant	Potential future residential development.
	Surface Water	Surface Water	Surface Water	Military Base Personnel	Adult	Ingestion Dermal	On-site	Quant	Personnel may access site for work/training related activities
				Recreational Users	Adult and Adolescent	Ingestion Dermal	On-site	Quant	Visiting park area.
				Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.
	Sediment	Sediment	Sediment	Construction Workers	Adult	Ingestion Dermal	On-site	Quant	Excavation, construction activities for potential future development.
				Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.

TABLE 1B (Continued)
SELECTION OF EXPOSURE PATHWAYS
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	On-Site/ Off-Site	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Surface Soil	Surface Soil	Surface Soil	Industrial / Commercial Workers	Adult	Ingestion Dermal	On-site	Quant	Groundskeeping activities
				Construction Workers	Adult	Ingestion Dermal	On-site	Quant	Excavation, construction activities for potential future development.
				Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.
		Air	Fugitive Dusts	Industrial / Commercial Workers	Adult	Inhalation	On-site	Quant	Groundskeeping activities
				Construction Workers	Adult	Inhalation	On-site	Quant	Excavation, construction activities for potential future development.
				Residents	Adult and Young Child	Inhalation	On-site	Quant	Potential future residential development.
	Subsurface Soil	Subsurface Soil	Subsurface Soil	Construction Workers	Adult	Ingestion Dermal	On-site	Quant	Excavation, construction activities for potential future development.
				Construction Workers	Adult	Inhalation	On-site	Quant	Excavation, construction activities for potential future development.
	Groundwater	Groundwater	Groundwater	Industrial / Commercial Workers	Adult	Ingestion Dermal	On-site	Quant	Groundskeeping activities
				Construction Workers	Adult	Dermal	On-site	Quant	Excavation, construction activities for potential future development.
				Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.
	Surface Water	Air	Volatiles in groundwater	Industrial / Commercial Workers	Adult	Inhalation	On-site	Quant	Groundskeeping activities
				Residents	Adult	Inhalation	On-site	Quant	Potential future residential development.
				Construction Workers	Adult	Dermal	On-site	Quant	Excavation, construction activities for potential future development.
Surface Water		Surface Water	Surface Water	Residents	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.
				Construction Workers	Adult	Dermal	On-site	Quant	Excavation, construction activities for potential future development.
Sediment	Sediment	Sediment	Sediment	Construction Workers	Adult and Young Child	Ingestion Dermal	On-site	Quant	Potential future residential development.

TABLE 2.1A
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current, Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

CAS Number	Chemical	Minimum Concentration	Minimum Qualifier	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value ⁽¹⁾	Screening ⁽²⁾ Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for ⁽³⁾ Contaminant Deletion or Selection
78-93-3	VOLATILES (ug/kg)															
67-64-1	2-Butanone (MEK)	6.9	J	6.9	J	µg/kg	IR84-MW20-00	1/25	2.7U - 110U	6.9	NA	7.30E+05 N	N/A	N/A	NO	BSL
100-41-4	Acetone	40	J	40	J	µg/kg	84-MW15-00	1/25	2.1U - 1400U	40	NA	1.60E+05 N	N/A	N/A	NO	BSL
1330-20-7	Ethylbenzene	330	J	330	J	µg/kg	IR84-DP82-00	1/25	0.58U - 1.5U	330	NA	2.30E+05 S	N/A	N/A	NO	BSL
	Xylenes, total	8.7	J	120	J	µg/kg	IR84-DP82-00	2/25	1.9U - 2.2U	120	NA	2.10E+05 S	N/A	N/A	NO	BSL
91-57-6	SEMIVOLATILES (ug/kg)															
83-32-9	2-Methylnaphthalene	120	J	92,000	J	µg/kg	IR84-DP84-00	3/25	50U - 6700U	92,000	NA	5.60E+03 N ⁽³⁾	N/A	N/A	YES	ASL
120-12-7	Acenaphthene	140	J	20,000	J	µg/kg	IR84-DP46-00	8/25	53U - 590U	20,000	NA	3.70E+05 N	N/A	N/A	NO	BSL
56-55-3	Anthracene	210	J	56,000	J	µg/kg	IR84-DP46-00	8/25	51U - 560U	56,000	NA	2.20E+06 N	N/A	N/A	NO	BSL
50-32-8	Benzo(a)anthracene	520	J	190,000	J	µg/kg	IR84-DP46-00	8/25	57U - 630U	190,000	NA	6.20E+02 C	N/A	N/A	YES	ASL
205-99-2	Benzo(a)pyrene	470	J	150,000	J	µg/kg	IR84-DP46-00	7/25	63U - 1700U	150,000	NA	6.20E+01 C	N/A	N/A	YES	ASL
191-24-2	Benzo(b)fluoranthene	540	J	170,000	J	µg/kg	IR84-DP46-00	7/25	61U - 1600U	170,000	NA	6.20E+02 C	N/A	N/A	YES	ASL
207-08-9	Benzo(k)fluoranthene	74	J	55,000	J	µg/kg	IR84-DP46-00	9/25	57U - 630U	55,000	NA	2.30E+05 N ⁽³⁾	N/A	N/A	NO	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	340	J	120,000	J	µg/kg	IR84-DP46-00	7/25	55U - 1500U	120,000	NA	6.20E+03 C	N/A	N/A	YES	ASL
86-74-8	Carbazole	380	J	380	J	µg/kg	IR84-MW20-00	1/25	56U - 7600U	380	NA	3.50E+04 C	N/A	N/A	NO	BSL
218-01-9	Chrysene	130	J	38,000	J	µg/kg	IR84-DP46-00	7/25	54U - 1400U	38,000	NA	2.40E+04 C	N/A	N/A	YES	ASL
53-70-3	Dibenz(a,h)anthracene	70	J	180,000	J	µg/kg	IR84-DP46-00	8/25	48U - 530U	180,000	NA	6.20E+04 C	N/A	N/A	YES	ASL
132-64-9	Dibenzofuran	84	J	8,900	J	µg/kg	IR84-DP46-00	7/25	53U - 1400U	17,000	NA	6.20E+01 C	N/A	N/A	YES	ASL
206-44-0	Fluoranthene	1,200	J	300,000	J	µg/kg	IR84-DP46-00	7/25	52U - 1400U	8,900	NA	2.90E+04 N	N/A	N/A	NO	BSL
86-73-7	Fluorene	130	J	19,000	J	µg/kg	IR84-DP46-00	8/25	59U - 640U	300,000	NA	2.30E+05 N	N/A	N/A	YES	ASL
193-39-5	Hexachlorocyclopentadiene	410	J	410	J	µg/kg	IR84-DP46-00	9/25	50U - 59U	19,000	NA	2.60E+05 N	N/A	N/A	NO	BSL
91-20-3	Indeno(1,2,3-cd)pyrene	250	J	59,000	J	µg/kg	IR84-DP46-00	7/25	63U - 8400U	410	NA	4.20E+04 N	N/A	N/A	NO	BSL
85-01-8	Naphthalene	140	J	7,500	J	µg/kg	IR84-DP46-00	5/25	73U - 1900U	59,000	NA	6.20E+02 C	N/A	N/A	YES	ASL
129-00-0	Phenanthrene	910	J	180,000	J	µg/kg	IR84-DP46-00	9/25	51U - 1400U	7,500	NA	5.60E+03 N ⁽³⁾	N/A	N/A	YES	ASL
	Pyrene	760	J	250,000	J	µg/kg	IR84-DP46-00	8/25	54U - 63.5U	180,000	NA	2.30E+05 N ⁽³⁾	N/A	N/A	NO	BSL
72-54-8	PCBs (ug/kg)															
72-55-9	4,4'-DDD	3.2	J	3,000	J	µg/kg	IR84-DP47-00	7/23	0.83U - 890U	3,000	NA	2.40E+03 C	N/A	N/A	YES	ASL
50-29-3	4,4'-DDE	2,962.5	J	58	J	µg/kg	IR84-DP49-00	7/23	0.6U - 640U	58	NA	1.70E+03 C	N/A	N/A	NO	BSL
319-84-6	4,4'-DDT	1.9	J	190	J	µg/kg	IR84-DP49-00	7/23	1.4U - 1500U	190	NA	1.70E+03 C	N/A	N/A	NO	BSL
5103-71-9	BHC: alpha-	21	J	21	J	µg/kg	IR84-DP82-00	1/23	0.48U - 520U	21	NA	9.00E+01 C	N/A	N/A	NO	BSL
5103-74-2	Chlordane, alpha-	2	J	48,000	J	µg/kg	IR84-DP47-00	10/23	0.62U - 6.8U	48,000	NA	1.60E+03 C ⁽¹⁾	N/A	N/A	YES	ASL
60-57-1	Chlordane, gamma-	3.5125	J	58,000	J	µg/kg	IR84-DP47-00	10/23	0.6U - 6.5U	58,000	NA	1.60E+03 C ⁽¹⁾	N/A	N/A	YES	ASL
1031-07-8	Dieldrin	3.5	J	320	J	µg/kg	IR84-DP49-00	8/23	1.6U - 1700U	320	NA	3.00E+01 C	N/A	N/A	YES	ASL
72-20-8	Endosulfan Sulfate	3.2	J	40	J	µg/kg	IR84-DP82-00	5/24	0.29U - 320U	40	NA	3.70E+04 N ⁽³⁾	N/A	N/A	NO	BSL
7421-93-4	Endrin	3,622.5	J	3,622.5	J	µg/kg	IR84-MW20-00	1/23	0.64U - 690U	3,622.5	NA	1.80E+03 N ⁽³⁾	N/A	N/A	NO	BSL
53494-70-5	Endrin Aldehyde	4.5	J	61	J	µg/kg	IR84-DP82-00	7/24	1.6U - 1700U	61	NA	1.80E+03 N ⁽³⁾	N/A	N/A	NO	BSL
76-44-8	Endrin Ketone	1.7	J	26	J	µg/kg	IR84-DP81-00	5/24	0.27U - 290U	26	NA	1.80E+03 N ⁽³⁾	N/A	N/A	NO	BSL
1024-57-3	Heptachlor Epoxide	1.5	J	22,000	J	µg/kg	IR84-DP47-00	8/23	0.65U - 7U	22,000	NA	1.10E+02 C	N/A	N/A	YES	ASL
72-43-5	Heptachlor	4.2	J	4,500	J	µg/kg	IR84-DP47-00	6/23	0.69U - 7.6U	4,500	NA	5.30E+01 C	N/A	N/A	YES	ASL
12672-29-6	Methoxychlor	1.9	J	79	J	µg/kg	IR84-DP82-00	7/24	0.86U - 920U	79	NA	3.10E+04 N	N/A	N/A	NO	BSL
11097-69-1	Aroclor-1248	56	J	160,000	J	µg/kg	IR84-DP47-00	4/91	4.8U - 18000U	160,000	NA	2.20E+02 C	N/A	N/A	YES	ASL
11096-82-5	Aroclor-1254	51,000	J	51,000	J	µg/kg	IR84-DP53-00	1/91	21U - 18000U	51,000	NA	2.20E+02 C	N/A	N/A	YES	ASL
	Aroclor-1260	18	J	200,000	J	µg/kg	IR84-SB27-01	64/91	7.8U - 4200U	200,000	NA	2.20E+02 C	N/A	N/A	YES	ASL

TABLE 2.1A (Continued)
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current, Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

CAS Number	Chemical	Minimum Concentration	Minimum Qualifier	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value ⁽¹⁾	Screening Toxicity Value ⁽²⁾	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for ⁽³⁾ Contaminant Deletion or Selection
86290-81-5	TOTAL PETROLEUM HYDROCARBONS	880	J	880	J	µg/kg	IR84-DP46-00	1/11	18U - 19U	880	NA	N/A	N/A	N/A	YES	NSC
68334-30-5	Gasoline Range Organics (µg/kg)	7	J	470	J	mg/kg	IR84-DP46-00	1/11	(4)	470	ND	N/A	N/A	N/A	YES	NSC
7429-90-5	METALS (mg/kg)	1,270	J	5,910	J	mg/kg	IR84-MW20-00	25/25	(4)	5,910	3556.3052	7.60E+03 N	N/A	N/A	NO	BSL
7440-36-0	Aluminum	0.66	J	3.3	J	mg/kg	IR84-DP49-00	13/25	0.32U - 0.6UJ	3.3	0.3934	3.10E+00 N	N/A	N/A	YES	ASL
7440-38-2	Antimony	0.33	J	9.1	J	mg/kg	IR84-DP49-00	23/25	0.32U - 0.32U	9.1	0.5108	3.90E-01 C	N/A	N/A	YES	ASL
7440-39-3	Arsenic	3	J	65.7	J	mg/kg	IR84-DP49-00	22/25	3.7U - 9.8U	65.7	10.6444	5.40E+02 N	N/A	N/A	NO	BSL
7440-41-7	Barium	0.06	J	0.075	J	mg/kg	IR84-DP46-00	5/25	0.048U - 0.11U	0.075	0.0728	1.50E+01 N	N/A	N/A	NO	BSL
7440-43-9	Beryllium	0.067	J	0.57	J	mg/kg	IR84-DP53-00	13/25	0.045U - 0.049U	0.57	0.0278	3.70E+00 N	N/A	N/A	NO	BSL
7440-70-2	Cadmium	109	J	100,000	J	mg/kg	IR84-DP50-00	25/25	(4)	100,000	1462.2764	N/A	N/A	N/A	NO	NUT
18540-29-9	Chromium VI	1.7	J	20.2	J	mg/kg	IR84-DP49-00	25/25	(4)	20.2	ND	3.00E+01 C	N/A	N/A	NO	BSL
7440-48-4	Cobalt	0.18	J	0.76	J	mg/kg	IR84-DP49-00	22/25	0.16U - 0.17U	0.76	0.2302	4.70E+02 N	N/A	N/A	NO	BSL
7440-50-8	Copper	0.35	J	146	J	mg/kg	IR84-DP49-00	25/25	(4)	146	5.2188	2.90E+02 N	N/A	N/A	NO	BSL
7439-89-6	Iron	684	J	3,480	J	mg/kg	IR84-MW20-00	25/25	(4)	3,480	1737.4264	2.30E+03 N ⁽¹⁰⁾	N/A	N/A	YES	ASL
7439-92-1	Lead	1.8	J	97.3	J	mg/kg	IR84-DP49-00	25/25	(4)	97.3	10.4738	4.00E+02 N ⁽¹⁰⁾	N/A	N/A	NO	BSL
7439-95-4	Magnesium	47.3	J	1,480	J	mg/kg	IR84-DP49-00	25/25	(4)	32.8	211.3692	N/A	N/A	N/A	NO	BSL
7439-96-5	Manganese	2.7	J	0.2	J	mg/kg	IR84-DP49-00	25/25	0.0089U - 0.0095U	0.2	0.0732	1.80E+02 N	N/A	N/A	NO	BSL
7439-97-6	Mercury	0.01	J	0.2	J	mg/kg	IR84-DP74-00	18/25	(4)	2.9	11.3294	2.30E+00 N	N/A	N/A	NO	BSL
7440-02-0	Nickel	0.46	J	2.9	J	mg/kg	IR84-DP49-00	25/25	(4)	2.9	1.0454	1.60E+02 N	N/A	N/A	NO	BSL
7440-09-7	Potassium	70.2	J	258	J	mg/kg	IR84-DP76-00	16/25	34.8U - 97.6U	258	89.1538	N/A	N/A	N/A	NO	NUT
7782-49-2	Selenium	0.365	J	0.61	J	mg/kg	IR84-DP74-00	2/25	0.32U - 0.56U	0.61	0.3194	3.90E+01 N	N/A	N/A	NO	BSL
7440-23-5	Sodium	165	J	235	J	mg/kg	IR84-DP50-00	3/25	52.2U - 69.6U	235	ND	N/A	N/A	N/A	NO	NUT
7440-28-0	Thallium	0.6	J	0.6	J	mg/kg	IR84-DP45-00	1/25	0.52U - 0.7U	0.6	5.9918	5.20E-01 N	N/A	N/A	YES	ASL
7440-62-2	Vanadium	2.3	J	10.4	J	mg/kg	IR84-DP76-00	25/25	(4)	10.4	10.748	5.50E+01 N	N/A	N/A	NO	BSL
7440-66-6	Zinc	1.3	J	154	J	mg/kg	IR84-DP49-00	25/25	(4)	154	10.748	2.30E+03 N	N/A	N/A	NO	BSL

(1) MCB Camp Lejeune Base Background Study, Final (Baker, 2001): 2 * Mean (1/2 nondetects)
(2) All non-carcinogenic criteria were divided by 10 to account for potential additive effects of chemicals
USEPA Region IX COC Screening Value (derived from USEPA Region IX PRG Table)
(3) Rationale Codes
Selection Reason: No Screening Criteria (NSC)
Above Screening Levels (ASL)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Deletion Reason:
(4) No detection limits given; analyte detected in every sample.
(5) Screening values for naphthalene used as a surrogate
(6) Screening value for pyrene used as a surrogate
(7) Screening value for chlordane used as a surrogate.
(8) Screening value for endosulfan used as a surrogate.
(9) Screening value for endrin used as a surrogate.
(10) Action level for lead.

Definitions:
N/A = Not applicable
NA = Not Analyzed
ND = Not Detected
COPC = Chemical of Potential Concern
ARAR/TBC = applicable or Relevant and appropriate Requirement/To Be Considered
J - Analyte present - Reported value is estimated
Delete NI - Presumptive evidence for the presence of the material at an estimated value
* = (Inorganics) Duplicate analysis was not within control limits
U - Not detected
UJ - Reported quantitation limit is qualified as estimated
C = Carcinogenic
N = Non-Carcinogenic
S = Soil Saturation
mg/kg = milligrams per kilogram
µg/kg = microgram per kilogram

TABLE 2.1B
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

CAS Number	Chemical	Minimum Concentration	Minimum Qualifier	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value ⁽¹⁾	Screening ⁽²⁾ Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for ⁽³⁾ Contaminant Deletion or Selection
78-93-3	VOLATILES (ug/kg)															
67-64-1	2-Butanone (MEK)	6.9	J	6.9	J	µg/kg	IR84-MW20-00	1/13	2.7U - 110U	6.9	NA	7.30E+05 N	N/A	N/A	NO	BSL
100-41-4	Acetone	40	J	40	J	µg/kg	84-MW15-00	1/13	2.1U - 1400U	40	NA	1.60E+05 N	N/A	N/A	NO	BSL
1330-20-7	Ethylbenzene	330	J	330	J	µg/kg	IR84-DP82-00	1/13	0.58U - 1.5U	330	NA	2.30E+05 S	N/A	N/A	NO	BSL
	Xylenes, total	8.7	J	120	J	µg/kg	IR84-DP82-00	2/13	1.9U - 2.2U	120	NA	2.10E+05 S	N/A	N/A	NO	BSL
91-57-6	SEMI-VOLATILES (ug/kg)															
83-32-9	2-Methylnaphthalene	350	J	92,000	J	µg/kg	IR84-DP84-00	2/13	51U - 550U	92,000	NA	5.60E+03 N ^(a)	N/A	N/A	YES	ASL
120-12-7	Acenaphthene	2,300	J	2,800	J	µg/kg	IR84-DP84-00	2/13	54U - 590U	2,800	NA	3.70E+05 N	N/A	N/A	NO	BSL
50-32-8	Anthracene	3,500	J	4,100	J	µg/kg	IR84-DP84-00	2/13	52U - 560U	4,100	NA	2.20E+06 N	N/A	N/A	NO	BSL
205-99-2	Benzo(a)anthracene	1,800	J	5,900	J	µg/kg	84-MW17-00	2/13	58U - 630U	5,900	NA	6.20E+02 C	N/A	N/A	YES	ASL
191-24-2	Benzo(b)fluoranthene	5,800	J	5,800	J	µg/kg	84-MW17-00	1/13	64U - 1700U	7,100	NA	6.20E+01 C	N/A	N/A	YES	ASL
207-08-9	Benzo(k)fluoranthene	7,100	J	3,200	J	µg/kg	84-MW17-00	2/13	61U - 1600U	3,200	NA	6.20E+02 C	N/A	N/A	YES	ASL
117-81-7	Bis(2-ethylhexyl)phthalate	3,800	J	3,800	J	µg/kg	84-MW17-00	1/13	58U - 630U	3,800	NA	2.30E+05 N ^(a)	N/A	N/A	YES	BSL
86-74-8	Carbazole	2,100	J	2,100	J	µg/kg	IR84-MW20-00	1/13	56U - 1500U	380	NA	6.20E+03 C	N/A	N/A	YES	CHEM
218-01-9	Chrysene	2,800	J	6,700	J	µg/kg	84-MW17-00	1/13	55U - 1400U	2,100	NA	3.50E+04 C	N/A	N/A	YES	BSL
53-70-3	Dibenz(a,h)anthracene	1,200	J	1,200	J	µg/kg	84-MW17-00	2/13	49U - 530U	6,700	NA	2.40E+04 C	N/A	N/A	YES	CHEM
132-64-9	Dibenzofuran	1,800	J	1,800	J	µg/kg	84-MW17-00	1/13	54U - 1400U	1,200	NA	6.20E+01 C	N/A	N/A	YES	CHEM
206-44-0	Fluoranthene	1,700	J	16,000	J	µg/kg	84-MW17-00	1/13	53U - 1400U	1,800	NA	6.20E+01 C	N/A	N/A	NO	ASL
86-73-7	Fluorene	580	J	9,000	J	µg/kg	84-MW17-00	2/13	59U - 640U	16,000	NA	2.90E+04 N	N/A	N/A	NO	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	3,200	J	3,200	J	µg/kg	IR84-DP84-00	3/13	51U - 59U	9,000	NA	2.30E+05 N	N/A	N/A	NO	BSL
91-20-3	Naphthalene	640	J	640	J	µg/kg	84-MW17-00	1/13	74U - 1900U	3,200	NA	6.20E+02 C	N/A	N/A	YES	ASL
85-01-8	Phenanthrene	910	J	24,000	J	µg/kg	IR84-DP84-00	3/13	52U - 1400U	640	NA	5.60E+03 N ^(a)	N/A	N/A	NO	BSL
129-00-0	Pyrene	10,000	J	16,000	J	µg/kg	IR84-DP84-00	2/13	55U - 63.5U	24,000	NA	2.30E+05 N ^(a)	N/A	N/A	NO	BSL
72-54-8	PESTICIDES/PCBs (ug/kg)															
72-55-9	4,4'-DDD	3.6	J	32	J	µg/kg	IR84-DP82-00	4/11	0.84U - 1.7U	32	NA	2.40E+03 C	N/A	N/A	NO	BSL
50-29-3	4,4'-DDE	2,9625	J	2,9625	J	µg/kg	IR84-MW20-00	1/11	0.6U - 6.5U	2,9625	NA	1.70E+03 C	N/A	N/A	NO	BSL
319-84-6	4,4'-DDT	8.2	J	8.2	J	µg/kg	IR84-DP83-00	1/11	1.4U - 15U	8.2	NA	1.70E+03 C	N/A	N/A	NO	BSL
5103-71-9	BHC, alpha-	21	J	21	J	µg/kg	IR84-DP83-00	1/11	0.49U - 2.6U	21	NA	9.00E+01 C	N/A	N/A	NO	BSL
5103-74-2	Chlordane, alpha-	2,4175	J	40	J	µg/kg	84-MW17-00	2/11	0.63U - 6.8U	40	NA	1.60E+03 C ⁽¹⁾	N/A	N/A	NO	BSL
60-57-1	Chlordane, gamma-	3,5125	J	43	J	µg/kg	84-MW17-00	2/11	0.6U - 6.5U	43	NA	1.60E+03 C ⁽¹⁾	N/A	N/A	NO	BSL
1031-07-8	Dieldrin	14	J	52	J	µg/kg	IR84-DP82-00	3/11	1.6U - 3.3U	52	NA	3.00E+01 C	N/A	N/A	YES	ASL
72-20-8	Endosulfan Sulfate	3.2	J	40	J	µg/kg	IR84-DP82-00	5/12	0.3U - 0.61U	40	NA	3.70E+04 N ^(a)	N/A	N/A	NO	BSL
7421-93-4	Endrin	3,6225	J	3,6225	J	µg/kg	IR84-MW20-00	1/11	0.65U - 7U	3,6225	NA	1.80E+03 N	N/A	N/A	NO	BSL
53494-70-5	Endrin Aldehyde	4.5	J	61	J	µg/kg	IR84-DP82-00	5/12	1.6U - 3.3U	61	NA	1.80E+03 N ^(a)	N/A	N/A	NO	BSL
72-43-5	Endrin Ketone	1.7	J	26	J	µg/kg	IR84-DP81-00	4/12	0.28U - 3U	26	NA	1.80E+03 N ^(a)	N/A	N/A	NO	BSL
12672-29-6	Methoxychlor	8.7	J	79	J	µg/kg	IR84-DP82-00	4/12	0.87U - 4.7U	79	NA	3.10E+04 N	N/A	N/A	NO	BSL
11096-82-5	Aroclor-1248	56	J	56	J	µg/kg	IR84-DP20-00	1/77	4.8U - 18000U	56	NA	2.20E+02 C	N/A	N/A	NO	BSL
	Aroclor-1260	18	J	200,000	J	µg/kg	IR84-SB27-01	58/77	7.8U - 140U	200,000	NA	2.20E+02 C	N/A	N/A	YES	ASL

Scenario Timeframe: Current, Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

TABLE 2.1B (Continued)
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current, Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

CAS Number	Chemical	Minimum Concentration	Minimum Qualifier	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value (1)	Screening (2) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (3) Contaminant Deletion or Selection
7440-36-0	METALS (mg/kg)															
7440-38-2	Antimony	0.66	J	2	J	mg/kg	IR84-DP84-00	5/13	0.52UJ - 0.6UJ	2	0.3934	3.10E+00 N	N/A	N/A	NO	BSL
7440-39-3	Arsenic	0.64	J	6.7	J	mg/kg	84-MW17-00	11/13	0.32U - 0.32U	6.7	0.5108	3.90E-01 C	N/A	N/A	YES	ASL
7440-43-9	Barium	3	J	24.6	J	mg/kg	IR84-DP84-00	11/13	6.3U - 9.8U	24.6	10.6444	5.40E+02 N	N/A	N/A	NO	BSL
7440-43-9	Cadmium	0.1155	J	0.23	J	mg/kg	IR84-DP82-00	4/13	0.046U - 0.049U	0.23	0.0278	3.70E+00 N	N/A	N/A	NO	BSL
7440-70-2	Calcium	109	J	17,900	J	mg/kg	IR84-DP82-00	13/13	(4)	17,900	1462.2764	N/A	N/A	N/A	NO	NUT
7440-47-3	Chromium	1.7	J	7.5	J	mg/kg	IR84-DP74-00	13/13	(4)	7.5	4.5002	2.10E+02 C	N/A	N/A	NO	BSL
7440-48-4	Cobalt	0.18	J	0.41	J	mg/kg	IR84-DP84-00	11/13	0.16U - 0.17U	0.41	0.2302	4.70E+02 N	N/A	N/A	NO	BSL
7440-50-8	Copper	0.35	J	28.4	J	mg/kg	IR84-DP84-00	13/13	(4)	28.4	5.2188	2.90E+02 N	N/A	N/A	NO	BSL
7439-89-6	Iron	950	J	3,480	J	mg/kg	IR84-MW20-00	13/13	(4)	3,480	1737.4264	2.30E+03 N (10)	N/A	N/A	YES	ASL
7439-92-1	Lead	1.8	J	65.4	J	mg/kg	IR84-DP82-00	13/13	(4)	65.4	10.4738	4.00E+02 N	N/A	N/A	NO	BSL
7439-95-4	Magnesium	47.3	J	347	J	mg/kg	IR84-DP82-00	13/13	(4)	347	211.5692	N/A	N/A	N/A	NO	NUT
7439-96-5	Manganese	2.7	J	15.9	J	mg/kg	IR84-DP74-00	7/13	0.0089U - 0.0095U	15.9	11.3294	1.80E+02 N	N/A	N/A	NO	BSL
7439-97-6	Mercury	0.015	J	0.2	J	mg/kg	IR84-DP84-00	13/13	(4)	0.2	0.0732	2.30E+02 N	N/A	N/A	NO	BSL
7440-02-0	Nickel	0.46	J	2.6	J	mg/kg	IR84-DP84-00	13/13	(4)	2.6	1.0454	1.60E+02 N	N/A	N/A	NO	BSL
7440-09-7	Potassium	70.2	J	258	J	mg/kg	IR84-DP76-00	7/13	34.8U - 75.9U	258	89.1538	N/A	N/A	N/A	NO	NUT
7782-49-2	Selenium	0.365	J	0.61	J	mg/kg	IR84-DP74-00	2/13	0.33U - 0.43U	0.61	0.3194	3.90E+01 N	N/A	N/A	NO	BSL
7440-62-2	Vanadium	2.5	J	10.4	J	mg/kg	IR84-DP76-00	13/13	(4)	10.4	5.9918	5.50E+01 N	N/A	N/A	NO	BSL
7440-66-6	Zinc	1.3	J	40.7	J	mg/kg	IR84-DP82-00	13/13	(4)	40.7	10.748	2.30E+03 N	N/A	N/A	NO	BSL

- (1) MCB Camp Lejeune Base Background Study, Final (Baker, 2001); 2 * Mean (1/2 nondetects)
(2) All non-carcinogenic criteria were divided by 10 to account for potential additive effects of chemicals
USEPA Region IX COC Screening Value (derived from USEPA Region IX PRG Table)
(3) Rationale Codes
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)

- (4) No detection limits given; analyte detected in every sample.
(5) Screening values for naphthalene used as a surrogate
(6) Screening value for pyrene used as a surrogate
(7) Screening value for chlordane used as a surrogate.
(8) Screening value for endosulfan used as a surrogate.
(9) Screening value for endrin used as a surrogate.
(10) Action level for lead.

Definitions:

N/A = Not applicable

NA = Not Analyzed

COPC = Chemical of Potential Concern

ARAR/TBC = applicable or Relevant and appropriate Requirement/To Be Considered

J - Analyte present - Reported value is estimated

* = (Inorganics) Duplicate analysis was not within control limits

U - Not detected

UI - Reported quantitation limit is qualified as estimated

C = Carcinogenic

N = Non-Carcinogenic

S = Soil Saturation

mg/kg = milligrams per kilogram

ug/kg = microgram per kilogram

TABLE 2.2A
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

CAS Number	Chemical	Minimum Concentration	Minimum Qualifier	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value ⁽¹⁾	Screening ⁽²⁾ Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for ⁽³⁾ Contaminant Deletion or Selection
540-59-0	VOLATILES (ug/kg)															
78-93-3	1,2-Dichloroethene (total)	91	J	91	J	ug/kg	IR84-DP82-04	1/23	1.3U - 93U	91	NA	4.30E+03 N ⁽²⁾	N/A	N/A	NO	BSL
78-93-3	2-Butanone (MEK)	3.8	J	3.8	J	ug/kg	IR84-MW21-04	1/23	2.6U - 260U	3.8	NA	7.30E+05 N	N/A	N/A	NO	BSL
71-43-2	Acetone	14	J	18	J	ug/kg	IR84-MW21-04	2/23	2U - 940U	18	NA	1.60E+05 N	N/A	N/A	NO	BSL
67-66-3	Benzene	120	J	160	J	ug/kg	IR84-MW15-04	2/23	0.62U - 54U	160	NA	6.50E+02 C	N/A	N/A	NO	BSL
100-41-4	Chloroform	0.98	J	0.98	J	ug/kg	IR84-MW22-02	1/23	0.81U - 32U	0.98	NA	2.40E+02 C	N/A	N/A	NO	BSL
75-09-2	Ethylbenzene	0.89	J	1,300	J	ug/kg	IR84-DP75-05	5/23	0.56U - 15U	1,300	NA	2.30E+05 S	N/A	N/A	NO	BSL
100-42-5	Methylene Chloride	1.3	J	1.3	J	ug/kg	IR84-DP78-03	1/23	1.2U - 270U	1.3	NA	8.90E+03 C	N/A	N/A	NO	BSL
108-88-3	Styrene	2.1	J	2.1	J	ug/kg	IR84-MW23-01	1/23	0.47U - 54U	2.1	NA	1.70E+06 S	N/A	N/A	NO	BSL
1330-20-7	Toluene	75	J	75	J	ug/kg	IR84-DP75-05	1/23	0.5U - 310U	75	NA	5.20E+05 S	N/A	N/A	NO	BSL
	Xylenes, total	4.1	J	3,100	J	ug/kg	IR84-DP75-05	4/23	1.8U - 63U	3,100	NA	2.10E+05 S	N/A	N/A	NO	BSL
91-57-6	SEMIVOLATILES (ug/kg)															
83-32-9	2-Methylnaphthalene	1,000	J	27,000	J	ug/kg	84-MW15-04	3/31	50U - 130U	27,000	NA	5.60E+03 N ⁽²⁾	N/A	N/A	YES	ASL
120-12-7	Acenaphthene	61	J	950	J	ug/kg	IR84-DP15-03	4/31	53U - 640U	950	NA	3.70E+05 N	N/A	N/A	NO	BSL
56-55-3	Anthracene	190	J	830	J	ug/kg	IR84-DP46-02	3/31	51U - 630U	830	NA	2.20E+06 N	N/A	N/A	NO	BSL
50-32-8	Benzo(a)anthracene	640	J	3,000	J	ug/kg	IR84-DP46-02	3/31	57U - 700U	3,000	NA	6.20E+02 C	N/A	N/A	YES	ASL
205-99-2	Benzo(b)fluoranthene	590	J	2,600	J	ug/kg	IR84-DP46-02	5/31	63U - 770U	2,600	NA	6.20E+01 C	N/A	N/A	YES	ASL
191-24-2	Benzo(k)fluoranthene	65	J	1,200	J	ug/kg	IR84-DP46-02	5/31	60U - 740U	2,800	NA	6.20E+05 N ⁽¹⁾	N/A	N/A	YES	ASL
207-08-9	Bis(2-chloroethoxy)methane	280	J	1,700	J	ug/kg	IR84-DP46-02	3/31	57U - 700U	1,700	NA	6.20E+03 C	N/A	N/A	YES	ASL
111-91-1	Bis(2-ethylhexyl)phthalate	91	J	54	J	ug/kg	IR84-DP81-04	1/31	49U - 600U	54	NA	N/A	N/A	N/A	YES	CHEM
86-74-8	Carbazole	110	J	1,800	J	ug/kg	IR84-MW22-02	7/31	56U - 690U	1,800	NA	3.50E+04 C	N/A	N/A	NO	NSC
218-01-9	Chrysene	57	J	480	J	ug/kg	IR84-DP46-02	3/31	54U - 660U	480	NA	2.40E+04 C	N/A	N/A	YES	CHEM
53-70-3	Dibenz(a,h)anthracene	98	J	430	J	ug/kg	IR84-DP46-02	5/31	48U - 590U	3,100	NA	6.20E+04 C	N/A	N/A	YES	CHEM
132-64-9	Dibenzofuran	160	J	1,300	J	ug/kg	IR84-DP46-02	3/31	53U - 650U	430	NA	6.20E+01 C	N/A	N/A	YES	CHEM
206-44-0	Fluoranthene	74	J	1,500	J	ug/kg	IR84-DP15-03	5/31	52U - 620U	1,300	NA	2.90E+04 N	N/A	N/A	NO	BSL
86-73-7	Hexachlorocyclopentadiene	340	J	94	J	ug/kg	IR84-DP47-01	5/31	50U - 600U	1,500	NA	2.30E+05 N	N/A	N/A	NO	BSL
91-20-3	Indeno(1,2,3-cd)pyrene	55	J	1,200	J	ug/kg	IR84-DP46-02	3/31	73U - 890U	94	NA	4.20E+04 N	N/A	N/A	NO	BSL
85-01-8	Naphthalene	150	J	8,500	J	ug/kg	IR84-DP46-02	4/31	51U - 140U	8,500	NA	6.20E+02 C	N/A	N/A	YES	ASL
85-44-9	Phenanthrene	120	NJ	3,400	NJ	ug/kg	84-MW15-04	6/31	54U - 78U	3,400	NA	5.60E+03 N ⁽¹⁾	N/A	N/A	NO	BSL
129-00-0	Phthalic anhydride	69	J	170	J	ug/kg	IR84-SB04-02	2/2	(4)	170	NA	1.00E+08 M	N/A	N/A	NO	BSL
	Pyrene	1,1675	J	4,100	J	ug/kg	IR84-DP46-02	5/31	53U - 650U	4,100	NA	2.30E+05 N	N/A	N/A	NO	BSL
72-54-8	PESTICIDES / PCBs (ug/kg)															
72-55-9	4,4'-DDD	1.155	J	46	J	ug/kg	IR84-DP45-03	7/31	0.82U - 880U	46	NA	2.40E+03 C	N/A	N/A	NO	BSL
50-29-3	4,4'-DDE	2.5	J	120	J	ug/kg	IR84-DP52-01	5/31	0.59U - 630U	16	NA	1.70E+03 C	N/A	N/A	NO	BSL
319-85-7	BHC, beta	1.7	J	14,000	J	ug/kg	IR84-MW17-07	1/31	0.48U - 510U	17	NA	3.20E+02 C	N/A	N/A	NO	BSL
5103-71-9	Chlordane, alpha	5.9	J	18,000	J	ug/kg	IR84-DP47-01	7/31	0.61U - 3.8U	14,000	NA	1.60E+03 C ⁽²⁾	N/A	N/A	YES	ASL
5103-74-2	Chlordane, gamma	6.3	J	18,000	J	ug/kg	IR84-DP47-01	7/31	0.59U - 3.6U	18,000	NA	1.60E+03 C ⁽²⁾	N/A	N/A	YES	ASL
60-57-1	Dieldrin	1.4	J	2.4	J	ug/kg	IR84-SB01-02	3/31	1.6U - 1700U	2.4	NA	3.00E+01 C	N/A	N/A	NO	BSL
7421-93-4	Endrin Aldehyde	10	J	10	J	ug/kg	IR84-DP15-03	1/31	1.6U - 1700U	10	NA	1.80E+03 N ⁽²⁾	N/A	N/A	NO	BSL
76-44-8	Heptachlor	1.6	J	6,900	J	ug/kg	IR84-DP47-01	6/31	0.64U - 3.9U	6,900	NA	1.10E+02 C	N/A	N/A	YES	ASL
1024-57-3	Heptachlor Epoxide	63	J	200	J	ug/kg	IR84-DP46-02	2/31	0.69U - 720U	200	NA	5.30E+01 C	N/A	N/A	YES	ASL
72-43-5	Methoxychlor	2.9	J	47,000	J	ug/kg	IR84-DP15-03	3/31	0.85U - 910U	24	NA	3.10E+04 N	N/A	N/A	NO	BSL
12672-29-6	Aroclor-1248	47,000	J	5,000	J	ug/kg	IR84-DP47-01	1/37	21U - 2300U	47,000	NA	2.20E+02 C	N/A	N/A	YES	ASL
11097-69-1	Aroclor-1254	5,000	J	45,000	J	ug/kg	IR84-DP46-02	1/37	7.8U - 820U	45,000	NA	2.20E+02 C	N/A	N/A	YES	ASL
11096-82-5	Aroclor-1260	13	J		J	ug/kg	IR84-DP18-02	11/37			NA		N/A	N/A	YES	ASL

TABLE 2.2A (Continued)
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

CAS Number	Chemical	Minimum Concentration	Minimum Qualifier	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value ⁽¹⁾	Screening ⁽²⁾ Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for ⁽³⁾ Contaminant Deletion or Selection
86290-81-5 68334-30-5	TOTAL PETROLEUM HYDROCARBONS Gasoline Range Organics (ug/kg) Diesel Range Organics (mg/kg) METALS (mg/kg)	220 15		580,000 5,500		ug/kg mg/kg	IR84-DP15-03 IR84-DP15-03	2/8 8/8	18U - 19U (4)	580,000 5,500	NA ND	N/A N/A	N/A N/A	N/A N/A	YES YES	NSC NSC
7429-90-5	Aluminum	589	J	7,210		mg/kg	IR84-DP77-03	31/31	(4)	7,210	7216.4828	7.60E+03 N	N/A	N/A	NO	BSL
7440-36-0	Antimony	0.6		1.3	B	mg/kg	IR84-DP15-03	7/31	0.51UJ - 0.74U	1.3	0.3762	3.10E+00 N	N/A	N/A	NO	BSL
7440-38-2	Arsenic	0.33	J	2		mg/kg	IR84-DP15-03	27/31	0.31U - 0.39U	2	0.4976	3.90E-01 C	N/A	N/A	YES	ASL
7440-39-3	Barium	0.92	J	24.3	B	mg/kg	IR84-DP49-01	20/31	2.9U - 36.6U	24.3	11.3358	5.40E+02 N	N/A	N/A	NO	BSL
7440-41-7	Beryllium	0.051	J	0.13		mg/kg	IR84-DP15-03	5/31	0.05U - 0.12U	0.13	0.0686	1.50E+01 N	N/A	N/A	NO	BSL
7440-43-9	Cadmium	0.03675	J	0.18	J	mg/kg	IR84-DP49-01	7/31	0.045U - 0.065U	0.18	ND	3.70E+00 N	N/A	N/A	NO	BSL
7440-70-2	Calcium	71.4	J	66,800	J	mg/kg	IR84-SB03-02	31/31	(4)	66,800	116.3862	N/A	N/A	N/A	NO	NUT
18540-29-9	Chromium VI	1.2	J	9.9		mg/kg	IR84-DP45-03	31/31	(4)	9.9	ND	3.00E+01 C	N/A	N/A	NO	BSL
7440-48-4	Cobalt	0.16	J	0.69	J	mg/kg	IR84-DP52-01	25/31	0.16U - 0.19U	0.69	0.3964	4.70E+02 N	N/A	N/A	NO	BSL
7440-50-8	Copper	0.34	J	25.5		mg/kg	IR84-DP50-01	27/31	0.28U - 0.33U	25.5	1.5224	2.90E+02 N	N/A	N/A	NO	BSL
7439-89-6	Iron	155		6,140		mg/kg	IR84-DP15-03	31/31	(4)	6,140	2423.8344	2.30E+03 N ⁽¹⁰⁾	N/A	N/A	YES	ASL
7439-92-1	Lead	0.87	J	52.7		mg/kg	IR84-DP49-01	31/31	(4)	52.7	5.7656	4.00E+02 N ⁽¹⁰⁾	N/A	N/A	NO	BSL
7439-95-4	Magnesium	16.4	J	943		mg/kg	IR84-SB03-02	31/31	(4)	943	187.6828	N/A	N/A	N/A	NO	NUT
7439-96-5	Manganese	0.48	J	50.5	J	mg/kg	IR84-SB03-02	31/31	(4)	50.5	5.3896	1.80E+02 N	N/A	N/A	NO	BSL
7439-97-6	Mercury	0.01	J	0.055		mg/kg	IR84-DP46-02	22/31	0.0088U - 0.01U	0.055	0.0626	2.30E+00 N	N/A	N/A	NO	BSL
7440-02-0	Nickel	0.42	J	3.5	J	mg/kg	IR84-DP50-01	30/31	0.32U - 0.32U	3.5	1.5576	1.60E+02 N	N/A	N/A	NO	BSL
7782-49-2	Potassium	21.3	J	195	J	mg/kg	IR84-DP77-03	26/31	32.9U - 79.8U	195	162.6276	N/A	N/A	N/A	NO	NUT
7440-23-5	Selenium	0.295	J	0.73	J	mg/kg	IR84-SB03-02	8/31	0.32U - 0.82U	0.73	0.4128	3.90E+01 N	N/A	N/A	NO	BSL
7440-28-0	Sodium	89.7	J	89.7	J	mg/kg	IR84-SB03-02	1/31	52.1U - 75.4U	89.7	ND	N/A	N/A	N/A	NO	NUT
7440-62-2	Thallium	0.64	J	0.9	J	mg/kg	IR84-SB03-02	5/31	0.52U - 0.75U	0.9	ND	5.20E-01 N	N/A	N/A	YES	ASL
7440-66-6	Vanadium	1.1	J	11.2		mg/kg	IR84-DP15-03	31/31	(4)	11.2	9.831	5.50E+01 N	N/A	N/A	NO	BSL
	Zinc	1.4	J	42.6	J	mg/kg	IR84-DP49-01	27/31	1.3U - 1.5U	42.6	3.0842	2.30E+03 N	N/A	N/A	NO	BSL

- (1) MCB Camp Lejeune Base Background Study, Final (Baker, 2001): 2 * Mean (1/2 nondetects)
(2) All non-carcinogenic criteria were divided by 10 to account for potential additive effects of chemicals
USEPA Region IX COC Screening Value (derived from USEPA Region IX PRG Table)
(3) Rationale Codes
Selection Reason: Same chemical class (CHEM)
No Screening Criteria (NSC)
Above Screening Levels (ASL)
Essential Nutrient (NUT)
Below Screening Level (BSL)
Deletion Reason:
(4) No detection limits given; analyte detected in every sample.
(5) Screening value for 1,2-dichloroethene (cis) used as a surrogate.
(6) Screening values for naphthalene used as a surrogate.
(7) Screening value for pyrene used as a surrogate.
(8) Screening value for chlordane used as a surrogate.
(9) Screening value for endrin used as a surrogate.
(10) Action level for lead.
- Definitions:
N/A = Not applicable
NA = Not Analyzed
ND = Not Detected
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
J - Analyte present - Reported value is estimated
NJ - Presumptive evidence for the presence of the material at an estimated value
B - Constituent was detected in a blank
U - Not detected
UJ - Reported quantitation limit is qualified as estimated
C = Carcinogenic
N = Non-Carcinogenic
S = Soil Saturation
M = Max. Ceiling Limit
mg/kg = milligrams per kilogram
ug/kg = microgram per kilogram

TABLE 2.2B
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJUNE
JACKSONVILLE, NORTH CAROLINA

CAS Number	Chemical	Minimum Concentration	Minimum Qualifier	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value ⁽¹⁾	Screening ⁽²⁾ Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for ⁽³⁾ Contaminant Deletion or Selection
540-59-0	VOLATILES (ug/kg)															
78-93-3	1,2-Dichloroethene (total)	91	J	91	J	ug/kg	IR84-DP82-04	1/14	1.4U - 93U	91	NA	4.30E+03 N ⁽³⁾	N/A	N/A	NO	BSL
67-64-1	2-Butanone (MEK)	3.8	J	3.8	J	ug/kg	IR84-MW21-04	1/14	2.7U - 260U	3.8	NA	7.30E+05 N	N/A	N/A	NO	BSL
71-43-2	Benzene	160	J	160	J	ug/kg	IR84-MW21-04	2/14	2.1U - 940U	18	NA	1.60E+05 N	N/A	N/A	NO	BSL
100-41-4	Ethylbenzene	0.89	J	1,000	J	ug/kg	84-MW15-04	1/14	0.64U - 54U	1,000	NA	6.50E+02 C	N/A	N/A	NO	BSL
75-09-2	Methylene Chloride	1.3	J	2.1	J	ug/kg	84-MW15-04	4/14	0.38U - 15U	1,000	NA	2.30E+05 S	N/A	N/A	NO	BSL
100-42-5	Styrene	2.1	J	2.1	J	ug/kg	IR84-DP78-03	1/14	1.3U - 270U	2.1	NA	8.90E+03 C	N/A	N/A	NO	BSL
1330-20-7	Xylenes, total	4.1	J	2,800	J	ug/kg	IR84-MW23-01	1/14	0.49U - 54U	2,800	NA	1.70E+06 S	N/A	N/A	NO	BSL
91-57-6	SEMI-VOLATILES (ug/kg)															
83-32-9	2-Methylnaphthalene	9,100	J	27,000	J	ug/kg	84-MW15-04	3/14	1.9U - 63U	27,000	NA	2.10E+05 S	N/A	N/A	NO	BSL
205-99-2	Acenaphthene	950	J	950	J	ug/kg	84-MW15-04	2/18	50U - 72U	950	NA	5.60E+03 N ⁽³⁾	N/A	N/A	YES	ASL
111-91-1	Benzofluoranthene	68	J	68	J	ug/kg	IR84-DP15-03	1/18	53U - 640U	68	NA	3.70E+05 N	N/A	N/A	NO	BSL
117-81-7	Bis(2-chloroethoxy)methane	54	J	54	J	ug/kg	IR84-DP81-04	1/18	60U - 740U	54	NA	6.20E+02 C	N/A	N/A	NO	BSL
218-01-9	Chrysene	91	J	381	J	ug/kg	IR84-DP79-02	1/18	49U - 600U	381	NA	N/A	N/A	N/A	YES	NSC
132-64-9	Dibenzofuran	59	J	59	J	ug/kg	IR84-SB03-02	4/18	56U - 690U	59	NA	3.50E+04 C	N/A	N/A	NO	BSL
86-73-7	Fluoranthene	1,300	J	1,300	J	ug/kg	IR84-DP15-03	1/18	48U - 590U	1,300	NA	6.20E+04 C	N/A	N/A	NO	BSL
91-20-3	Fluorene	82	J	82	J	ug/kg	IR84-SB03-02	1/18	52U - 620U	82	NA	2.90E+04 N	N/A	N/A	NO	BSL
85-01-8	Phenanthrene	1,500	J	1,500	J	ug/kg	IR84-DP15-03	1/18	58U - 720U	1,500	NA	2.30E+05 N	N/A	N/A	NO	BSL
85-44-9	Phthalic anhydride	2,000	J	8,500	J	ug/kg	84-MW15-04	2/18	51U - 74U	8,500	NA	5.60E+03 N ⁽³⁾	N/A	N/A	YES	ASL
129-00-0	Pyrene	3,400	J	3,400	J	ug/kg	IR84-DP15-03	2/18	54U - 78U	3,400	NA	2.30E+05 N ⁽³⁾	N/A	N/A	NO	BSL
72-54-8	PESTICIDES/PCBs (ug/kg)	120	NJ	170	NJ	ug/kg	IR84-SB04-02	2/2	(4)	170	NA	1.00E+08 M	N/A	N/A	NO	BSL
72-55-9	4,4'-DDD	91	J	91	J	ug/kg	IR84-SB03-02	1/18	53U - 650U	91	NA	2.30E+05 N	N/A	N/A	NO	BSL
50-29-3	4,4'-DDT	2.4	J	9.1	J	ug/kg	IR84-DP15-03	3/18	0.82U - 2U	9.1	NA	2.40E+03 C	N/A	N/A	NO	BSL
319-85-7	BHC, beta	2.2	J	4.4	J	ug/kg	IR84-SB03-02	2/18	0.59U - 3.6U	4.4	NA	1.70E+03 C	N/A	N/A	NO	BSL
5103-71-9	Chlordane, alpha	2.5	J	8.7	J	ug/kg	IR84-SB03-02	2/18	1.4U - 8.3U	8.7	NA	1.70E+03 C	N/A	N/A	NO	BSL
5103-74-2	Chlordane, gamma	1.7	J	1.7	J	ug/kg	84-MW17-07	1/18	0.48U - 2.9U	1.7	NA	3.20E+02 C	N/A	N/A	NO	BSL
60-57-1	Dieldrin	5.9	J	5.9	J	ug/kg	IR84-SB03-02	1/18	0.61U - 3.8U	5.9	NA	1.60E+03 C ⁽³⁾	N/A	N/A	NO	BSL
7421-93-4	Endrin Aldehyde	6.3	J	6.3	J	ug/kg	IR84-SB03-02	1/18	0.59U - 3.6U	6.3	NA	1.60E+03 C ⁽³⁾	N/A	N/A	NO	BSL
72-43-5	Methoxychlor	2.4	J	2.4	J	ug/kg	IR84-SB01-02	1/18	1.6U - 9.6U	2.4	NA	3.00E+01 C	N/A	N/A	NO	BSL
11096-82-5	Aroclor-1260	10	J	10	J	ug/kg	IR84-DP15-03	1/18	1.6U - 4.5U	10	NA	1.80E+03 N ⁽³⁾	N/A	N/A	NO	BSL
86290-81-5	TOTAL PETROLEUM HYDROCARBONS	2.9	J	24	J	ug/kg	IR84-DP15-03	2/18	0.85U - 2.5U	24	NA	3.10E+04 N	N/A	N/A	NO	BSL
68334-30-5	Gasoline Range Organics (mg/kg)	13	J	45,000	J	ug/kg	IR84-DP18-02	8/24	7.8U - 11U	45,000	NA	2.20E+02 C	N/A	N/A	YES	ASL
	Diesel Range Organics (mg/kg)	580,000	J	580,000	J	mg/kg	IR84-DP15-03	1/1	(4)	580,000	NA	N/A	N/A	N/A	YES	NSC
		5,500	J	5,500	J	mg/kg	IR84-DP15-03	1/1	(4)	5,500	ND	N/A	N/A	N/A	YES	NSC

TABLE 2.2B (Continued)
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

CAS Number	Chemical	Minimum Concentration	Minimum Qualifier	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background Value ⁽¹⁾	Screening ⁽²⁾ Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for ⁽³⁾ Contaminant Deletion or Selection
7429-90-5	Aluminum	589	B	7,210	B	mg/kg	IR84-DP77-03	18/18	(4)	7,210	7216.4828	7.60E+03 N	N/A	N/A	NO	BSL
7440-36-0	Antimony	1.3	J	1.3	J	mg/kg	IR84-DP15-03	1/18	0.51U - 0.74U	1.3	0.3762	3.10E+00 N	N/A	N/A	NO	BSL
7440-38-2	Arsenic	0.33	J	2	J	mg/kg	IR84-DP15-03	15/18	0.31U - 0.35U	2	0.4976	3.90E-01 C	N/A	N/A	YES	ASL
7440-39-3	Barium	0.92	J	21.6	B	mg/kg	IR84-MW23-01	11/18	4U - 56.6U	21.6	11.3358	5.40E+02 N	N/A	N/A	NO	BSL
7440-41-7	Beryllium	0.1	B	0.13	B	mg/kg	IR84-DP15-03	2/18	0.05U - 0.12U	0.13	0.0686	1.50E+01 N	N/A	N/A	NO	BSL
7440-43-9	Cadmium	0.097	J	0.12	J	mg/kg	IR84-SB03-02	2/18	0.045U - 0.065U	0.12	ND	3.70E+00 N	N/A	N/A	NO	BSL
7440-70-2	Calcium	71.4	J	66,800	J	mg/kg	IR84-SB03-02	18/18	(4)	66,800	116.3862	N/A	N/A	N/A	NO	NUT
7440-47-3	Chromium	1.2	J	9.7	J	mg/kg	IR84-DP15-03	18/18	(4)	9.7	8.8572	2.10E+02 C	N/A	N/A	NO	NUT
7440-48-4	Cobalt	0.16	J	0.68	J	mg/kg	IR84-DP15-03	14/18	0.16U - 0.18U	0.68	0.3964	4.70E+02 N	N/A	N/A	NO	BSL
7440-50-8	Copper	0.34	J	5.1	J	mg/kg	IR84-DP15-03	14/18	0.28U - 0.33U	5.1	1.5224	2.90E+02 N	N/A	N/A	NO	BSL
7439-89-6	Iron	475	J	6,140	J	mg/kg	IR84-DP15-03	18/18	(4)	6,140	2423.8344	2.30E+03 N	N/A	N/A	YES	ASL
7439-92-1	Lead	0.87	J	11.4	J	mg/kg	IR84-SB03-02	18/18	(4)	11.4	5.7656	4.00E+02 N ⁽¹⁰⁾	N/A	N/A	NO	BSL
7439-95-4	Magnesium	16.4	J	943	J	mg/kg	IR84-SB03-02	18/18	(4)	943	187.6828	N/A	N/A	N/A	NO	NUT
7439-96-5	Manganese	0.0116	J	50.5	J	mg/kg	IR84-MW21-04	10/18	0.0088U - 0.01U	50.5	5.3896	1.80E+02 N	N/A	N/A	NO	BSL
7439-97-6	Mercury	0.42	J	0.037	J	mg/kg	IR84-DP15-03	17/18	0.32U - 0.32U	0.037	0.0626	2.30E+00 N	N/A	N/A	NO	BSL
7440-02-0	Nickel	21.3	J	2.3	J	mg/kg	IR84-DP77-03	14/18	32.9U - 73.2U	2.3	1.5576	1.60E+02 N	N/A	N/A	NO	BSL
7440-09-7	Potassium	0.39	J	0.73	J	mg/kg	IR84-SB03-02	5/18	0.32U - 0.82U	195	162.6276	N/A	N/A	N/A	NO	NUT
7782-49-2	Selenium	89.7	J	89.7	J	mg/kg	IR84-SB03-02	1/18	52.1U - 75.4U	89.7	0.4128	3.90E+01 N	N/A	N/A	NO	BSL
7440-23-5	Sodium	0.65	J	0.9	J	mg/kg	IR84-SB03-02	4/18	0.52U - 0.75U	0.9	ND	N/A	N/A	N/A	NO	NUT
7440-28-0	Thallium	1.1	J	11.2	J	mg/kg	IR84-DP15-03	18/18	(4)	11.2	9.831	5.20E-01 N	N/A	N/A	YES	ASL
7440-62-2	Vanadium	1.4	J	33.2	J	mg/kg	IR84-SB03-02	15/18	1.3U - 1.5U	33.2	3.0842	5.50E+01 N	N/A	N/A	NO	BSL
7440-66-6	Zinc	1.4	J	33.2	J	mg/kg	IR84-SB03-02	15/18	1.3U - 1.5U	33.2	3.0842	2.30E+03 N	N/A	N/A	NO	BSL

(1) MCB Camp Lejeune Base Background Study, Final (Baker, 2001): 2 * Mean (1/2 nondetects)

(2) All non-carcinogenic criteria were divided by 10 to account for potential additive effects of chemicals

USEPA Region IX COC Screening Value (derived from USEPA Region IX PRG Table)

(3) Rationale Codes

Selection Reason: No Screening Criteria (NSC)

Deletion Reason: Above Screening Levels (ASL)

Essential Nutrient (NUT)

Below Screening Level (BSL)

(4) No detection limits given; analyte detected in every sample.

(5) Screening value for 1,2-dichloroethene (cis) used as a surrogate.

(6) Screening values for naphthalene used as a surrogate

(7) Screening value for pyrene used as a surrogate.

(8) Screening value for chlordane used as a surrogate.

(9) Screening value for endrin used as a surrogate.

(10) Action level for lead.

Definitions:

N/A = Not applicable

NA = Not Analyzed

ND = Not Detected

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

J - Analyte present - Reported value is estimated

NJ - Presumptive evidence for the presence of the material at an estimated value

B - Constituent was detected in a blank

U - Not detected

UI - Reported quantitation limit is qualified as estimated

C = Carcinogenic

N = Non-Carcinogenic

S = Soil Saturation

M = Max, Ceiling Limit

mg/kg = milligrams per kilogram

ug/kg = microgram per kilogram

TABLE 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEIBUNE
JACKSONVILLE, NORTH CAROLINA

CAS Number	Chemical	Minimum Concentration	Minimum Qualifier	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Screening (1) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (2) Contaminant Deletion or Selection
78-93-3	VOLATILES (ug/L)	0.53	J	0.69	J	ug/L	IR84-MW22-01C	2/19	0.41U - 10U	0.69	1.90E+02 N	170	NC WQC	NO	BSL
71-43-2	2-Butanone (MEK)	1.5	J	3.4	J	ug/L	AST781-GW03-98B	2/19	0.160 - 10U	3.4	3.50E-01 C	5	MCL	YES	ASL
75-15-0	Benzene	0.49	J	0.49	J	ug/L	IR84-MW18-01C	1/19	0.2U - 10U	0.49	1.00E+02 N	N/A	N/A	NO	BSL
67-66-3	Carbon Disulfide	16	J	16	J	ug/L	IR84-MW18-01C	2/19	0.14U - 10U	16	1.60E-01 C	100	MCL	YES	ASL
74-87-3	Chloroform	0.17	J	0.62	J	ug/L	IR84-MW18-01C	2/19	0.13U - 10U	0.62	1.50E+00 C	N/A	N/A	NO	BSL
100-41-4	Chloromethane	0.6	J	6.7	J	ug/L	AST781-GW04-98B	4/19	0.12U - 10U	6.7	1.30E+02 N	700	MCL	NO	BSL
1634-04-4	Methyl Tert-Butyl Ether (MTBE)	0.52	J	0.52	J	ug/L	IR84-MW16-01C	1/19	0.13U - 10U	0.52	2.00E+01 N/C	200	NC WQC	NO	BSL
75-09-2	Methylene Chloride	0.37	J	0.7	J	ug/L	IR84-MW22-01C	3/19	0.34U - 10U	0.7	4.30E+00 C	5	NC WQC	NO	BSL
79-01-6	Trichloroethene (TCE)	0.19	J	0.19	J	ug/L	IR84-MW17-01C	1/19	0.14U - 10U	0.19	1.60E+00 C	5	MCL	NO	BSL
1330-20-7	Xylenes, total	1.8	J	1.8	J	ug/L	IR84-MW17-01C	1/19	0.33U - 10U	1.8	1.40E+02 N	10000	MCL	NO	BSL
91-57-6	SEMI-VOLATILES (ug/L)	1.05	J	1.05	J	ug/L	IR84-MW20-01C	1/13	0.64U - 0.64U	1.05	6.20E-01 N (4)	N/A	N/A	YES	ASL
91-20-3	2-Methylnaphthalene	2.2	J	2.2	J	ug/L	IR84-MW22-01C	1/13	0.75U - 0.75U	2.2	6.20E-01 N	21	NC WQC	YES	ASL
72-54-8	PESTICIDES / PCBs (ug/L)	0.0285	J	0.044	J	ug/L	IR84-MW18-01C	3/13	0.0064U - 0.13U	0.044	2.80E-01 C	N/A	N/A	NO	BSL
72-55-9	4,4'-DDD	0.025	J	0.025	J	ug/L	IR84-MW20-01C	1/13	0.0074U - 0.15U	0.025	2.00E-01 C	N/A	N/A	NO	BSL
50-29-3	4,4'-DDT	0.029	J	0.046	J	ug/L	IR84-MW21-01C	3/13	0.0072U - 0.14U	0.046	2.00E-01 C	N/A	N/A	NO	BSL
319-85-7	BHC, beta-	0.01405	J	0.029	J	ug/L	IR84-MW21-01C	4/13	0.0062U - 0.12U	0.029	3.70E-02 C	N/A	N/A	NO	BSL
5103-74-2	Chlordane, gamma-	0.04	J	0.04	J	ug/L	IR84-MW18-01C	1/13	0.0065U - 0.13U	0.04	1.90E-01 C (3)	0.027	NC WQC	NO	BSL
959-98-8	Endosulfan I	0.023	J	0.023	J	ug/L	IR84-MW18-01C	1/13	0.0069U - 0.14U	0.023	2.20E+01 N (4)	N/A	N/A	NO	BSL
1024-57-3	Heptachlor Epoxide	0.0167	J	0.0167	J	ug/L	IR84-MW20-01C	1/13	0.0068U - 0.14U	0.0167	7.40E-03 C	0.2	MCL	YES	ASL
88-85-7	Dioxob	0.015	J	1.5	J	ug/L	IR84-MW17-01C	4/13	0.013U - 0.13U	1.5	3.60E+00 N	7	MCL	NO	BSL
94-74-6	MCPA	44	J	44	J	ug/L	IR84-MW18-01C	1/13	8U - 80U	44	1.80E+00 N	N/A	N/A	YES	ASL
7429-90-5	Aluminum	0.44	J	0.73	J	ug/L	IR84-MW17-01C	9/13	0.11U - 0.225U	0.73	3.60E+00 N	50	4MCL	NO	BSL
7440-36-0	Antimony	0.0022	J	0.011	J	ug/L	IR84-MW17-01C	3/13	0.0022U - 0.0022U	0.011	1.50E-03 N	6	MCL	YES	ASL
7440-38-2	Arsenic	0.0074	J	0.03	J	ug/L	IR84-MW08-01C	3/13	0.0039U - 0.0039U	0.03	4.50E-05 C	50	MCL	YES	ASL
7440-39-3	Barium	0.0036	J	0.12	J	ug/L	IR84-MW18-01C	13/13	(3)	0.12	2.60E-01 N	2000	MCL	NO	BSL
7440-41-7	Beryllium	0.00037	J	0.0011	J	ug/L	IR84-MW10-01C, IR84-MW10-01C	13/13	(3)	0.0011	7.50E-03 N	4	MCL	NO	BSL
7440-43-9	Cadmium	0.00056	J	0.00061	J	ug/L	IR84-MW23-01C	2/13	0.00028U - 0.00028U	0.00061	1.80E-03 N	5	MCL	NO	BSL
7440-70-2	Calcium	1.4	J	106	J	ug/L	IR84-MW07-01C	13/13	(3)	106	N/A	N/A	N/A	NO	NUT
18540-29-9	Chromium VI	0.0011	J	0.0022	J	ug/L	IR84-MW19-01C	3/13	0.0014U - 0.0014U	0.0022	1.10E-02 N	100	MCL (4)	NO	BSL
7440-48-4	Cobalt	0.0022	J	0.0057	J	ug/L	IR84-MW18-01C	3/13	0.0013U - 0.0013U	0.0057	2.20E-01 N	N/A	N/A	NO	BSL
7439-89-6	Iron	0.18	J	67.7	J	ug/L	IR84-MW08-01C	11/13	0.088U - 0.088U	67.7	1.10E+00 N	300	4MCL	YES	ASL
7439-95-4	Magnesium	0.004	J	11.3	J	ug/L	IR84-MW18-01C	13/13	(3)	11.3	N/A	N/A	N/A	NO	NUT
7439-96-5	Manganese	0.00072	J	0.000072	J	ug/L	IR84-MW17-01C	13/13	(3)	0.45	8.80E-02 N	50	4MCL	YES	ASL
7439-97-6	Mercury	0.000072	J	0.000072	J	ug/L	IR84-MW17-01C	1/13	0.00069U - 0.00069U	0.000072	1.10E-03 N	2	MCL	NO	BSL
7440-02-0	Nickel	0.0027	J	0.11	J	ug/L	IR84-MW18-01C	2/13	0.0022U - 0.0022U	0.11	7.30E-02 N	100	MCL	NO	BSL
7440-09-7	Potassium	0.86	J	11	J	ug/L	IR84-MW21-01C	10/13	0.26U - 0.69U	11	N/A	N/A	N/A	NO	NUT
7440-23-5	Sodium	2.1	J	22	J	ug/L	IR84-MW19-01C	13/13	(3)	22	N/A	N/A	N/A	NO	NUT
7440-28-0	Thallium	0.0054	J	0.0057	J	ug/L	IR84-MW08-01C	2/13	0.005U - 0.005U	0.0057	2.40E-04 N	2	MCL	YES	ASL
7440-62-2	Vandium	0.0084	J	0.0037	J	ug/L	IR84-MW21-01C	9/13	0.00082U - 0.00082U	0.0037	2.60E-02 N	N/A	N/A	NO	BSL
7440-66-6	Zinc	0.013	J	0.31	J	ug/L	IR84-MW18-01C	3/13	0.012U - 0.012U	0.31	1.10E+00 N	5000	4MCL	NO	BSL

J - Analyte present - Reported value is estimated
U - Not detected

Definitions:
N/A = Not Applicable
NA = Not Analyzed
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

C = Carcinogenic
N = Non-Carcinogenic

(1) All non-carcinogenic RBCs were divided by 10 to account for potential additive effects of chemicals USEPA Region IX COC Screening Value (derived from USEPA Region IX PRG Table)

(2) Rationale Codes
Selection Reason: Above Screening Levels (ASL)
Deletion Reason: Essential Nutrient (NUT)
Below Screening Level (BSL)

(3) No detection limits given; analyte detected in every sample.
(4) Screening values for naphthalene used as a surrogate
(5) Screening value for chloroform used as a surrogate.

MCL = Maximum Contaminant Level
4MCL = Secondary Maximum Contaminant Level
NC WQC = North Carolina Water Quality Criteria (EHNH)

TABLE 2.4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current, Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water

CAS Number	Chemical	Minimum Concentration	Minimum Qualifier	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Screening ⁽¹⁾ Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for ⁽²⁾ Contaminant Deletion or Selection
67-64-1	VOLATILES (ug/L)	5.6	J	5.6	J	µg/L	IR84-SW07-98B	1/1	(3)	5.6	N/A	N/A	N/A	YES	NSC
71-43-2	Acetone	1.2	J	1.2	J	µg/L	IR84-SW07-98B	1/1	(3)	1.2	1.20E+00	N/A	N/A	NO	BSL
108-88-3	Benzene	2.7	J	2.7	J	µg/L	IR84-SW07-98B	1/1	(3)	2.7	6.80E+03	N/A	N/A	NO	BSL
1330-20-7	Toluene	3.5	J	3.5	J	µg/L	IR84-SW07-98B	1/1	(3)	3.5	N/A	N/A	N/A	YES	NSC
	Xylenes, total														

(1) All non-carcinogenic RBCs were divided by 10 to account for potential additive effects of chemicals
EPA Ambient Water Quality Criteria: Consumption of water and organisms

Definitions:
N/A = Not Analyzed
COPC = Chemical of Potential Concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

(2) Rationale Codes Selection Reason: No Screening Criteria (NSC)
Deletion Reason: Below Screening Level (BSL)

J - Analyte present - Reported value is estimated

(3) No detection limits given; analyte detected in every sample.

ug/L = microgram per liter

TABLE 2.4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current, Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water

CAS Number	Chemical	Minimum Concentration	Minimum Qualifier	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Screening ⁽¹⁾ Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for ⁽²⁾ Contaminant Deletion or Selection
67-64-1	VOLATILES (ug/L)	5.6	J	5.6	J	µg/L	IR84-SW07-98B	1/1	(3)	5.6	N/A	N/A	N/A	YES	NSC
71-43-2	Acetone	1.2	J	1.2	J	µg/L	IR84-SW07-98B	1/1	(3)	1.2	7.14E+01	N/A	N/A	NO	BSL
108-88-3	Benzene	2.7	J	2.7	J	µg/L	IR84-SW07-98B	1/1	(3)	2.7	N/A	N/A	N/A	YES	NSC
1330-20-7	Toluene	3.5	J	3.5	J	µg/L	IR84-SW07-98B	1/1	(3)	3.5	N/A	N/A	N/A	YES	NSC
	Xylenes, total														

(1) North Carolina Surface Water Quality Standards (human health consumption of fish)

(2) Rationale Codes Selection Reason: No Screening Criteria (NSC)

Deletion Reason: Below Screening Level (BSL)

(3) No detection limits given; analyte detected in every sample.

Definitions: N/A = Not applicable

NA = Not Analyzed

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

J - Analyte present - Reported value is estimated

ug/L = microgram per liter

TABLE 2.5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current, Future															
Medium: Sediment															
Exposure Medium: Sediment															
Exposure Point: Sediment															
CAS Number	Chemical	Minimum Concentration	Minimum Qualifier	Maximum Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Screening ⁽¹⁾ Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for ⁽²⁾ Contaminant Deletion or Selection
1330-20-7	VOLATILES (ug/kg)	910	J	910	J	µg/kg	IR84-SD07-98B	1/1	(3)	910	2.10E+05 S	N/A	N/A	NO	BSL
91-57-6	Xylenes, total	10,000		10,000		µg/kg	IR84-SD07-98B	1/1	(3)	10,000	5.60E+03 N ⁽⁴⁾	N/A	N/A	YES	ASL
117-81-7	2-Methylnaphthalene	2,400	J	2,400	J	µg/kg	IR84-SD07-98B	1/1	(3)	2,400	3.50E+04 C	N/A	N/A	NO	BSL
91-20-3	Bis(2-ethylhexyl)phthalate	2,000		2,000		µg/kg	IR84-SD07-98B	1/1	(3)	2,000	5.60E+03 N	N/A	N/A	NO	BSL
85-01-8	Naphthalene	2,500		2,500		µg/kg	IR84-SD07-98B	1/1	(3)	2,500	2.30E+05 N ⁽³⁾	N/A	N/A	NO	BSL
12672-29-6	Phenanthrene	2,800		2,800		µg/kg	84-SD05-01	1/7	160U - 4700U	2,800	2.20E+02 C	N/A	N/A	YES	ASL
11096-82-5	PCBs (ug/kg)	3,700		40,000		µg/kg	IR84-SD01-98B	7/7	(3)	40,000	2.20E+02 C	N/A	N/A	YES	ASL
68334-30-5	TOTAL PETROLEUM HYDROCARBONS			11,600		mg/kg	IR84-SD01-98B	3/3	(3)	11,600	N/A	N/A	N/A	YES	NSC
	Diesel Range Organics (mg/kg)	3,500													

(1) All non-carcinogenic RBCs were divided by 10 to account for potential additive effects of chemicals
USEPA Region IX COC Screening Value (derived from USEPA Region IX PRG Table)

Definitions:

N/A = Not applicable

NA = Not Analyzed

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

J - Analyte present - Reported value is estimated

U - Not detected

(3) No detection limits given: analyte detected in every sample.

(4) Screening values for naphthalene used as a surrogate

(5) Screening value for pyrene used as a surrogate.

C = Carcinogenic

N = Non-Carcinogenic

S = Soil Saturation

mg/kg = milligrams per kilogram

ug/kg = microgram per kilogram

TABLE 3.1A
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current, Future Medium: Surface Soil Exposure Medium: Surface Soil Exposure Point: Surface Soil												
Chemical of Potential Concern	Units	Arithmetic Mean	95% Upper Confidence Level (95% UCL)	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
2-Methylnaphthalene	mg/kg	3.87	1.96	92		mg/kg	1.96	W-Lognormal	(1)	1.96	W-Lognormal	(1)
Benzo(a)anthracene	mg/kg	8.48	69.0	190		mg/kg	69.0	W-Lognormal	(1)	69.0	W-Lognormal	(1)
Benzo(a)pyrene	mg/kg	6.80	30.5	150		mg/kg	30.5	W-Lognormal	(1)	30.5	W-Lognormal	(1)
Benzo(b)fluoranthene	mg/kg	7.75	40.9	170		mg/kg	40.9	W-Lognormal	(1)	40.9	W-Lognormal	(1)
Benzo(k)fluoranthene	mg/kg	5.34	18.7	120		mg/kg	18.7	W-Lognormal	(1)	18.7	W-Lognormal	(1)
Carbazole	mg/kg	1.78	3.16	38	J	mg/kg	3.16	W-Lognormal	(1)	3.16	W-Lognormal	(1)
Chrysene	mg/kg	8.18	96.0	180		mg/kg	96.0	W-Lognormal	(1)	96.0	W-Lognormal	(1)
Dibenz(a,h)anthracene	mg/kg	0.867	1.41	17	J	mg/kg	1.41	W-Lognormal	(1)	1.41	W-Lognormal	(1)
Fluoranthene	mg/kg	13.9	243	300		mg/kg	243	W-Lognormal	(1)	243	W-Lognormal	(1)
Indeno(1,2,3-cd)pyrene	mg/kg	2.81	8.79	59		mg/kg	8.79	W-Lognormal	(1)	8.79	W-Lognormal	(1)
Naphthalene	mg/kg	0.414	0.525	7.5	J	mg/kg	0.525	W-Lognormal	(1)	0.525	W-Lognormal	(1)
Pyrene	mg/kg	12.0	282	250		mg/kg	250	Max	(2)	250	Max	(2)
4,4'-DDD	mg/kg	0.189	4.81	3	J	mg/kg	3	Max	(2)	3	Max	(2)
Chlordane, alpha-	mg/kg	4.44	44,123	48	J	mg/kg	48	Max	(2)	48	Max	(2)
Chlordane, gamma-	mg/kg	5.35	75,346	58		mg/kg	58	Max	(2)	58	Max	(2)
Dieldrin	mg/kg	0.161	7.48	0.32		mg/kg	0.32	Max	(2)	0.32	Max	(2)
Heptachlor	mg/kg	1.91	1,785	22		mg/kg	22	Max	(2)	22	Max	(2)
Heptachlor Epoxide	mg/kg	0.418	47.6	4.5	J	mg/kg	4.5	Max	(2)	4.5	Max	(2)
Aroclor-1248	mg/kg	2.23	1.51	160		mg/kg	1.51	D-Lognormal	(1)	1.51	D-Lognormal	(1)
Aroclor-1254	mg/kg	0.953	0.975	51		mg/kg	0.975	D-Lognormal	(1)	0.975	D-Lognormal	(1)
Aroclor-1260	mg/kg	5.20	54.6	200		mg/kg	54.6	D-Lognormal	(1)	54.6	D-Lognormal	(1)
Gasoline Range Organics	mg/kg	0.0883	0.207	0.88		mg/kg	0.207	W-Lognormal	(1)	0.207	W-Lognormal	(1)
Diesel Range Organics	mg/kg	188	1,794	470		mg/kg	470	Max	(2)	470	Max	(2)
Antimony	mg/kg	0.82	1.22	3.3	J	mg/kg	1.22	W-Lognormal	(1)	1.22	W-Lognormal	(1)
Arsenic	mg/kg	1.93	3.49	9.1		mg/kg	3.49	W-Lognormal	(1)	3.49	W-Lognormal	(1)
Iron	mg/kg	1,934	2,260	3480		mg/kg	2,260	W-Lognormal	(1)	2,260	W-Lognormal	(1)
Thallium	mg/kg	0.29	0.31	0.6	J	mg/kg	0.31	W-Lognormal	(1)	0.31	W-Lognormal	(1)

EPC = Exposure Point Concentration

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.

- (1) Conservative estimate of the arithmetic average concentration (95% UCL), based on the Shapiro-Wilks (W-) or D-Augustino (D-) distribution tests
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

TABLE 3.1B
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current, Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil

Chemical of Potential Concern	Units	Arithmetic Mean	95% Upper Confidence Level (95% UCL)	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
2-Methylnaphthalene	mg/kg	7.15	57.9	92	J	mg/kg	57.9	W-Lognormal	(1)	57.9	W-Lognormal	(1)
Benzo(a)anthracene	mg/kg	0.640	4.76	5.9		mg/kg	4.76	W-Lognormal	(1)	4.76	W-Lognormal	(1)
Benzo(a)pyrene	mg/kg	0.564	2.48	5.8		mg/kg	2.48	W-Lognormal	(1)	2.48	W-Lognormal	(1)
Benzo(b)fluoranthene	mg/kg	0.658	2.81	7.1		mg/kg	2.81	W-Lognormal	(1)	2.81	W-Lognormal	(1)
Benzo(k)fluoranthene	mg/kg	0.396	1.78	3.8		mg/kg	1.78	W-Lognormal	(1)	1.78	W-Lognormal	(1)
Carbazole	mg/kg	0.261	0.95	2.1		mg/kg	0.95	W-Lognormal	(1)	0.95	W-Lognormal	(1)
Chrysene	mg/kg	0.771	7.11	6.7		mg/kg	6.7	Max	(2)	6.7	Max	(2)
Dibenz(a,h)anthracene	mg/kg	0.191	0.695	1.2		mg/kg	0.695	W-Lognormal	(1)	0.695	W-Lognormal	(1)
Indeno(1,2,3-cd)pyrene	mg/kg	0.380	1.72	3.2		mg/kg	1.72	W-Lognormal	(1)	1.72	W-Lognormal	(1)
Dieldrin	mg/kg	0.00899	0.0877	0.052		mg/kg	0.052	Max	(2)	0.052	Max	(2)
Aroclor-1260	mg/kg	5.98	95.6	200		mg/kg	95.6	D-Lognormal	(1)	95.6	D-Lognormal	(1)
Arsenic	mg/kg	1.68	5.26	6.7		mg/kg	5.26	W-Lognormal	(1)	5.26	W-Lognormal	(1)
Iron	mg/kg	1,922	2,347	3480		mg/kg	2,347	W-Lognormal	(1)	2,347	W-Lognormal	(1)

EPC = Exposure Point Concentration

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.

- (1) Conservative estimate of the arithmetic average concentration (95% UCL), based on the Shapiro-Wilks (W-) or D-Augustino (D-) distribution tests
- (2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

TABLE 3.2A
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

Chemical of Potential Concern	Units	Arithmetic Mean	95% Upper Confidence Level (95% UCL)	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
2-Methylnaphthalene	mg/kg	1.22	0.573	27		mg/kg	0.573	W-Lognormal	(1)	0.573	W-Lognormal	(1)
Benzo(a)anthracene	mg/kg	0.192	0.199	3		mg/kg	0.199	W-Lognormal	(1)	0.199	W-Lognormal	(1)
Benzo(a)pyrene	mg/kg	0.178	0.194	2.6		mg/kg	0.194	W-Lognormal	(1)	0.194	W-Lognormal	(1)
Benzo(b)fluoranthene	mg/kg	0.196	0.217	2.8		mg/kg	0.217	W-Lognormal	(1)	0.217	W-Lognormal	(1)
Benzo(k)fluoranthene	mg/kg	0.123	0.137	1.7		mg/kg	0.137	W-Lognormal	(1)	0.137	W-Lognormal	(1)
Bis(2-chloroethoxy)methane	mg/kg	0.0467	0.0512	0.054		mg/kg	0.0512	W-Lognormal	(1)	0.0512	W-Lognormal	(1)
Carbazole	mg/kg	0.0713	0.0845	0.48		mg/kg	0.0845	W-Lognormal	(1)	0.0845	W-Lognormal	(1)
Chrysene	mg/kg	0.190	0.209	3.1		mg/kg	0.209	W-Lognormal	(1)	0.209	W-Lognormal	(1)
Dibenz(a,h)anthracene	mg/kg	0.0659	0.0758	0.43	J	mg/kg	0.0758	W-Lognormal	(1)	0.0758	W-Lognormal	(1)
Indeno(1,2,3-cd)pyrene	mg/kg	0.124	0.145	1.2		mg/kg	0.145	W-Lognormal	(1)	0.145	W-Lognormal	(1)
Naphthalene	mg/kg	0.379	0.226	8.5		mg/kg	0.226	W-Lognormal	(1)	0.226	W-Lognormal	(1)
Chlordane, alpha-	mg/kg	0.545	1.22	14	J	mg/kg	1.22	W-Lognormal	(1)	1.22	W-Lognormal	(1)
Chlordane, gamma-	mg/kg	0.690	1.65	18		mg/kg	1.65	W-Lognormal	(1)	1.65	W-Lognormal	(1)
Heptachlor	mg/kg	0.255	0.155	6.9		mg/kg	0.155	W-Lognormal	(1)	0.155	W-Lognormal	(1)
Heptachlor Epoxide	mg/kg	0.0207	0.0161	0.2	J	mg/kg	0.0161	W-Lognormal	(1)	0.0161	W-Lognormal	(1)
Aroclor-1248	mg/kg	1.30	0.318	47		mg/kg	0.318	W-Lognormal	(1)	0.318	W-Lognormal	(1)
Aroclor-1254	mg/kg	0.276	0.333	5		mg/kg	0.333	W-Lognormal	(1)	0.333	W-Lognormal	(1)
Aroclor-1260	mg/kg	1.63	5.61	45		mg/kg	5.61	W-Lognormal	(1)	5.61	W-Lognormal	(1)
Gasoline Range Organics	mg/kg	72.5	4,837,171,589	580		mg/kg	580	Max	(2)	580	Max	(2)
Diesel Range Organics	mg/kg	727	32,931	5,500		mg/kg	5,500	Max	(2)	5,500	Max	(2)
Arsenic	mg/kg	0.804	1.11	2		mg/kg	1.11	W-Lognormal	(1)	1.11	W-Lognormal	(1)
Iron	mg/kg	1,951	2,754	6140		mg/kg	2,754	W-Lognormal	(1)	2,754	W-Lognormal	(1)
Thallium	mg/kg	0.363	0.405	0.9	J	mg/kg	0.405	W-Lognormal	(1)	0.405	W-Lognormal	(1)

EPC = Exposure Point Concentration

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.

- (1) Conservative estimate of the arithmetic average concentration (95% UCL), based on the Shapiro-Wilks (W-) or D-Augustino (D-) distribution tests
(2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.

TABLE 3.2B
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil

Chemical of Potential Concern	Units	Arithmetic Mean	95% Upper Confidence Level (95% UCL)	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
2-Methylnaphthalene	mg/kg	2.03	6.38	27		mg/kg	6.38	W-Lognormal	(1)	6.38	W-Lognormal	(1)
Bis(2-chloroethoxy)methane	mg/kg	0.0591	0.0785	0.054		mg/kg	0.054	Max	(2)	0.054	Max	(2)
Naphthalene	mg/kg	0.609	0.862	8.5		mg/kg	0.862	W-Lognormal	(1)	0.862	W-Lognormal	(1)
Aroclor-1260	mg/kg	2.41	27.0	45		mg/kg	27.0	W-Lognormal	(1)	27.0	W-Lognormal	(1)
Gasoline Range Organics	mg/kg	580	ND	580		mg/kg	580	Max	(3)	580	Max	(3)
Diesel Range Organics	mg/kg	5,500	ND	5,500		mg/kg	5,500	Max	(3)	5,500	Max	(3)
Arsenic	mg/kg	0.856	1.50	2		mg/kg	1.50	W-Lognormal	(1)	1.50	W-Lognormal	(1)
Iron	mg/kg	1,958	3,007	6140		mg/kg	3,007	W-Lognormal	(1)	3,007	W-Lognormal	(1)
Thallium	mg/kg	0.401	0.488	0.9	J	mg/kg	0.488	W-Lognormal	(1)	0.488	W-Lognormal	(1)

EPC = Exposure Point Concentration

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.

- (1) Conservative estimate of the arithmetic average concentration (95% UCL), based on the Shapiro-Wilks (W-) or D-Augustino (D-) distribution tests
- (2) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.
- (3) Data set contains fewer than five samples. Therefore, maximum concentration used for EPC.

TABLE 3.3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater, total inorganics

Chemical of Potential Concern	Units	Arithmetic Mean	95% Upper Confidence Level (95% UCL)	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Benzene	mg/L	0.00137	0.0100	0.0034	J	mg/L	0.0034	Max	(1)	0.0034	Max	(1)
Chloroform	mg/L	0.00323	0.0961	0.016		mg/L	0.016	Max	(1)	0.016	Max	(1)
2-Methylnaphthalene	mg/L	0.000376	0.000448	0.00105	J	mg/L	0.00105	Max	(1)	0.00105	Max	(1)
Naphthalene	mg/L	0.000515	0.000654	0.0022	J	mg/L	0.0022	Max	(1)	0.0022	Max	(1)
Heptachlor Epoxide	mg/L	0.0000095	0.0000186	0.0000167	J	mg/L	0.0000167	Max	(1)	0.0000167	Max	(1)
MCPA	mg/L	0.0105	0.0184	0.044	J	mg/L	0.044	Max	(1)	0.044	Max	(1)
Antimony	mg/L	0.00000200	0.00000330	0.011	J	mg/L	0.011	Max	(1)	0.011	Max	(1)
Arsenic	mg/L	0.00000540	0.00000940	0.03		mg/L	0.03	Max	(1)	0.03	Max	(1)
Iron	mg/L	0.0133	5.90	67.7		mg/L	67.7	Max	(1)	67.7	Max	(1)
Manganese	mg/L	0.000100	0.000876	0.45		mg/L	0.45	Max	(1)	0.45	Max	(1)
Thallium	mg/L	0.00000300	0.00000350	0.0057	J	mg/L	0.0057	Max	(1)	0.0057	Max	(1)

EPC = Exposure Point Concentration

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.

(1) Conservative estimate using the maximum concentration.

TABLE 3.4
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current, Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water, total inorganics

Chemical of Potential Concern	Units	Arithmetic Mean	95% Upper Confidence Level (95% UCL)	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure				Central Tendency			
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Rationale
Acetone	mg/L	0.00560	ND	0.0056	J	mg/L	0.0056	Max	(1)	0.0056	Max	(1)	0.0056	(1)
Toluene	mg/L	0.00270	ND	0.0027	J	mg/L	0.0027	Max	(1)	0.0027	Max	(1)	0.0027	(1)
Xylenes, total	mg/L	0.00350	ND	0.0035	J	mg/L	0.0035	Max	(1)	0.0035	Max	(1)	0.0035	(1)

EPC = Exposure Point Concentration

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.

(1) Data set contains fewer than five samples. Therefore, maximum concentration used for EPC.

TABLE 3.5
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current, Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment

Chemical of Potential Concern	Units	Arithmetic Mean	95% Upper Confidence Level (95% UCL)	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure				Central Tendency			
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Rationale
2-Methylnaphthalene	mg/kg	10.0	ND	10		mg/kg	10	Max	(2)	10	Max	(2)	10	(2)
Aroclor-1248	mg/kg	1.09	62.0	2.8		mg/kg	2.8	Max	(1)	2.8	Max	(1)	2.8	(1)
Aroclor-1260	mg/kg	14.1	51.2	40		mg/kg	40	Max	(1)	40	Max	(1)	40	(1)
Diesel Range Organics	mg/kg	6,467	427,412	11,600		mg/kg	11,600	Max	(2)	11,600	Max	(2)	11,600	(2)

EPC = Exposure Point Concentration

For non-detects, 1/2 sample quantitation limit was used as a proxy concentration.

- (1) 95% UCL exceeds maximum detected concentration. Therefore, maximum concentration used for EPC.
- (2) Data set contains fewer than five samples. Therefore, maximum concentration used for EPC.

TABLE 4.1.1
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times FI \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Soil	mg/day	100	USEPA, 1989	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	FI	Fraction Ingested from Source	NA	1	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1995	--	--	
	ED	Exposure Duration	years	4	Std Tour of Duty	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
Dermal	AT-N	Averaging Time (Non-Cancer)	days	1,460	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ² /day	3,300	USEPA, 1997	--	--	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.2	USEPA, 1997	--	--	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1995	--	--	
	ED	Exposure Duration	years	4	Std Tour of Duty	--	--	
Inhalation	BW	Body Weight	kg	70	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times IR \times ET \times EF \times ED \times 1/PEF \times 1/BW \times 1/AT$
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	1,460	USEPA, 1989	--	--	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	
	RR	Respiration Rate	m ³ /hour	0.83	USEPA, 1995	--	--	
	ET	Exposure Time	hours/day	8	Prof Judge	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1995	--	--	
	ED	Exposure Duration	years	4	Std Tour of Duty	--	--	
	PEF	Particulate Emission Factor	m ³ /kg	1.32E+09	USEPA, 1996	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	1,460	USEPA, 1989	--	--	

Notes

(1) USEPA Region IV default values of 0.01% organics and 0.001% for inorganics were used for ABS values.

Prof Judge - Professional Judgement

Std Tour of Duty - Standard Tour of Duty

Sources:

Exposure Parameters, MilitaryW-SS

TABLE 4.1.2
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C	Contaminant Concentration in Surface Water	mg/L	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times W \times EF \times ED \times 1/BW \times 1/AT$
	IR-W	Ingestion Rate of Surface Water	L/hour	0.01	USEPA, 1995	--	--	
	ET	Exposure Time	hours/day	2.6	USEPA, 1992	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1995	--	--	
	ED	Exposure Duration	years	4	Sid Tour of Duty	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
Dermal	AT-N	Averaging Time (Non-Cancer)	days	1,460	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times PC \times ET \times EF \times ED \times 1/BW \times 1/AT$
	C	Contaminant Concentration in Surface Water	mg/L	See Table	See Table	--	--	
	CF	Conversion Factor	L/cm ³	1.00E-03	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ²	3,300	USEPA, 1997	--	--	
	PC	Permeability Constant	cm/hour	Chemical Specific	USEPA, 1992	--	--	
	ET	Exposure Time	hours/day	2.6	USEPA, 1992	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1995	--	--	
	ED	Exposure Duration	years	4	Sid Tour of Duty	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	1,460	USEPA, 1989	--	--	

Notes

Sid Tour of Duty - Standard Tour of Duty

Sources:

TABLE 4.1.3
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Sediment	mg/kg	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times Fi \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Sediment	mg/day	100	USEPA, 1991	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	Fi	Fraction Ingested from Source	NA	1	Prof Judge	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	4	Std Tour of Duty	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
Dermal	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	AT-N	Averaging Time (Non-Cancer)	days	1,460	USEPA, 1989	--	--	
	C	Contaminant Concentration in Sediment	mg/kg	See Table	See Table	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ² /day	3,300	USEPA, 1997	--	--	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.2	USEPA, 1997	--	--	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	4	Std Tour of Duty	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	1,460	USEPA, 1989	--	--	

Notes

(1) USEPA Region IV default values of 0.01 % organics and 0.001 % for inorganics were used for ABS values.

Prof Judge - Professional Judgement

Std Tour of Duty - Standard Tour of Duty

TABLE 4.2.1
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times Fi \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Soil	mg/day	100	USEPA, 1989	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	Fi	Fraction Ingested from Source	NA	1	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	
	ED	Exposure Duration	years	24	USEPA, 1989	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
Dermal	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	--	--	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ² /day	5,700	USEPA, 1997	--	--	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.2	USEPA, 1997	--	--	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	--	--	
Inhalation	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	CDI (mg/kg-day) = $C \times IR \times ET \times EF \times ED \times 1/PEF \times 1/BW \times 1/AT$
	ED	Exposure Duration	years	24	USEPA, 1989	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	--	--	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	
	RR	Respiration Rate	m ³ /hour	0.83	USEPA, 1991	--	--	
	ET	Exposure Time	hours/day	8	USEPA, 1991	--	--	
	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	
	ED	Exposure Duration	years	24	USEPA, 1989	--	--	
	PEF	Particulate Emission Factor	m ³ /kg	1.32E+09	USEPA, 1996	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	--	--	

Notes

(1) USEPA Region IV default values of 0.01% organics and 0.001% for inorganics were used for ABS values.

Prof Judge - Professional Judgement

Sources:

Exposure Parameters, ARecU-SS

TABLE 4.2.2
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Surface Water	mg/L	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times W \times EF \times ED \times 1/BW \times 1/AT$
	IR-W	Ingestion Rate of Surface Water	L/hour	0.01	USEPA, 1995	--	--	
	ET	Exposure Time	hours/day	2.6	USEPA, 1992	--	--	
	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	
	ED	Exposure Duration	years	24	USEPA, 1989	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
Dermal	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times PC \times ET \times EF \times ED \times 1/BW \times 1/AT$
	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	--	--	
	C	Contaminant Concentration in Surface Water	mg/L	See Table	See Table	--	--	
	CF	Conversion Factor	L/cm ³	1.00E-03	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ²	5,700	USEPA, 1997	--	--	
	PC	Permeability Constant	cm/hour	Chemical Specific	USEPA, 1992	--	--	
	ET	Exposure Time	hours/day	2.6	USEPA, 1992	--	--	
	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	
	ED	Exposure Duration	years	24	USEPA, 1989	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	--	--	

Notes

Prof Judge - Professional Judgement

Sources:

TABLE 4.2.3
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Sediment	mg/kg	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times Fi \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Sediment	mg/day	100	USEPA, 1989	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	Fi	Fraction Ingested from Source	NA	1	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	
	ED	Exposure Duration	years	24	USEPA, 1989	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
Dermal	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	C	Contaminant Concentration in Sediment	mg/kg	See Table	See Table	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ² /day	5,700	USEPA, 1997	--	--	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.2	USEPA, 1997	--	--	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	
	ED	Exposure Duration	years	24	USEPA, 1989	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	--	--	

Notes

(1) USEPA Region IV default values of 0.01% organics and 0.001% for inorganics were used for ABS values.
Prof Judge - Professional Judgement

TABLE 4.3.1
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times FI \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Soil	mg/day	100	USEPA, 1989	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	FI	Fraction Ingested from Source	NA	1	Prof Judge	--	--	
	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	
	ED	Exposure Duration	years	9	USEPA, 1989	--	--	
	BW	Body Weight	kg	45	USEPA, 1995	--	--	
Dermal	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	AT-N	Averaging Time (Non-Cancer)	days	3,285	USEPA, 1989	--	--	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ² /day	5,300	USEPA, 1997	--	--	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.2	USEPA, 1997	--	--	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	--	--	
Inhalation	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	CDI (mg/kg-day) = $C \times IR \times ET \times EF \times ED \times 1/PEF \times 1/BW \times 1/AT$
	ED	Exposure Duration	years	9	USEPA, 1989	--	--	
	BW	Body Weight	kg	45	USEPA, 1995	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	USEPA, 1989	--	--	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	
	RR	Respiration Rate	m ³ /hour	0.83	USEPA, 1991	--	--	
	ET	Exposure Time	hours/day	8	USEPA, 1991	--	--	
	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	
	ED	Exposure Duration	years	9	USEPA, 1989	--	--	
	PEF	Particulate Emission Factor	m ³ /kg	1.32E+09	USEPA, 1996	--	--	
	BW	Body Weight	kg	45	USEPA, 1995	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	USEPA, 1989	--	--	

Notes

(1) USEPA Region IV default values of 0.01% organics and 0.001% for inorganics were used for ABS values.

Prof Judge - Professional Judgement

Sources:

Exposure Parameters, CRecU-SS

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TABLE 4.3.2
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Surface Water	mg/L	See Table	See Table	--	--	$\text{Chronic Daily Intake (CDI)} (\text{mg/kg-day}) = \frac{C \times \text{IR} \times W \times \text{EF} \times \text{ED} \times 1/\text{BW} \times 1/\text{AT}}$
	IR-W	Ingestion Rate of Surface Water	L/hour	0.01	USEPA, 1995	--	--	
	ET	Exposure Time	hours/day	2.6	USEPA, 1992	--	--	
	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	
	ED	Exposure Duration	years	9	USEPA, 1989	--	--	
	BW	Body Weight	kg	45	USEPA, 1995	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
Dermal	AT-N	Averaging Time (Non-Cancer)	days	3,285	USEPA, 1989	--	--	$\text{CDI} (\text{mg/kg-day}) = \frac{C \times \text{CF} \times \text{SA} \times \text{PC} \times \text{ET} \times \text{EF} \times \text{ED} \times 1/\text{BW} \times 1/\text{AT}}$
	C	Contaminant Concentration in Surface Water	mg/L	See Table	See Table	--	--	
	CF	Conversion Factor	L/cm ³	1.00E-03	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ²	5,300	USEPA, 1997	--	--	
	PC	Permeability Constant	cm/hour	Chemical Specific	USEPA, 1992	--	--	
	ET	Exposure Time	hours/day	2.6	USEPA, 1992	--	--	
	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	
	ED	Exposure Duration	years	9	USEPA, 1989	--	--	
	BW	Body Weight	kg	45	USEPA, 1995	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	USEPA, 1989	--	--	

Notes

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Sources:

TABLE 4.3.3
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Sediment	mg/kg	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times F_i \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Sediment	mg/day	100	USEPA, 1989	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	F _i	Fraction Ingested from Source	NA	1	Prof Judge	--	--	
	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	
	ED	Exposure Duration	years	9	USEPA, 1989	--	--	
	BW	Body Weight	kg	45	USEPA, 1995	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
Dermal	AT-N	Averaging Time (Non-Cancer)	days	3,285	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	C	Contaminant Concentration in Sediment	mg/kg	See Table	See Table	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ² /day	5,300	USEPA, 1997	--	--	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.2	USEPA, 1997	--	--	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	48	Prof Judge	--	--	
	ED	Exposure Duration	years	9	USEPA, 1989	--	--	
	BW	Body Weight	kg	45	USEPA, 1995	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	3,285	USEPA, 1989	--	--	

Notes

- (1) USEPA Region IV default values of 0.01% organics and 0.001% for inorganics were used for ABS values.
Prof Judge - Professional Judgement

TABLE 4.4.1
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	See Table	See Table	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times FI \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Soil	mg/kg day	100	USEPA, 1989	50	USEPA, 1993	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	1.00E-06	USEPA, 1989	
	FI	Fraction Ingested from Source	NA	1	Prof Judge	1	Prof Judge	
	EF	Exposure Frequency	days/year	350	USEPA, 1991	234	USEPA, 1993	
	ED	Exposure Duration	years	24	USEPA, 1989	9	USEPA, 1993	
	BW	Body Weight	kg	70	USEPA, 1989	70	USEPA, 1989	
Dermal	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	3,285	USEPA, 1993	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	See Table	See Table	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	1.00E-06	USEPA, 1989	
	SA	Surface Area Available for Contact	cm ² /day	5,700	USEPA, 1997	5,000	USEPA, 1992	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.07	USEPA, 1997	0.07	USEPA, 1997	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	(1)	USEPA, 1995	
Inhalation	EF	Exposure Frequency	days/year	350	USEPA, 1991	234	USEPA, 1993	CDI (mg/kg-day) = $C \times IR \times ET \times EF \times ED \times 1/PEF \times 1/BW \times 1/AT$
	ED	Exposure Duration	years	24	USEPA, 1989	9	USEPA, 1993	
	BW	Body Weight	kg	70	USEPA, 1989	70	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	3,285	USEPA, 1993	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	See Table	See Table	
	RR	Respiration Rate	m ³ /hour	0.83	USEPA, 1995	0.8	USEPA, 1995	
	ET	Exposure Time	hours/day	24	Prof Judge	24	Prof Judge	
	EF	Exposure Frequency	days/year	350	USEPA, 1991	234	USEPA, 1993	
	ED	Exposure Duration	years	24	USEPA, 1989	9	USEPA, 1993	
	PEF	Particulate Emission Factor	m ³ /kg	1.32E+09	USEPA, 1996	1.32E+09	USEPA, 1996	
	BW	Body Weight	kg	70	USEPA, 1989	70	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	3,285	USEPA, 1993	

Notes

(1) USEPA Region IV default values of 0.01% organics and 0.001% for inorganics were used for ABS values.

Prof Judge - Professional Judgement

Sources:

Exposure Parameters, ARes-SS



TABLE 4.4.2
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Tap Water - Drinking Water Scenario
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Groundwater	mg/L	See Table	See Table	See Table	See Table	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times W \times EF \times ED \times 1/BW \times 1/AT$
	IR-W	Ingestion Rate of Groundwater	L/day	2	See Table	1.4	USEPA, 1993	
	EF	Exposure Frequency	days/year	350	Prof Judge	234	USEPA, 1993	
	ED	Exposure Duration	years	24	USEPA, 1989	9	USEPA, 1993	
	BW	Body Weight	kg	70	USEPA, 1989	70	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
Dermal	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	3,285	USEPA, 1989	CDI (mg/kg-day) = $C \times CF \times SA \times PC \times ET \times EF \times ED \times 1/BW \times 1/AT$
	C	Contaminant Concentration in Groundwater	mg/L	See Table	See Table	See Table	See Table	
	CF	Conversion Factor	L/cm ³	1.00E-03	USEPA, 1989	1.00E-03	USEPA, 1989	
	SA	Surface Area Available for Contact	cm ²	18,000	USEPA, 1997	20,000	USEPA, 1992	
	PC	Permeability Constant	cm/hour	Chemical Specific	USEPA, 1992	Chemical Specific	USEPA, 1992	
	ET	Exposure Time	hours/day	0.25	USEPA, 1989	0.25	USEPA, 1992	
	EF	Exposure Frequency	days/year	350	Prof Judge	234	USEPA, 1993	
	ED	Exposure Duration	years	24	USEPA, 1989	9	USEPA, 1993	
	BW	Body Weight	kg	70	USEPA, 1989	70	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
Inhalation	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	3,285	USEPA, 1989	CDI (mg/kg-day) = $C \times IR \times ET \times EF \times ED \times 1/PEF \times 1/BW \times 1/AT$
	C	Contaminant Concentration in Soil	mg/L	See Table	See Table	See Table	See Table	
	RR	Respiration Rate	m ³ /hour	0.83	USEPA, 1995	0.83	USEPA, 1995	
	ET	Exposure Time	hours/day	0	USEPA, 1989	0	USEPA, 1992	
	EF	Exposure Frequency	days/year	350	Prof Judge	234	USEPA, 1993	
	ED	Exposure Duration	years	24	USEPA, 1989	9	USEPA, 1993	
	PEF	Particulate Emission Factor	m ³ /kg	--	--	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	70	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	3,285	USEPA, 1989	

Notes

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TABLE 4.4.3
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C	Contaminant Concentration in Surface Water	mg/L	See Table	See Table	See Table	See Table	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times W \times EF \times ED \times 1/BW \times 1/AT$
	IR-W	Ingestion Rate of Surface Water	L/hour	0.01	See Table	0.01	USEPA, 1995	
	ET	Exposure Time	hours/day	2.6	USEPA, 1992	2.6	USEPA, 1992	
	EF	Exposure Frequency	days/year	48	Prof Judge	48	Prof Judge	
	ED	Exposure Duration	years	24	USEPA, 1989	9	USEPA, 1993	
	BW	Body Weight	kg	70	USEPA, 1989	70	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
Dermal	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	3,285	USEPA, 1993	CDI (mg/kg-day) = $C \times CF \times SA \times PC \times ET \times EF \times ED \times 1/BW \times 1/AT$
	C	Contaminant Concentration in Surface Water	mg/L	See Table	See Table	See Table	See Table	
	CF	Conversion Factor	L/cm ³	1.00E-03	USEPA, 1989	1.00E-03	USEPA, 1989	
	SA	Surface Area Available for Contact	cm ²	5,700	USEPA, 1997	5,000	USEPA, 1992	
	PC	Permeability Constant	cm/hour	Chemical Specific	USEPA, 1992	Chemical Specific	USEPA, 1992	
	ET	Exposure Time	hours/day	2.6	USEPA, 1992	2.6	USEPA, 1992	
	EF	Exposure Frequency	days/year	48	Prof Judge	48	Prof Judge	
	ED	Exposure Duration	years	24	USEPA, 1989	9	USEPA, 1993	
	BW	Body Weight	kg	70	USEPA, 1989	70	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	3,285	USEPA, 1993	

Notes

Prof Judge - Professional Judgement

Sources:

TABLE 4.4.4
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Sediment	mg/kg	See Table	See Table	See Table	See Table	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times F_i \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Sediment	mg/kg day	100	USEPA, 1989	50	USEPA, 1993	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	1.00E-06	USEPA, 1989	
	F _i	Fraction Ingested from Source	NA	1	Prof Judge	1	USEPA, 1989	
	EF	Exposure Frequency	days/year	48	Prof Judge	48	Prof Judge	
	ED	Exposure Duration	years	24	USEPA, 1989	9	USEPA, 1993	
	BW	Body Weight	kg	70	USEPA, 1989	70	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
Dermal	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	3,285	USEPA, 1989	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	C	Contaminant Concentration in Sediment	mg/kg	See Table	See Table	See Table	See Table	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	1.00E-06	USEPA, 1989	
	SA	Surface Area Available for Contact	cm ² /day	5,700	USEPA, 1997	5,000	USEPA, 1992	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.07	USEPA, 1997	0.07	USEPA, 1997	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	(1)	USEPA, 1995	
	EF	Exposure Frequency	days/year	48	Prof Judge	48	Prof Judge	
	ED	Exposure Duration	years	24	USEPA, 1989	9	USEPA, 1993	
	BW	Body Weight	kg	70	USEPA, 1989	70	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	8,760	USEPA, 1989	3,285	USEPA, 1989	

Notes

(1) USEPA Region IV default values of 0.01% organics and 0.001% for inorganics were used for ABS values.
Prof Judge - Professional Judgement

TABLE 4.5.1
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	See Table	See Table	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times Fi \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Soil	mg/day	200	USEPA, 1989	100	USEPA, 1993	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	1.00E-06	USEPA, 1993	
	Fi	Fraction Ingested from Source	NA	1	USEPA, 1995	1	USEPA, 1995	
	EF	Exposure Frequency	days/year	350	USEPA, 1991	234	USEPA, 1993	
	ED	Exposure Duration	years	6	USEPA, 1989	6	USEPA, 1989	
	BW	Body Weight	kg	15	USEPA, 1991	15	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
Dermal	AT-N	Averaging Time (Non-Cancer)	days	2,190	USEPA, 1989	2,190	USEPA, 1989	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	See Table	See Table	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	1.00E-06	USEPA, 1992	
	SA	Surface Area Available for Contact	cm ² /day	2,800	USEPA, 1997	2,000	USEPA, 1992	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.2	USEPA, 1997	0.2	USEPA, 1992	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	(1)	USEPA, 1995	
	EF	Exposure Frequency	days/year	350	USEPA, 1991	234	USEPA, 1993	
	ED	Exposure Duration	years	6	USEPA, 1989	6	USEPA, 1989	
Inhalation	BW	Body Weight	kg	15	USEPA, 1991	15	USEPA, 1989	CDI (mg/kg-day) = $C \times IR \times ET \times EF \times ED \times 1/PEF \times 1/BW \times 1/AT$
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	USEPA, 1989	2,190	USEPA, 1989	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	See Table	See Table	
	RR	Respiration Rate	m ³ /hour	0.625	USEPA, 1995	0.625	USEPA, 1995	
	ET	Exposure Time	hours/day	24	Prof Judge	24	USEPA, 1991	
	EF	Exposure Frequency	days/year	350	USEPA, 1991	234	USEPA, 1993	
	ED	Exposure Duration	years	6	USEPA, 1989	6	USEPA, 1996	
	PEF	Particulate Emission Factor	m ³ /kg	1.32E+09	USEPA, 1996	1.32E+09	USEPA, 1996	
	BW	Body Weight	kg	15	USEPA, 1991	15	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	USEPA, 1989	2,190	USEPA, 1989	

Notes

(1) USEPA Region IV default values of 0.01% organics and 0.001% for inorganics were used for ABS values.

Prof Judge - Professional Judgement

Sources:

Exposure Parameters, CRes-SS

TABLE 4.5.2
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Tap Water - Drinking Water Scenario
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C	Contaminant Concentration in Groundwater	mg/L	See Table	See Table	See Table	See Table	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times W \times EF \times ED \times 1/BW \times 1/AT$
	IR-W	Ingestion Rate of Groundwater	L/day	1	USEPA, 1989	1	USEPA, 1995	
	EF	Exposure Frequency	days/year	350	USEPA, 1991	234	USEPA, 1993	
	ED	Exposure Duration	years	6	USEPA, 1989	6	USEPA, 1989	
	BW	Body Weight	kg	15	USEPA, 1989	15	USEPA, 1989	
Dermal	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	CDI (mg/kg-day) = $C \times CF \times SA \times PC \times ET \times EF \times ED \times 1/BW \times 1/AT$
	AT-N	Averaging Time (Non-Cancer)	days	2,190	USEPA, 1989	2,190	USEPA, 1989	
	C	Contaminant Concentration in Groundwater	mg/L	See Table	See Table	See Table	See Table	
	CF	Conversion Factor	L/cm ³	1.00E-03	USEPA, 1989	1.00E-03	USEPA, 1992	
	SA	Surface Area Available for Contact	cm ²	6,600	USEPA, 1997	7,930	USEPA, 1992	
Inhalation	PC	Permeability Constant	cm/hour	Chemical Specific	USEPA, 1992	Chemical Specific	USEPA, 1992	CDI (mg/kg-day) = $C \times IR \times ET \times EF \times ED \times 1/PEF \times 1/BW \times 1/AT$
	ET	Exposure Time	hours/day	0.25	USEPA, 1989	0.25	USEPA, 1992	
	EF	Exposure Frequency	days/year	350	USEPA, 1991	234	USEPA, 1993	
	ED	Exposure Duration	years	6	USEPA, 1989	6	USEPA, 1989	
	BW	Body Weight	kg	15	USEPA, 1989	15	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	CDI (mg/kg-day) = $C \times IR \times ET \times EF \times ED \times 1/PEF \times 1/BW \times 1/AT$
	AT-N	Averaging Time (Non-Cancer)	days	2,190	USEPA, 1989	2,190	USEPA, 1989	
	C	Contaminant Concentration in Soil	mg/L	See Table	See Table	See Table	See Table	
	RR	Respiration Rate	m ³ /hour	0.63	USEPA, 1995	0.63	USEPA, 1995	
	ET	Exposure Time	hours/day	0	USEPA, 1989	0	USEPA, 1992	
	EF	Exposure Frequency	days/year	350	USEPA, 1991	234	USEPA, 1993	CDI (mg/kg-day) = $C \times IR \times ET \times EF \times ED \times 1/PEF \times 1/BW \times 1/AT$
	ED	Exposure Duration	years	6	USEPA, 1989	6	USEPA, 1989	
	PEF	Particulate Emission Factor	m ³ /kg	--	--	--	--	
	BW	Body Weight	kg	15	USEPA, 1989	15	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	USEPA, 1989	2,190	USEPA, 1989	

Notes

TABLE 4.5.3
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Surface Water	mg/L	See Table	See Table	See Table	See Table	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times W \times EF \times ED \times 1/BW \times 1/AT$
	IR-W	Ingestion Rate of Surface Water	L/hour	0.05	USEPA, 1995	0.05	USEPA, 1995	
	ET	Exposure Time	hours/day	2.6	USEPA, 1992	2.6	USEPA, 1992	
	EF	Exposure Frequency	days/year	48	Prof Judge	48	Prof Judge	
	ED	Exposure Duration	years	6	USEPA, 1989	6	USEPA, 1989	
	BW	Body Weight	kg	15	USEPA, 1991	15	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
Dermal	AT-N	Averaging Time (Non-Cancer)	days	2,190	USEPA, 1989	2,190	USEPA, 1989	CDI (mg/kg-day) = $C \times CF \times SA \times PC \times ET \times EF \times ED \times 1/BW \times 1/AT$
	C	Contaminant Concentration in Surface Water	mg/L	See Table	See Table	See Table	See Table	
	CF	Conversion Factor	L/cm ³	1.00E-03	USEPA, 1989	1.00E-03	USEPA, 1993	
	SA	Surface Area Available for Contact	cm ²	2,800	USEPA, 1997	2,000	USEPA, 1992	
	PC	Permeability Constant	cm/hour	Chemical Specific	USEPA, 1992	Chemical Specific	USEPA, 1992	
	ET	Exposure Time	hours/day	2.6	USEPA, 1992	2.6	USEPA, 1992	
	EF	Exposure Frequency	days/year	48	Prof Judge	48	Prof Judge	
	ED	Exposure Duration	years	6	USEPA, 1989	6	USEPA, 1989	
	BW	Body Weight	kg	15	USEPA, 1991	15	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	USEPA, 1989	2,190	USEPA, 1989	

Notes

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Sources:

TABLE 4.5.4
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Sediment	mg/kg	See Table	See Table	See Table	See Table	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times FI \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Sediment	mg/day	200	USEPA, 1989	100	USEPA, 1993	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	1.00E-06	--	
	FI	Fraction Ingested from Source	NA	1	USEPA, 1995	1	USEPA, 1995	
	EF	Exposure Frequency	days/year	48	Prof Judge	48	Prof Judge	
	ED	Exposure Duration	years	6	USEPA, 1989	6	USEPA, 1989	
	BW	Body Weight	kg	15	USEPA, 1991	15	USEPA, 1989	
Dermal	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	AT-N	Averaging Time (Non-Cancer)	days	2,190	USEPA, 1989	2,190	USEPA, 1989	
	C	Contaminant Concentration in Sediment	mg/kg	See Table	See Table	See Table	See Table	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	1.00E-06	--	
	SA	Surface Area Available for Contact	cm ² /day	2,800	USEPA, 1997	1,745	USEPA, 1992	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.2	USEPA, 1997	0.2	USEPA, 1992	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	(1)	USEPA, 1995	
	EF	Exposure Frequency	days/year	48	Prof Judge	48	Prof Judge	
	ED	Exposure Duration	years	6	USEPA, 1989	6	USEPA, 1989	
	BW	Body Weight	kg	15	USEPA, 1991	15	USEPA, 1989	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	25,550	USEPA, 1989	
	AT-N	Averaging Time (Non-Cancer)	days	2,190	USEPA, 1989	2,190	USEPA, 1989	

Notes

(1) USEPA Region IV default values of 0.01% organics and 0.001% for inorganics were used for ABS values.

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TABLE 4.6.1
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times FI \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Soil	mg/day	480	USEPA, 1997	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	FI	Fraction Ingested from Source	NA	1	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	1	Prof Judge	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
Dermal	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	AT-N	Averaging Time (Non-Cancer)	days	365	USEPA, 1989	--	--	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ² /day	3,300	USEPA, 1997	--	--	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.2	USEPA, 1997	--	--	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	--	--	
Inhalation	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	CDI (mg/kg-day) = $C \times IR \times ET \times EF \times ED \times 1/PEF \times 1/BW \times 1/AT$
	ED	Exposure Duration	years	1	Prof Judge	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	365	USEPA, 1989	--	--	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	
	RR	Respiration Rate	m ³ /hour	0.8	USEPA, 1995	--	--	
	ET	Exposure Time	hours/day	8	Prof Judge	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	1	Prof Judge	--	--	
	PEF	Particulate Emission Factor	m ³ /kg	1.32E+09	USEPA, 1996	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	365	USEPA, 1989	--	--	

Notes

(1) USEPA Region IV default values of 0.01% organics and 0.001% for inorganics were used for ABS values.

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Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund Vol 1, Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
USEPA, 1991: Risk Assessment Guidance for Superfund Vol 1, Human Health Evaluation Manual Supplemental Guidance: Standard Default Exposure Factors.
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USEPA, 1997: Exposure Factors Handbook. Vol. 1: General Factors. ORD. EPA/600/P-95/002Fa.

TABLE 4.6.2
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times Fi \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Soil	mg/day	480	USEPA, 1997	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	Fi	Fraction Ingested from Source	NA	1	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	1	Prof Judge	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
Dermal	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	AT-N	Averaging Time (Non-Cancer)	days	365	USEPA, 1989	--	--	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ² /day	3,300	USEPA, 1997	--	--	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.2	USEPA, 1997	--	--	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	1	Prof Judge	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
Inhalation	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times IR \times ET \times EF \times ED \times 1/PEF \times 1/BW \times 1/AT$
	AT-N	Averaging Time (Non-Cancer)	days	365	USEPA, 1989	--	--	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	
	RR	Respiration Rate	m ³ /hour	0.83	USEPA, 1995	--	--	
	ET	Exposure Time	hours/day	8	Prof Judge	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	1	Prof Judge	--	--	
	PEF	Particulate Emission Factor	m ³ /kg	1.32E+09	USEPA, 1996	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	

Notes

(1) USEPA Region IV default values of 0.01 % organics and 0.001 % for inorganics were used for ABS values.

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TABLE 4.6.3
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Groundwater	mg/L	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times W \times EF \times ED \times 1/BW \times 1/AT$
	IR-W	Ingestion Rate of Groundwater	L/day	NA	USEPA, 1989	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	1	Prof Judge	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
Dermal	AT-N	Averaging Time (Non-Cancer)	days	365	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times PC \times ET \times EF \times ED \times 1/BW \times 1/AT$
	C	Contaminant Concentration in Groundwater	mg/L	See Table	See Table	--	--	
	CF	Conversion Factor	L/cm ³	1.00E-03	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ²	3,300	USEPA, 1997	--	--	
	PC	Permeability Constant	cm/hour	Chemical Specific	USEPA, 1992	--	--	
	ET	Exposure Time	hours/day	8.00E+00	USEPA, 1989	--	--	
	EF	Exposure Frequency	days/year	2.50E+02	USEPA, 1991	--	--	
	ED	Exposure Duration	years	1.00E+00	Prof Judge	--	--	
	BW	Body Weight	kg	7.00E+01	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	2.56E+04	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	3.65E+02	USEPA, 1989	--	--	

Notes

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TABLE 4.6.4
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C	Contaminant Concentration in Surface Water	mg/L	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times W \times EF \times ED \times 1/BW \times 1/AT$
	IR-W	Ingestion Rate of Surface Water	L/hour	NA	USEPA, 1989	--	--	
	ET	Exposure Time	hours/day	8	USEPA, 1989	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	1	Prof Judge	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
Dermal	AT-N	Averaging Time (Non-Cancer)	days	365	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times PC \times ET \times EF \times ED \times 1/BW \times 1/AT$
	C	Contaminant Concentration in Surface Water	mg/L	See Table	See Table	--	--	
	CF	Conversion Factor	L/cm ³	1.00E-03	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ²	3,300	USEPA, 1997	--	--	
	PC	Permeability Constant	cm/hour	Chemical Specific	USEPA, 1992	--	--	
	ET	Exposure Time	hours/day	8	USEPA, 1989	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	1	Prof Judge	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	365	USEPA, 1989	--	--	

Notes

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Sources:

TABLE 4.6.5
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Sediment	mg/kg	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times Fi \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Sediment	mg/day	NA	Prof Judge	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	Fi	Fraction Ingested from Source	NA	1	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	1	Prof Judge	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
Dermal	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	AT-N	Averaging Time (Non-Cancer)	days	365	USEPA, 1989	--	--	
	C	Contaminant Concentration in Sediment	mg/kg	See Table	See Table	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ² /day	3,300	USEPA, 1997	--	--	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.2	USEPA, 1997	--	--	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	1	Prof Judge	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	365	USEPA, 1989	--	--	
						--	--	
						--	--	

Notes

(1) USEPA Region IV default values of 0.01% organics and 0.001% for inorganics were used for ABS values.
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TABLE 4.7.1
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times CF \times FI \times EF \times ED \times 1/BW \times 1/AT$
	IR-S	Ingestion Rate of Soil	mg/day	50	USEPA, 1995	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	FI	Fraction Ingested from Source	NA	1	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	25	USEPA, 1991	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
Dermal	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times AF \times ABS \times EF \times ED \times 1/BW \times 1/AT$
	AT-N	Averaging Time (Non-Cancer)	days	9,125	USEPA, 1989	--	--	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	
	CF	Conversion Factor	kg/mg	1.00E-06	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ² /day	3,300	USEPA, 1997	--	--	
	AF	Soil to Skin Adherence Factor	mg/cm ²	0.2	USEPA, 1997	--	--	
	ABS	Absorption Factor	NA	(1)	USEPA, 1995	--	--	
Inhalation	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	CDI (mg/kg-day) = $C \times IR \times ET \times EF \times ED \times 1/PEF \times 1/BW \times 1/AT$
	ED	Exposure Duration	years	25	USEPA, 1989	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	USEPA, 1989	--	--	
	C	Contaminant Concentration in Soil	mg/kg	See Table	See Table	--	--	
	RR	Respiration Rate	m ³ /hour	0.83	USEPA, 1995	--	--	
	ET	Exposure Time	hours/day	8	USEPA, 1991	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	25	USEPA, 1991	--	--	
	PEF	Particulate Emission Factor	m ³ /kg	1.32E+09	USEPA, 1996	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	USEPA, 1989	--	--	

Notes

(1) USEPA Region IV default values of 0.01% organics and 0.001% for inorganics were used for ABS values.

Sources:

TABLE 4.7.2
VALUES USED FOR DAILY INTAKE CALCULATIONS
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	C	Contaminant Concentration in Groundwater	mg/L	See Table	See Table	--	--	Chronic Daily Intake (CDI) (mg/kg-day) = $C \times IR \times W \times EF \times ED \times I/BW \times I/AT$
	IR-W	Ingestion Rate of Groundwater	L/day	2	USEPA, 1995	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	25	USEPA, 1991	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
Dermal	AT-N	Averaging Time (Non-Cancer)	days	9,125	USEPA, 1989	--	--	CDI (mg/kg-day) = $C \times CF \times SA \times PC \times ET \times EF \times ED \times I/BW \times I/AT$
	C	Contaminant Concentration in Groundwater	mg/L	See Table	See Table	--	--	
	CF	Conversion Factor	L/cm ³	1.00E-03	USEPA, 1989	--	--	
	SA	Surface Area Available for Contact	cm ²	18,000	USEPA, 1997	--	--	
	PC	Permeability Constant	cm/hour	Chemical Specific	USEPA, 1992	--	--	
	ET	Exposure Time	hours/day	0.25	USEPA, 1989	--	--	
	EF	Exposure Frequency	days/year	250	USEPA, 1991	--	--	
	ED	Exposure Duration	years	25	USEPA, 1991	--	--	
	BW	Body Weight	kg	70	USEPA, 1989	--	--	
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1989	--	--	
	AT-N	Averaging Time (Non-Cancer)	days	9,125	USEPA, 1989	--	--	

Notes

TABLE 5.2
NON-CANCER TOXICITY DATA -- INHALATION
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD (1)	Units	Primary Target Organ	Combined Uncertainty/Modifying Factors	Sources of RfC/RfD: Target Organ	Dates (2) (MM/DD/YY)
Acetone	NA	NA	NA	1.00E-01	mg/kg/day	NA	NA	RE	NA
Benzene	Subchronic	9.0E-03	mg/m ³	1.71E-03	mg/kg/day	CVS	1000/1	NCEA	9/1/1998
Chloroform	NA	NA	NA	8.60E-05	mg/kg/day	NA	NA	NCEA	NA
Toluene	Chronic	4.0E-01	mg/m ³	1.10E-01	mg/kg/day	CNS / RfS	300/1	HEAST	4/12/2002
Xylenes, total	NA	NA	NA	NA	mg/kg/day	NA	NA	Withdrawn	NA
Bis(2-chloroethoxy)methane	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
Carbazole	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	4.00E-02	mg/kg/day	NA	NA	NA	NA
Naphthalene	Chronic	3.0E-03	mg/m ³	8.57E-04	mg/kg/day	RfS	3000/1	IRIS	9/19/2000
Pyrene	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
4,4'-DDD	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
Chlordane, alpha-	Subchronic	7.0E-04	mg/m ³	2.00E-04	mg/kg/day	Liver	1000/1	IRIS	3/22/2001
Chlordane, gamma-	Subchronic	7.0E-04	mg/m ³	2.00E-04	mg/kg/day	Liver	1000/1	IRIS	3/22/2001
Dieldrin	NA	NA	NA	NA	mg/kg/day	NA	NA	RE	NA
Heptachlor	NA	NA	NA	NA	mg/kg/day	NA	NA	RE	NA
Heptachlor Epoxide	NA	NA	NA	NA	mg/kg/day	NA	NA	RE	NA
Aroclor-1248	NA	NA	NA	1.30E-05	mg/kg/day	NA	NA	RE	NA
Aroclor-1254	NA	NA	NA	2.00E-05	mg/kg/day	NA	NA	RE	NA
Aroclor-1260	NA	NA	NA	2.00E-05	mg/kg/day	NA	NA	RE	NA
MCPA	NA	NA	NA	5.00E-04	mg/kg/day	NA	NA	RE	NA
Diesel Range Organics	NA	NA	NA	NA	mg/kg/day	NA	NA	RE	NA
Gasoline Range Organics	NA	NA	NA	NA	mg/kg/day	NA	NA	RE	NA
Antimony	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
Iron	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA
Manganese	Chronic	5.0E-05	mg/m ³	1.40E-05	mg/kg/day	CNS	1000/1	IRIS	9/19/2000
Thallium	NA	NA	NA	NA	mg/kg/day	NA	NA	NA	NA

Notes:

(1) Provide equation used for derivation in text.

(2) For IRIS values, provide the date IRIS was searched.

For HEAST values, provide the date of HEAST.

For NCEA values, provide the date of the article provided by NCEA.

NA = Not Applicable

Target Organ Abbreviations:

CNS = Central Nervous System

CVS = Cardiovascular System

RfS = Respiratory System

Sources:

IRIS = Integrated Risk Information System

HEAST = Health Effects Assessment Summary Tables

NCEA = National Center for Environmental Assessment, USI

RE = Region 9 Route Extrapolation

TABLE 6.1
CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal Cancer Slope Factor (2)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (3) (MM/DD/YY)
Acetone	NA	8.30E-01	NA	(mg/kg/day) -1	D	NA	NA
Benzene	5.50E-02	9.30E-01	5.91E-02	(mg/kg/day) -1	A	IRIS	9/18/2000
Chloroform	6.10E-03	2.00E-01	3.05E-02	(mg/kg/day) -1	B2	IRIS	4/12/2002
Toluene	NA	8.00E-01	NA	(mg/kg/day) -1	D	NA	4/12/2002
Xylenes, total	NA	9.20E-01	NA	(mg/kg/day) -1	D	NA	2/28/2001
2-Methylnaphthalene	NA	8.00E-01	NA	(mg/kg/day) -1	D	NA	NA
Bis(2-chloroethoxy)methane	NA	5.00E-01	NA	(mg/kg/day) -1	D	NA	2/23/2001
Benzo(a)anthracene	7.30E-01	3.10E-01	2.35E+00	(mg/kg/day) -1	B2	NCEA	4/26/2000
Benzo(a)pyrene	7.30E+00	5.00E-01	1.46E+01	(mg/kg/day) -1	B2	IRIS	9/18/2000
Benzo(b)fluoranthene	7.30E-01	5.00E-01	1.46E+00	(mg/kg/day) -1	B2	NCEA	4/26/2000
Benzo(k)fluoranthene	7.30E-02	5.00E-01	1.46E-01	(mg/kg/day) -1	B2	NCEA	4/26/2000
Carbazole	2.00E-02	5.00E-01	4.00E-02	(mg/kg/day) -1	B2	HEAST	7/1/1997
Chrysene	7.30E-03	3.10E-01	2.35E-02	(mg/kg/day) -1	B2	NCEA	4/26/2000
Dibenz(a,h)anthracene	7.30E+00	3.10E-01	2.35E+01	(mg/kg/day) -1	B2	NCEA	4/26/2000
Fluoranthene	NA	3.10E-01	NA	(mg/kg/day) -1	D	NA	9/18/2000
Indeno(1,2,3-cd)pyrene	7.30E-01	3.10E-01	2.35E+00	(mg/kg/day) -1	B2	NCEA	4/26/2000
Naphthalene	NA	8.00E-01	NA	(mg/kg/day) -1	D	NA	9/19/2000
Pyrene	NA	3.10E-01	NA	(mg/kg/day) -1	D	NA	9/18/2000
4,4'-DDD	2.40E-01	7.00E-01	3.43E-01	(mg/kg/day) -1	B2	IRIS	9/15/2000
Chlordane, alpha-	3.50E-01	8.00E-01	4.38E-01	(mg/kg/day) -1	B2	IRIS	3/22/2001
Chlordane, gamma-	3.50E-01	8.00E-01	4.38E-01	(mg/kg/day) -1	B2	IRIS	9/18/2000
Dieldrin	1.60E+01	5.00E-01	3.20E+01	(mg/kg/day) -1	B2	IRIS	9/18/2000
Heptachlor	4.50E+00	7.20E-01	6.25E+00	(mg/kg/day) -1	B2	IRIS	9/18/2000
Heptachlor Epoxide	9.10E+00	7.20E-01	1.26E+01	(mg/kg/day) -1	B2	IRIS	9/18/2000
Aroclor-1248	2.00E+00	8.90E-01	2.25E+00	(mg/kg/day) -1	B2	IRIS	3/8/2001
Aroclor-1254	2.00E+00	9.00E-01	2.22E+00	(mg/kg/day) -1	B2	IRIS	3/8/2001
Aroclor-1260	2.00E+00	9.00E-01	2.22E+00	(mg/kg/day) -1	B2	IRIS	3/8/2001
MCPA	NA	5.00E-01	NA	(mg/kg/day) -1	D	NA	NA
Diesel Range Organics	NA	5.00E-01	NA	(mg/kg/day) -1	D	NA	NA

TABLE 6.1 (Continued)
CANCER TOXICITY DATA -- ORAL/DERMAL
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor (1)	Adjusted Dermal Cancer Slope Factor (2)	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (3) (MM/DD/YY)
Gasoline Range Organics	NA	5.00E-01	NA	(mg/kg/day)	D	NA	NA
Antimony	NA	2.00E-02	NA	(mg/kg/day)	D	NA	NA
Arsenic	1.50E+00	4.10E-01	3.66E+00	(mg/kg/day)	A	IRIS	9/18/2000
Iron	NA	1.50E-01	NA	(mg/kg/day)	D	NA	NA
Manganese	NA	4.00E-02	NA	(mg/kg/day)	D	NA	9/19/2000
Thallium	NA	1.50E-01	NA	(mg/kg/day)	D	NA	NA

Notes:

- (1) Refer to table presented as subsection of Appendix H
- (2) Adjusted dermal CSF = Oral CSF / Adj Factor
- (3) For IRIS values, provide the date IRIS was searched.
For HEAST values, provide the date of HEAST.
For NCEA values, provide article date provided by NCEA.

NA = Not Applicable

Sources:

IRIS = Integrated Risk Information System
HEAST = Health Effects Assessment Summary Tables
NCEA = National Center for Environmental Assessment, USEPA

EPA Group:

- A - Human carcinogen
- B1 - Probable human carcinogen - indicates that limited human data are available
- B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
- C - Possible human carcinogen
- D - Not classifiable as a human carcinogen
- E - Evidence of noncarcinogenicity

Weight of Evidence:

Known/Likely (EPA classes A, B1, B2, C)
Cannot be Determined (EPA class D)
Not Likely (EPA class E)

TABLE 6.2
CANCER TOXICITY DATA -- INHALATION
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Chemical of Potential Concern	Unit Risk	Units	Adjustment (1)	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YY)
Acetone	NA	NA	NA	NA	mg/kg/day	D	NA	NA
Benzene	4.5E+01	ug/m3	3,500	2.70E-02	mg/kg/day	A	IRIS	9/18/2000
Chloroform	2.3E-05	ug/m3	3,500	8.05E-02	mg/kg/day	B2	IRIS	4/12/2002
Toluene	NA	NA	NA	NA	mg/kg/day	D	NA	4/12/2002
Xylenes, total	NA	NA	NA	NA	mg/kg/day	D	NA	2/28/2001
2-Methylnaphthalene	NA	NA	NA	NA	mg/kg/day	D	NA	NA
Bis(2-chloroethoxy)methane	NA	NA	NA	NA	mg/kg/day	D	NA	2/23/2001
Benzo(a)anthracene	NA	NA	3,500	3.10E-01	mg/kg/day	D	NCEA	NA
Benzo(a)pyrene	8.9E-04	ug/m3	3,500	3.10E+00	mg/kg/day	B2	NCEA	4/26/2000
Benzo(b)fluoranthene	NA	NA	3,500	3.10E-01	mg/kg/day	B2	NCEA	NA
Benzo(k)fluoranthene	NA	NA	3,500	3.10E-02	mg/kg/day	B2	NCEA	NA
Carbazole	NA	NA	3,500	2.00E-02	mg/kg/day	D	RE	NA
Chrysene	NA	NA	3,500	3.10E-03	mg/kg/day	B2	NCEA	9/18/2000
Dibenz(a,h)anthracene	NA	NA	3,500	3.10E+00	mg/kg/day	D	NCEA	NA
Fluoranthene	NA	NA	NA	NA	mg/kg/day	D	NA	9/18/2000
Indeno(1,2,3-cd)pyrene	NA	NA	3,500	3.10E-01	mg/kg/day	B2	NCEA	9/18/2000
Naphthalene	NA	NA	NA	NA	mg/kg/day	C	NA	9/19/2000
Pyrene	NA	NA	NA	NA	mg/kg/day	D	NA	9/18/2000
4,4'-DDD	NA	NA	3,500	2.40E-01	mg/kg/day	B2	RE	NA
Chlordane, alpha-	1.0E-04	ug/m3	3,500	3.50E-01	mg/kg/day	B2	IRIS	3/22/2001
Chlordane, gamma-	1.0E-04	ug/m3	3,500	3.50E-01	mg/kg/day	B2	IRIS	9/18/2000
Dieldrin	4.6E-03	ug/m3	3,500	1.61E+01	mg/kg/day	B2	IRIS	9/18/2000
Heptachlor	1.3E-03	ug/m3	3,500	4.55E+00	mg/kg/day	B2	IRIS	9/18/2000
Heptachlor Epoxide	2.6E-03	ug/m3	3,500	9.10E+00	mg/kg/day	B2	IRIS	9/18/2000
Aroclor-1248	1.0E+00	ug/m3	3,500	2.00E+00	mg/kg/day	B2	IRIS	3/8/2001
Aroclor-1254	1.0E+00	ug/m3	3,500	2.00E+00	mg/kg/day	B2	IRIS	3/8/2001
Aroclor-1260	1.0E+00	ug/m3	3,500	2.00E+00	mg/kg/day	B2	IRIS	3/8/2001
MCPA	NA	NA	NA	NA	mg/kg/day	D	NA	NA
Diesel Range Organics	NA	NA	NA	NA	mg/kg/day	D	NA	NA

TABLE 6.2 (Continued)
CANCER TOXICITY DATA -- INHALATION
SITE 84 (BUILDING 45 AREA)
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Chemical of Potential Concern	Unit Risk	Units	Adjustment (1)	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (2) (MM/DD/YY)
Gasoline Range Organics	NA	NA	NA	NA	mg/kg/day	D	NA	NA
Antimony	NA	NA	NA	NA	mg/kg/day	D	NA	NA
Arsenic	4.3E-03	ug/m3	3,500	1.51E+01	mg/kg/day	A	IRIS	9/18/2000
Iron	NA	NA	NA	NA	mg/kg/day	D	NA	NA
Manganese	NA	NA	NA	NA	mg/kg/day	D	NA	9/19/2000
Thallium	NA	NA	NA	NA	mg/kg/day	D	NA	NA

Notes:

(1) Adjustment Factor applied to Unit Risk to calculate Inhalation Slope Factor =
70kg x 1/20m3/day x 1000ug/mg

(2) For IRIS values, provide the date IRIS was searched.

For HEAST values, provide the date of HEAST.

For NCEA values, provide the date of the article provided by NCEA.

NA = Not Applicable

Sources:

IRIS = Integrated Risk Information System

NCEA = National Center for Environmental Assessment, USEPA

RE = Region 9 Route Extrapolation

EPA Group:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data a

B2 - Probable human carcinogen - indicates sufficient evidence in ani
inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Weight of Evidence:

Known/Likely (EPA classes A, B1, B2, C)

Cannot be Determined (EPA class D)

Not Likely (EPA class E)

TABLE 7.1.1A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEBEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	1.3E-07	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	5.8E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	2.6E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	3.4E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	1.6E-05	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	2.7E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	8.1E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	1.2E-06	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.6E-05	mg/kg-day	1.2E-02	mg/kg-day	--	--	1.3E-03
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	7.4E-06	mg/kg-day	NA	--	--	--	2.1E-06
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	3.4E-08	mg/kg-day	1.6E-02	mg/kg-day	--	--	1.7E-03
	Pyrene	250	mg/kg	250	mg/kg	M	1.6E-05	mg/kg-day	9.3E-03	mg/kg-day	--	--	2.1E-06
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.9E-07	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	1.2E-05	mg/kg-day	4.0E-04	mg/kg-day	--	--	3.1E-02
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	1.5E-05	mg/kg-day	2.5E-05	mg/kg-day	--	--	8.3E-04
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	2.1E-08	mg/kg-day	3.6E-04	mg/kg-day	--	--	3.9E-03
	Hepachlor	22	mg/kg	22	mg/kg	M	1.4E-06	mg/kg-day	9.4E-06	mg/kg-day	--	--	3.1E-02
	Hepachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	2.9E-07	mg/kg-day	NA	--	--	--	--
	Arcochlor-1248	1.51	mg/kg	1.51	mg/kg	M	1.4E-06	mg/kg-day	1.8E-05	mg/kg-day	--	--	4.9E-02
	Arcochlor-1254	0.975	mg/kg	0.975	mg/kg	M	8.8E-07	mg/kg-day	NA	--	--	--	--
	Arcochlor-1260	54.6	mg/kg	54.6	mg/kg	M	4.9E-05	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	1.3E-08	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	3.0E-05	mg/kg-day	8.0E-06	mg/kg-day	--	--	9.9E-04
	Antimony	1.22	mg/kg	1.22	mg/kg	M	7.9E-09	mg/kg-day	1.2E-04	mg/kg-day	--	--	5.5E-03
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	6.8E-07	mg/kg-day	4.5E-02	mg/kg-day	--	--	3.2E-04
	Iron	2.260	mg/kg	2.260	mg/kg	M	1.5E-05	mg/kg-day	9.9E-06	mg/kg-day	--	--	2.0E-04
	Thallium	0.31	mg/kg	0.31	mg/kg	M	2.0E-09	mg/kg-day	9.9E-06	mg/kg-day	--	--	1.6E-01
	(Total)												8.5E-01

Total Hazard Index Across All Exposure Routes/Pathways

NOTES:
EPC - Exposure Point Concentration
N/A - Toxicity criterion not available.
-- - Not applicable.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

TABLE 7.1.1.A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	1.9E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	6.8E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	3.0E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	4.0E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	1.8E-05	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	3.1E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	9.4E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	1.4E-06	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	2.4E-04	mg/kg-day	4.0E-02	mg/kg-day	--	--	5.9E-03
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	8.6E-06	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	5.1E-07	mg/kg-day	2.0E-02	mg/kg-day	--	--	2.6E-05
	Pyrene	250	mg/kg	250	mg/kg	M	2.4E-04	mg/kg-day	3.0E-02	mg/kg-day	--	--	8.2E-03
	4,4'-DDD	3	mg/kg	3	mg/kg	M	2.9E-06	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	4.7E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	9.4E-02
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	5.7E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	1.1E-01
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	3.1E-07	mg/kg-day	5.0E-05	mg/kg-day	--	--	6.3E-03
	Hepachlor	22	mg/kg	22	mg/kg	M	2.2E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	4.3E-02
	Hepachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	4.4E-06	mg/kg-day	1.3E-05	mg/kg-day	--	--	3.4E-01
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	1.5E-06	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	9.5E-07	mg/kg-day	2.0E-05	mg/kg-day	--	--	4.8E-02
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	5.3E-05	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	2.0E-07	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	4.6E-04	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	1.2E-06	mg/kg-day	4.0E-04	mg/kg-day	--	--	3.0E-03
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	3.4E-06	mg/kg-day	3.0E-04	mg/kg-day	--	--	1.1E-02
	Iron	2,260	mg/kg	2,260	mg/kg	M	2.2E-03	mg/kg-day	3.0E-01	mg/kg-day	--	--	7.4E-03
	Thallium	0.31	mg/kg	0.31	mg/kg	M	3.0E-07	mg/kg-day	6.6E-05	mg/kg-day	--	--	4.5E-03
	(total)												6.8E-01

TABLE 7.1.1a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEIUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugative dust
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	mg/m ³	R	9.6E-11	NA	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	mg/m ³	R	3.4E-09	NA	NA	--	--
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	mg/m ³	R	1.5E-09	NA	NA	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	mg/m ³	R	2.0E-09	NA	NA	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	mg/m ³	R	9.2E-10	NA	NA	--	--
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	mg/m ³	R	1.6E-10	NA	NA	--	--
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	mg/m ³	R	4.7E-09	NA	NA	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	mg/m ³	R	7.0E-11	NA	NA	--	--
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	mg/m ³	R	1.2E-08	4.0E-02	NA	--	3.0E-07
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	mg/m ³	R	4.3E-10	NA	NA	--	--
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	mg/m ³	R	2.6E-11	8.6E-04	3.0E-03	mg/m ³	3.0E-08
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	mg/m ³	R	1.2E-08	3.0E-02	NA	--	4.1E-07
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	mg/m ³	R	1.5E-10	NA	NA	--	--
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	mg/m ³	R	2.4E-09	2.0E-04	7.0E-04	mg/m ³	1.2E-05
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	mg/m ³	R	2.9E-09	2.0E-04	7.0E-04	mg/m ³	1.4E-05
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	mg/m ³	R	1.6E-11	5.0E-05	NA	--	3.2E-07
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	mg/m ³	R	1.1E-09	5.0E-04	NA	--	2.2E-06
	Hepachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	mg/m ³	R	2.2E-10	1.3E-05	NA	--	1.7E-05
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	mg/m ³	R	7.4E-11	NA	NA	--	--
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	mg/m ³	R	4.8E-11	2.0E-05	NA	--	2.4E-06
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	mg/m ³	R	2.7E-09	NA	NA	--	--
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	mg/m ³	R	1.0E-11	NA	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	mg/m ³	R	2.3E-08	NA	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	mg/m ³	R	6.0E-11	NA	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	mg/m ³	R	1.7E-10	NA	NA	--	--
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	mg/m ³	R	1.1E-07	NA	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	mg/m ³	R	1.5E-11	NA	NA	--	--
	(Total)											4.9E-05
												4.9E-05

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

Total Hazard Index Across All Exposure Routes/Pathways

- (1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.1.1B RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	5.7E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	4.7E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	2.4E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	2.7E-06	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	1.7E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	9.3E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	6.6E-06	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	6.8E-07	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	1.7E-06	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	5.1E-08	mg/kg-day	5.0E-05	mg/kg-day	--	--	1.0E-03
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	9.4E-05	mg/kg-day	NA	--	--	--	1.7E-02
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	5.1E-06	mg/kg-day	3.0E-04	mg/kg-day	--	--	7.7E-03
	Iron	2,347	mg/kg	2,347	mg/kg	M	2.3E-03	mg/kg-day	3.0E-01	mg/kg-day	--	--	2.6E-02
	(total)												
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	3.7E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	4.0E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	2.1E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	2.4E-06	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	1.5E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	8.0E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	5.6E-06	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	5.8E-07	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	1.4E-06	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	3.4E-09	mg/kg-day	2.5E-05	mg/kg-day	--	--	1.3E-04
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	8.6E-05	mg/kg-day	1.2E-04	mg/kg-day	--	--	8.3E-03
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	1.0E-06	mg/kg-day	4.5E-02	mg/kg-day	--	--	3.4E-04
	Iron	2,347	mg/kg	2,347	mg/kg	M	1.5E-05	mg/kg-day	--	--	--	--	8.8E-03
	(Total)												3.5E-02

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

Total Hazard Index Across All Exposure Routes/Pathways

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.1.1aB RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	2.8E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	2.3E-10	mg/kg-day	NA	--	NA	--	--
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	1.2E-10	mg/kg-day	NA	--	NA	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	1.4E-10	mg/kg-day	NA	--	NA	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	8.8E-11	mg/kg-day	NA	--	NA	--	--
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	4.7E-11	mg/kg-day	NA	--	NA	--	--
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	3.3E-10	mg/kg-day	NA	--	NA	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	3.4E-11	mg/kg-day	NA	--	NA	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	8.5E-11	mg/kg-day	NA	--	NA	--	--
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	2.6E-12	mg/kg-day	5.0E-05	mg/kg-day	NA	--	5.1E-08
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	4.7E-09	mg/kg-day	NA	--	NA	--	--
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	2.6E-10	mg/kg-day	NA	--	NA	--	--
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	1.2E-07	mg/kg-day	NA	--	NA	--	--
(Total)													5.1E-08
Total Hazard Index Across All Exposure Routes/Pathways													5.1E-08

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.1.2 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	1.4E-06	mg/kg-day	1.0E-01	mg/kg-day	--	--	1.4E-05
	Toluene	0.0027	mg/L	0.0027	mg/L	M	6.9E-07	mg/kg-day	2.0E-01	mg/kg-day	--	--	3.4E-06
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	8.9E-07	mg/kg-day	2.0E+00	mg/kg-day	--	--	4.5E-07
	(Total)												1.8E-05
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	2.7E-07	mg/kg-day	8.3E-02	mg/kg-day	--	--	3.2E-06
	Toluene	0.0027	mg/L	0.0027	mg/L	M	1.0E-05	mg/kg-day	1.6E-01	mg/kg-day	--	--	6.4E-05
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	2.8E-05	mg/kg-day	1.8E+00	mg/kg-day	--	--	1.5E-05
	(Total)												8.2E-05
Total Hazard Index Across All Exposure Routes/Pathways													
													1.0E-04

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.1.3 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	9.8E-06	NA	--	--	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	2.7E-06	NA	--	--	--	--
	Aroclor-1260	40	mg/kg	40	mg/kg	M	3.9E-05	NA	--	--	--	--
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	1.1E-02	NA	--	--	--	--
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	6.5E-07	NA	--	--	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	2.5E-06	NA	--	--	--	--
	Aroclor-1260	40	mg/kg	40	mg/kg	M	3.6E-05	NA	--	--	--	--
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	7.5E-04	NA	--	--	--	--
Total Hazard Index Across All Exposure Routes/Pathways												

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.

-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.2.1A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	3.7E-07	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	1.3E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	5.7E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	7.7E-06	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	3.5E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	5.9E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	1.8E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	2.7E-07	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	4.6E-05	mg/kg-day	4.0E-02	mg/kg-day	--	--	1.1E-03
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	1.7E-06	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	9.9E-08	mg/kg-day	2.0E-02	mg/kg-day	--	--	4.9E-06
	Pyrene	250	mg/kg	250	mg/kg	M	4.7E-05	mg/kg-day	3.0E-02	mg/kg-day	--	--	1.6E-03
	4,4'-DDD	3	mg/kg	3	mg/kg	M	5.6E-07	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	9.0E-06	mg/kg-day	5.0E-04	mg/kg-day	--	--	1.8E-02
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	1.1E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	2.2E-02
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	6.0E-08	mg/kg-day	5.0E-05	mg/kg-day	--	--	1.2E-03
	Heptachlor	22	mg/kg	22	mg/kg	M	4.1E-06	mg/kg-day	5.0E-04	mg/kg-day	--	--	8.3E-03
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	8.5E-07	mg/kg-day	1.3E-05	mg/kg-day	--	--	6.5E-02
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	2.8E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	1.8E-07	mg/kg-day	2.0E-05	mg/kg-day	--	--	9.2E-03
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	1.0E-05	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	3.9E-08	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	8.8E-05	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	2.3E-07	mg/kg-day	4.0E-04	mg/kg-day	--	--	5.7E-04
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	6.6E-07	mg/kg-day	3.0E-04	mg/kg-day	--	--	2.2E-03
	Iron	2,260	mg/kg	2,260	mg/kg	M	4.2E-04	mg/kg-day	3.0E-01	mg/kg-day	--	--	1.4E-03
	Thallium	0.31	mg/kg	0.31	mg/kg	M	5.8E-08	mg/kg-day	6.6E-05	mg/kg-day	--	--	8.7E-04
	(total)												1.3E-01

TABLE 7.2.1A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	4.2E-08	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	1.9E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	8.5E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.1E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	5.2E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	8.8E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	2.7E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	3.9E-07	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	5.2E-06	mg/kg-day	1.2E-02	mg/kg-day	--	--	4.2E-04
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	2.4E-06	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	1.1E-08	mg/kg-day	1.6E-02	mg/kg-day	--	--	7.0E-07
	Pyrene	250	mg/kg	250	mg/kg	M	5.4E-06	mg/kg-day	9.3E-03	mg/kg-day	--	--	5.8E-04
	4,4'-DDD	3	mg/kg	3	mg/kg	M	6.4E-08	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	4.1E-06	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.0E-02
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	5.0E-06	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.2E-02
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	6.9E-09	mg/kg-day	2.5E-05	mg/kg-day	--	--	2.7E-04
	Heptachlor	22	mg/kg	22	mg/kg	M	4.7E-07	mg/kg-day	3.6E-04	mg/kg-day	--	--	1.3E-03
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	9.6E-08	mg/kg-day	9.4E-06	mg/kg-day	--	--	1.0E-02
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	4.5E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	2.9E-07	mg/kg-day	1.8E-05	mg/kg-day	--	--	1.6E-02
Gasoline Range Organics Diesel Range Organics Antimony Arsenic Iron Thallium (Total)	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	1.6E-05	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	4.4E-09	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	1.0E-05	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	2.6E-09	mg/kg-day	8.0E-06	mg/kg-day	--	--	3.3E-04
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	2.2E-07	mg/kg-day	1.2E-04	mg/kg-day	--	--	1.8E-03
	Iron	2,260	mg/kg	2,260	mg/kg	M	4.8E-06	mg/kg-day	4.5E-02	mg/kg-day	--	--	1.1E-04
	Thallium	0.31	mg/kg	0.31	mg/kg	M	6.6E-10	mg/kg-day	9.9E-06	mg/kg-day	--	--	6.6E-05
Total Hazard Index Across All Exposure Routes/Pathways													1.9E-01

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.2.1B RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	1.1E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	8.9E-07	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	4.7E-07	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	5.3E-07	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	3.3E-07	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	1.8E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	1.3E-06	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	1.3E-07	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	3.2E-07	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	9.8E-09	mg/kg-day	5.0E-05	mg/kg-day	--	--	2.0E-04
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	1.8E-05	mg/kg-day	NA	--	--	--	3.3E-03
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	9.9E-07	mg/kg-day	3.0E-04	mg/kg-day	--	--	1.5E-03
	Iron (total)	2,347	mg/kg	2,347	mg/kg	M	4.4E-04	mg/kg-day	3.0E-01	mg/kg-day	--	--	5.0E-03
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	1.2E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	1.3E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	6.9E-07	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	7.8E-07	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	5.0E-07	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	2.6E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	1.9E-06	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	1.9E-07	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	4.8E-07	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	1.1E-09	mg/kg-day	2.5E-05	mg/kg-day	--	--	4.5E-05
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	2.9E-05	mg/kg-day	NA	--	--	--	2.7E-03
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	3.4E-07	mg/kg-day	1.2E-04	mg/kg-day	--	--	1.1E-04
	Iron (Total)	2,347	mg/kg	2,347	mg/kg	M	5.0E-06	mg/kg-day	4.5E-02	mg/kg-day	--	--	2.9E-03
Total Hazard Index Across All Exposure Routes/Pathways													
7.9E-03													

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.2.1a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	1.9E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	6.5E-10	mg/kg-day	NA	mg/kg-day	NA	--	--
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	2.9E-10	mg/kg-day	NA	mg/kg-day	NA	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	3.9E-10	mg/kg-day	NA	mg/kg-day	NA	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	1.8E-10	mg/kg-day	NA	mg/kg-day	NA	--	--
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	3.0E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	9.1E-10	mg/kg-day	NA	mg/kg-day	NA	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	1.3E-11	mg/kg-day	4.0E-02	mg/kg-day	NA	--	5.7E-08
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	2.3E-09	mg/kg-day	NA	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	8.3E-11	mg/kg-day	NA	mg/kg-day	NA	--	5.8E-09
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	5.0E-12	mg/kg-day	8.6E-04	mg/kg-day	3.0E-03	mg/m3	7.9E-08
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	2.4E-09	mg/kg-day	3.0E-02	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	2.8E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	4.5E-10	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m3	2.3E-06
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	5.5E-10	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m3	2.7E-06
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	3.0E-12	mg/kg-day	5.0E-05	mg/kg-day	NA	--	6.0E-08
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	2.1E-10	mg/kg-day	1.3E-05	mg/kg-day	NA	--	4.2E-07
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	4.3E-11	mg/kg-day	NA	mg/kg-day	NA	--	3.3E-06
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	1.4E-11	mg/kg-day	2.0E-05	mg/kg-day	NA	--	--
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	9.2E-12	mg/kg-day	NA	mg/kg-day	NA	--	4.6E-07
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	5.2E-10	mg/kg-day	NA	mg/kg-day	NA	--	--
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	2.0E-12	mg/kg-day	NA	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	4.4E-09	mg/kg-day	NA	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	1.2E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	3.3E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	2.1E-08	mg/kg-day	NA	mg/kg-day	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	2.9E-12	mg/kg-day	NA	mg/kg-day	NA	--	--
	(Total)												9.4E-06

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

TABLE 7.2.1aB RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	5.5E-10	mg/kg-day	NA	--	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	4.5E-11	mg/kg-day	NA	--	NA	--	--
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	2.3E-11	mg/kg-day	NA	--	NA	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	2.7E-11	mg/kg-day	NA	--	NA	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	1.7E-11	mg/kg-day	NA	--	NA	--	--
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	9.0E-12	mg/kg-day	NA	--	NA	--	--
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	6.3E-11	mg/kg-day	NA	--	NA	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	6.6E-12	mg/kg-day	NA	--	NA	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	1.6E-11	mg/kg-day	NA	--	NA	--	--
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	4.9E-13	mg/kg-day	5.0E-05	mg/kg-day	NA	--	9.8E-09
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	9.0E-10	mg/kg-day	NA	--	NA	--	--
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	5.0E-11	mg/kg-day	NA	--	NA	--	--
	Iron	2.347	mg/kg	1.78E-06	mg/m ³	R	2.2E-08	mg/kg-day	NA	--	NA	--	--
	(Total)												9.8E-09

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.2.2 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	2.7E-07	mg/kg-day	1.0E-01	mg/kg-day	--	--	2.7E-06
	Toluene	0.0027	mg/L	0.0027	mg/L	M	1.3E-07	mg/kg-day	2.0E-01	mg/kg-day	--	--	6.6E-07
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	1.7E-07	mg/kg-day	2.0E+00	mg/kg-day	--	--	8.5E-08
	(Total)												3.5E-06
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	8.9E-08	mg/kg-day	8.3E-02	mg/kg-day	--	--	1.1E-06
	Toluene	0.0027	mg/L	0.0027	mg/L	M	3.4E-06	mg/kg-day	1.6E-01	mg/kg-day	--	--	2.1E-05
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	9.3E-06	mg/kg-day	1.8E+00	mg/kg-day	--	--	5.0E-06
	(Total)												2.7E-05
Total Hazard Index Across All Exposure Routes/Pathways													3.1E-05

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.

-- - Not applicable.

mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.



TABLE 7.3.1A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	5.7E-07	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	2.0E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	8.9E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.2E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	5.5E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	9.2E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	2.8E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	4.1E-07	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	7.1E-05	mg/kg-day	4.0E-02	mg/kg-day	--	--	1.8E-03
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	2.6E-06	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	1.5E-07	mg/kg-day	2.0E-02	mg/kg-day	--	--	7.7E-06
	Pyrene	250	mg/kg	250	mg/kg	M	7.3E-05	mg/kg-day	3.0E-02	mg/kg-day	--	--	2.4E-03
	4,4'-DDD	3	mg/kg	3	mg/kg	M	8.8E-07	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	1.4E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	2.8E-02
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	1.7E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	3.4E-02
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	9.4E-08	mg/kg-day	5.0E-05	mg/kg-day	--	--	1.9E-03
	Heptachlor	22	mg/kg	22	mg/kg	M	6.4E-06	mg/kg-day	5.0E-04	mg/kg-day	--	--	1.3E-02
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	1.3E-06	mg/kg-day	1.3E-05	mg/kg-day	--	--	1.0E-01
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	4.4E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	2.8E-07	mg/kg-day	2.0E-05	mg/kg-day	--	--	1.4E-02
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	1.6E-05	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	6.1E-08	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	1.4E-04	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	3.6E-07	mg/kg-day	4.0E-04	mg/kg-day	--	--	8.9E-04
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	1.0E-06	mg/kg-day	3.0E-04	mg/kg-day	--	--	3.4E-03
	Iron	2,260	mg/kg	2,260	mg/kg	M	6.6E-04	mg/kg-day	3.0E-01	mg/kg-day	--	--	2.2E-03
	Thallium	0.31	mg/kg	0.31	mg/kg	M	9.0E-08	mg/kg-day	6.6E-05	mg/kg-day	--	--	1.4E-03
	(total)												2.0E-01

TABLE 7.3.1A RME
CALCULATION OF NON-CANCER HAZARDS.
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	6.1E-08	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	2.8E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.2E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.6E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	7.5E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.3E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	3.9E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	5.7E-07	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	7.5E-06	mg/kg-day	1.2E-02	mg/kg-day	--	--	6.1E-04
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	3.5E-06	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	1.6E-08	mg/kg-day	1.6E-02	mg/kg-day	--	--	1.0E-06
	Pyrene	250	mg/kg	250	mg/kg	M	7.7E-06	mg/kg-day	9.3E-03	mg/kg-day	--	--	8.3E-04
	4,4'-DDD	3	mg/kg	3	mg/kg	M	9.3E-08	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	5.9E-06	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.5E-02
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	7.2E-06	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.8E-02
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	9.9E-09	mg/kg-day	2.5E-05	mg/kg-day	--	--	4.0E-04
	Heptachlor	22	mg/kg	22	mg/kg	M	6.8E-07	mg/kg-day	3.6E-04	mg/kg-day	--	--	1.9E-03
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	1.4E-07	mg/kg-day	9.4E-06	mg/kg-day	--	--	1.5E-02
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	6.5E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	4.2E-07	mg/kg-day	1.8E-05	mg/kg-day	--	--	2.3E-02
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	2.4E-05	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	6.4E-09	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	1.5E-05	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	3.8E-09	mg/kg-day	8.0E-06	mg/kg-day	--	--	4.7E-04
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	3.2E-07	mg/kg-day	1.2E-04	mg/kg-day	--	--	2.6E-03
	Iron	2,260	mg/kg	2,260	mg/kg	M	7.0E-06	mg/kg-day	4.5E-02	mg/kg-day	--	--	1.6E-04
	Thallium	0.31	mg/kg	0.31	mg/kg	M	9.5E-10	mg/kg-day	9.9E-06	mg/kg-day	--	--	9.6E-05
(Total)													7.8E-02
Total Hazard Index Across All Exposure Routes/Pathways													2.8E-01

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.3.1B RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	1.7E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	1.4E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	7.2E-07	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	8.2E-07	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	5.2E-07	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	2.8E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	2.0E-06	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	2.0E-07	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	5.0E-07	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	1.5E-08	mg/kg-day	5.0E-05	mg/kg-day	--	--	3.0E-04
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	2.8E-05	mg/kg-day	NA	--	--	--	5.1E-03
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	1.5E-06	mg/kg-day	3.0E-04	mg/kg-day	--	--	2.3E-03
	Iron	2,347	mg/kg	2,347	mg/kg	M	6.9E-04	mg/kg-day	3.0E-01	mg/kg-day	--	--	7.7E-03
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	1.8E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	1.9E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	1.0E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.1E-06	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	7.2E-07	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	3.8E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	2.7E-06	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	2.8E-07	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	6.9E-07	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	1.6E-09	mg/kg-day	2.5E-05	mg/kg-day	--	--	6.4E-05
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	4.1E-05	mg/kg-day	NA	--	--	--	4.0E-03
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	4.9E-07	mg/kg-day	1.2E-04	mg/kg-day	--	--	1.6E-04
	Iron	2,347	mg/kg	2,347	mg/kg	M	7.3E-06	mg/kg-day	4.5E-02	mg/kg-day	--	--	4.2E-03
Total Hazard Index Across All Exposure Routes/Pathways													
1.2E-02													

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.3.1aA RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	2.9E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	1.0E-09	mg/kg-day	NA	mg/kg-day	NA	--	--
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	4.5E-10	mg/kg-day	NA	mg/kg-day	NA	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	6.0E-10	mg/kg-day	NA	mg/kg-day	NA	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	2.7E-10	mg/kg-day	NA	mg/kg-day	NA	--	--
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	4.6E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	1.4E-09	mg/kg-day	NA	mg/kg-day	NA	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	2.1E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	3.6E-09	mg/kg-day	4.0E-02	mg/kg-day	NA	--	8.9E-08
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	1.3E-10	mg/kg-day	NA	mg/kg-day	NA	--	--
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	7.7E-12	mg/kg-day	8.6E-04	mg/kg-day	3.0E-03	mg/m ³	9.0E-09
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	3.7E-09	mg/kg-day	3.0E-02	mg/kg-day	NA	--	1.2E-07
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	4.4E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	7.1E-10	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	3.5E-06
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	8.5E-10	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	4.3E-06
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	4.7E-12	mg/kg-day	5.0E-05	mg/kg-day	NA	--	9.4E-08
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	3.2E-10	mg/kg-day	5.0E-04	mg/kg-day	NA	--	6.5E-07
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	6.6E-11	mg/kg-day	1.3E-05	mg/kg-day	NA	--	5.1E-06
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	2.2E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	1.4E-11	mg/kg-day	2.0E-05	mg/kg-day	NA	--	7.2E-07
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	8.0E-10	mg/kg-day	NA	mg/kg-day	NA	--	--
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	3.0E-12	mg/kg-day	NA	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	6.9E-09	mg/kg-day	NA	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	1.8E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	5.1E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	3.3E-08	mg/kg-day	NA	mg/kg-day	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	4.5E-12	mg/kg-day	NA	mg/kg-day	NA	--	--
	(Total)												1.5E-05
													1.5E-05

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

Total Hazard Index Across All Exposure Routes/Pathways

TABLE 7.3.1aB RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	8.5E-10	mg/kg-day	NA	--	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	7.0E-11	mg/kg-day	NA	--	NA	--	--
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	3.6E-11	mg/kg-day	NA	--	NA	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	4.1E-11	mg/kg-day	NA	--	NA	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	2.6E-11	mg/kg-day	NA	--	NA	--	--
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	1.4E-11	mg/kg-day	NA	--	NA	--	--
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	9.8E-11	mg/kg-day	NA	--	NA	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	1.0E-11	mg/kg-day	NA	--	NA	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	2.5E-11	mg/kg-day	NA	--	NA	--	--
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	7.6E-13	mg/kg-day	5.0E-05	mg/kg-day	NA	--	1.5E-08
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	1.4E-09	mg/kg-day	NA	--	NA	--	--
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	7.7E-11	mg/kg-day	NA	--	NA	--	--
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	3.5E-08	mg/kg-day	NA	--	NA	--	--
(Total)													1.5E-08
Total Hazard Index Across All Exposure Routes/Pathways													1.5E-08

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.3.2 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	4.3E-07	mg/kg-day	1.0E-01	mg/kg-day	--	--	4.3E-06
	Toluene	0.0027	mg/L	0.0027	mg/L	M	2.1E-07	mg/kg-day	2.0E-01	mg/kg-day	--	--	1.0E-06
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	2.7E-07	mg/kg-day	2.0E+00	mg/kg-day	--	--	1.3E-07
(Total)													
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	1.3E-07	mg/kg-day	8.3E-02	mg/kg-day	--	--	1.5E-06
	Toluene	0.0027	mg/L	0.0027	mg/L	M	4.9E-06	mg/kg-day	1.6E-01	mg/kg-day	--	--	3.1E-05
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	1.3E-05	mg/kg-day	1.8E+00	mg/kg-day	--	--	7.3E-06
(Total)													
Total Hazard Index Across All Exposure Routes/Pathways													
4.5E-05													

NOTES:

- EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
- mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day
- (1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.3.3 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	2.9E-06	mg/kg-day	NA	--	--	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	8.2E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1260	40	mg/kg	40	mg/kg	M	1.2E-05	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	3.4E-03	mg/kg-day	NA	--	--	--	--
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	3.1E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	1.2E-06	mg/kg-day	NA	--	--	--	--
	Aroclor-1260	40	mg/kg	40	mg/kg	M	1.7E-05	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	3.6E-04	mg/kg-day	NA	--	--	--	--
Total Hazard Index Across All Exposure Routes/Pathways													--

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.4.1A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	2.7E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	9.5E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	4.2E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	5.6E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	2.6E-05	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	4.3E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	1.3E-04	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	1.9E-06	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	3.3E-04	mg/kg-day	4.0E-02	mg/kg-day	--	--	8.3E-03
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	1.2E-05	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	7.2E-07	mg/kg-day	2.0E-02	mg/kg-day	--	--	3.6E-05
	Pyrene	250	mg/kg	250	mg/kg	M	3.4E-04	mg/kg-day	3.0E-02	mg/kg-day	--	--	1.1E-02
	4,4'-DDD	3	mg/kg	3	mg/kg	M	4.1E-06	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	6.6E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	1.3E-01
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	7.9E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	1.6E-01
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	4.4E-07	mg/kg-day	5.0E-05	mg/kg-day	--	--	8.8E-03
	Heptachlor	22	mg/kg	22	mg/kg	M	3.0E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	6.0E-02
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	6.2E-06	mg/kg-day	1.3E-05	mg/kg-day	--	--	4.7E-01
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	2.1E-06	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	1.3E-06	mg/kg-day	2.0E-05	mg/kg-day	--	--	6.7E-02
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	7.5E-05	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	2.8E-07	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	6.4E-04	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	1.7E-06	mg/kg-day	4.0E-04	mg/kg-day	--	--	4.2E-03
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	4.8E-06	mg/kg-day	3.0E-04	mg/kg-day	--	--	1.6E-02
	Iron	2,260	mg/kg	2,260	mg/kg	M	3.1E-03	mg/kg-day	3.0E-01	mg/kg-day	--	--	1.0E-02
	Thallium	0.31	mg/kg	0.31	mg/kg	M	4.2E-07	mg/kg-day	6.6E-05	mg/kg-day	--	--	6.4E-03
(total)													9.6E-01

TABLE 7.4.1A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	1.1E-07	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	4.9E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	2.2E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	2.9E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	1.3E-05	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	2.2E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	6.8E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	1.0E-06	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.3E-05	mg/kg-day	1.2E-02	mg/kg-day	--	--	1.1E-03
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	6.2E-06	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	2.9E-08	mg/kg-day	1.6E-02	mg/kg-day	--	--	1.8E-06
	Pyrene	250	mg/kg	250	mg/kg	M	1.4E-05	mg/kg-day	9.3E-03	mg/kg-day	--	--	1.5E-03
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.6E-07	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	1.0E-05	mg/kg-day	4.0E-04	mg/kg-day	--	--	2.6E-02
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	1.3E-05	mg/kg-day	4.0E-04	mg/kg-day	--	--	3.2E-02
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.7E-08	mg/kg-day	2.5E-05	mg/kg-day	--	--	7.0E-04
	Heptachlor	22	mg/kg	22	mg/kg	M	1.2E-06	mg/kg-day	3.6E-04	mg/kg-day	--	--	3.3E-03
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	2.5E-07	mg/kg-day	9.4E-06	mg/kg-day	--	--	2.6E-02
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	1.2E-06	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	7.5E-07	mg/kg-day	1.8E-05	mg/kg-day	--	--	4.1E-02
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	4.2E-05	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	1.1E-08	mg/kg-day	NA	--	--	--	--
(Total)	Diesel Range Organics	470	mg/kg	470	mg/kg	M	2.6E-05	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	6.7E-09	mg/kg-day	8.0E-06	mg/kg-day	--	--	8.3E-04
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	5.7E-07	mg/kg-day	1.2E-04	mg/kg-day	--	--	4.7E-03
	Iron	2,260	mg/kg	2,260	mg/kg	M	1.2E-05	mg/kg-day	4.5E-02	mg/kg-day	--	--	2.7E-04
	Thallium	0.31	mg/kg	0.31	mg/kg	M	1.7E-09	mg/kg-day	9.9E-06	mg/kg-day	--	--	1.7E-04
Total Hazard Index Across All Exposure Routes/Pathways													1.1E+00

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.4.1B RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	7.9E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	6.5E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	3.4E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	3.8E-06	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	2.4E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	1.3E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	9.2E-06	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	9.5E-07	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	2.4E-06	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	7.1E-08	mg/kg-day	5.0E-05	mg/kg-day	--	--	1.4E-03
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	1.3E-04	mg/kg-day	3.0E-04	mg/kg-day	--	--	2.4E-02
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	7.2E-06	mg/kg-day	3.0E-01	mg/kg-day	--	--	1.1E-02
	Iron	2,347	mg/kg	2,347	mg/kg	M	3.2E-03	mg/kg-day	3.0E-01	mg/kg-day	--	--	3.6E-02
	(total)												
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	3.2E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	3.4E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	1.8E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	2.0E-06	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	1.3E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	6.8E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	4.8E-06	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	4.9E-07	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	1.2E-06	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	2.8E-09	mg/kg-day	2.5E-05	mg/kg-day	--	--	1.1E-04
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	7.3E-05	mg/kg-day	NA	--	--	--	7.0E-03
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	8.6E-07	mg/kg-day	1.2E-04	mg/kg-day	--	--	2.9E-04
	Iron	2,347	mg/kg	2,347	mg/kg	M	1.3E-05	mg/kg-day	4.5E-02	mg/kg-day	--	--	7.4E-03
	(Total)												4.4E-02
Total Hazard Index Across All Exposure Routes/Pathways													

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.4.1a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	4.0E-10	mg/kg-day	NA	--	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	1.4E-08	mg/kg-day	NA	--	NA	--	--
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	6.3E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	8.4E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	3.9E-09	mg/kg-day	NA	--	NA	--	--
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	6.5E-10	mg/kg-day	NA	--	NA	--	--
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	2.0E-08	mg/kg-day	NA	--	NA	--	--
	Dibenzo(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	2.9E-10	mg/kg-day	NA	--	NA	--	--
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	5.0E-08	mg/kg-day	4.0E-02	mg/kg-day	NA	--	1.3E-06
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	1.8E-09	mg/kg-day	NA	--	NA	--	--
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	1.1E-10	mg/kg-day	8.6E-04	mg/kg-day	3.0E-03	mg/m ³	1.3E-07
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	5.2E-08	mg/kg-day	3.0E-02	mg/kg-day	NA	--	1.7E-06
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	6.2E-10	mg/kg-day	NA	--	NA	--	--
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	9.9E-09	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	5.0E-05
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	1.2E-08	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	6.0E-05
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	6.6E-11	mg/kg-day	5.0E-05	mg/kg-day	NA	--	1.3E-06
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	4.5E-09	mg/kg-day	5.0E-04	mg/kg-day	NA	--	9.1E-06
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	9.3E-10	mg/kg-day	1.3E-05	mg/kg-day	NA	--	7.2E-05
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	3.1E-10	mg/kg-day	NA	--	NA	--	--
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	2.0E-10	mg/kg-day	2.0E-05	mg/kg-day	NA	--	1.0E-05
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	1.1E-08	mg/kg-day	NA	--	NA	--	--
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	4.3E-11	mg/kg-day	NA	--	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	9.7E-08	mg/kg-day	NA	--	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	2.5E-10	mg/kg-day	NA	--	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	7.2E-10	mg/kg-day	NA	--	NA	--	--
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	4.7E-07	mg/kg-day	NA	--	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	6.3E-11	mg/kg-day	NA	--	NA	--	--
Total Hazard Index Across All Exposure Routes/Pathways													
													2.0E-04
													2.0E-04

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

- (1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.4.1aB RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	1.2E-08	NA	--	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	9.8E-10	NA	--	NA	--	--
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	5.1E-10	NA	--	NA	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	5.8E-10	NA	--	NA	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	3.7E-10	NA	--	NA	--	--
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	2.0E-10	NA	--	NA	--	--
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	1.4E-09	NA	--	NA	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	1.4E-10	NA	--	NA	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	3.6E-10	NA	--	NA	--	--
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	1.1E-11	5.0E-05	mg/kg-day	NA	--	2.1E-07
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	2.0E-08	NA	--	NA	--	--
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	1.1E-09	NA	--	NA	--	--
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	4.9E-07	NA	--	NA	--	--
(Total)												2.1E-07
Total Hazard Index Across All Exposure Routes/Pathways												2.1E-07

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.4.2 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Tap
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzene	0.0034	mg/L	0.0034	mg/L	M	9.3E-05	mg/kg-day	3.0E-03	mg/kg-day	--	--	3.1E-02
	Chloroform	0.016	mg/L	0.016	mg/L	M	4.4E-04	mg/kg-day	1.0E-02	mg/kg-day	--	--	4.4E-02
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	2.9E-05	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	6.0E-05	mg/kg-day	2.0E-02	mg/kg-day	--	--	3.0E-03
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	4.6E-07	mg/kg-day	1.3E-05	mg/kg-day	--	--	3.5E-02
	MCPA	0.044	mg/L	0.044	mg/L	M	1.2E-03	mg/kg-day	5.0E-04	mg/kg-day	--	--	2.4E+00
	Antimony	0.011	mg/L	0.011	mg/L	M	3.0E-04	mg/kg-day	4.0E-04	mg/kg-day	--	--	7.5E-01
	Arsenic	0.03	mg/L	0.03	mg/L	M	8.2E-04	mg/kg-day	3.0E-04	mg/kg-day	--	--	2.7E+00
	Iron	67.7	mg/L	67.7	mg/L	M	1.9E+00	mg/kg-day	3.0E-01	mg/kg-day	--	--	6.2E+00
	Manganese	0.45	mg/L	0.45	mg/L	M	1.2E-02	mg/kg-day	2.4E-02	mg/kg-day	--	--	5.1E-01
	Thallium	0.0057	mg/L	0.0057	mg/L	M	1.6E-04	mg/kg-day	6.6E-05	mg/kg-day	--	--	2.4E+00
	(Total)												1.5E+01
Dermal	Benzene	0.0034	mg/L	0.0034	mg/L	M	4.4E-06	mg/kg-day	2.8E-03	mg/kg-day	--	--	1.6E-03
	Chloroform	0.016	mg/L	0.016	mg/L	M	8.8E-06	mg/kg-day	2.0E-03	mg/kg-day	--	--	4.4E-03
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	9.2E-06	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	9.4E-06	mg/kg-day	1.6E-02	mg/kg-day	--	--	5.8E-04
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	5.7E-08	mg/kg-day	9.4E-06	mg/kg-day	--	--	6.0E-03
	MCPA	0.044	mg/L	0.044	mg/L	M	1.3E-05	mg/kg-day	2.5E-04	mg/kg-day	--	--	5.3E-02
	Antimony	0.011	mg/L	0.011	mg/L	M	6.8E-07	mg/kg-day	8.0E-06	mg/kg-day	--	--	8.5E-02
	Arsenic	0.03	mg/L	0.03	mg/L	M	1.8E-06	mg/kg-day	1.2E-04	mg/kg-day	--	--	1.5E-02
	Iron	67.7	mg/L	67.7	mg/L	M	4.2E-03	mg/kg-day	4.5E-02	mg/kg-day	--	--	9.3E-02
	Manganese	0.45	mg/L	0.45	mg/L	M	2.8E-05	mg/kg-day	9.6E-04	mg/kg-day	--	--	2.9E-02
	Thallium	0.0057	mg/L	0.0057	mg/L	M	3.5E-07	mg/kg-day	9.9E-06	mg/kg-day	--	--	3.5E-02
	(Total)												3.2E-01
													1.5E+01

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day

Total Hazard Index Across All Exposure Routes/Pathways

- (1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.4.2a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Tap
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Benzene Chloroform (Total)	0.0034	mg/L	4.81E-03	mg/m ³	R	1.4E-05	mg/kg-day	1.7E-03	mg/kg-day	9.0E-03	mg/m3	8.0E-03
		0.016	mg/L	1.80E-02	mg/m ³	R	5.1E-05	mg/kg-day	8.6E-05	NA	--		6.0E-01
													6.0E-01
Total Hazard Index Across All Exposure Routes/Pathways													
													6.0E-01

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.4.3 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	2.7E-07	mg/kg-day	1.0E-01	mg/kg-day	--	--	2.7E-06
	Toluene	0.0027	mg/L	0.0027	mg/L	M	1.3E-07	mg/kg-day	2.0E-01	mg/kg-day	--	--	6.6E-07
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	1.7E-07	mg/kg-day	2.0E+00	mg/kg-day	--	--	8.5E-08
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	8.9E-08	mg/kg-day	8.3E-02	mg/kg-day	--	--	3.5E-06
	Toluene	0.0027	mg/L	0.0027	mg/L	M	3.4E-06	mg/kg-day	1.6E-01	mg/kg-day	--	--	1.1E-06
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	9.3E-06	mg/kg-day	1.8E+00	mg/kg-day	--	--	2.1E-05
Total Hazard Index Across All Exposure Routes/Pathways													3.1E-05

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/L - milligram per liter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 7.4.4 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	1.9E-06	mg/kg-day	NA	--	--	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	5.3E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1260	40	mg/kg	40	mg/kg	M	7.5E-06	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	2.2E-03	mg/kg-day	NA	--	--	--	--
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	7.5E-08	mg/kg-day	NA	--	--	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	2.9E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1260	40	mg/kg	40	mg/kg	M	4.2E-06	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	8.7E-05	mg/kg-day	NA	--	--	--	--
Total Hazard Index Across All Exposure Routes/Pathways													

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 7.4.1A CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	9.0E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	3.2E-05	mg/kg-day	NA	mg/kg-day	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.4E-05	mg/kg-day	NA	mg/kg-day	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.9E-05	mg/kg-day	NA	mg/kg-day	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	8.5E-06	mg/kg-day	NA	mg/kg-day	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.4E-06	mg/kg-day	NA	mg/kg-day	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	4.4E-05	mg/kg-day	NA	mg/kg-day	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	6.5E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.1E-04	mg/kg-day	4.0E-02	mg/kg-day	--	--	2.8E-03
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	4.0E-06	mg/kg-day	NA	mg/kg-day	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	2.4E-07	mg/kg-day	2.0E-02	mg/kg-day	--	--	1.2E-05
	Pyrene	250	mg/kg	250	mg/kg	M	1.1E-04	mg/kg-day	3.0E-02	mg/kg-day	--	--	3.8E-03
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.4E-06	mg/kg-day	NA	mg/kg-day	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	2.2E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	4.4E-02
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	2.7E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	5.3E-02
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.5E-07	mg/kg-day	5.0E-05	mg/kg-day	--	--	2.9E-03
	Heptachlor	22	mg/kg	22	mg/kg	M	1.0E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	2.0E-02
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	2.1E-06	mg/kg-day	1.3E-05	mg/kg-day	--	--	1.6E-01
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	6.9E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	4.5E-07	mg/kg-day	2.0E-05	mg/kg-day	--	--	2.2E-02
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	2.5E-05	mg/kg-day	NA	mg/kg-day	--	--	--
Gasoline Range Organics Diesel Range Organics Antimony Arsenic Iron Thallium		0.207	mg/kg	0.207	mg/kg	M	9.5E-08	mg/kg-day	NA	mg/kg-day	--	--	--
		470	mg/kg	470	mg/kg	M	2.2E-04	mg/kg-day	NA	mg/kg-day	--	--	--
		1.22	mg/kg	1.22	mg/kg	M	5.6E-07	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.4E-03
		3.49	mg/kg	3.49	mg/kg	M	1.0E-06	mg/kg-day	3.0E-04	mg/kg-day	--	--	5.3E-03
		2,260	mg/kg	2,260	mg/kg	M	1.0E-03	mg/kg-day	3.0E-01	mg/kg-day	--	--	3.4E-03
	(total)	0.31	mg/kg	0.31	mg/kg	M	1.4E-07	mg/kg-day	6.6E-05	mg/kg-day	--	--	2.1E-03
													3.2E-01

TABLE 7.4.1A CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	6.3E-08	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	2.9E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.3E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.7E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	7.8E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.3E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	4.0E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	5.9E-07	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	7.8E-06	mg/kg-day	1.2E-02	mg/kg-day	--	--	6.3E-04
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	3.7E-06	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	1.7E-08	mg/kg-day	1.6E-02	mg/kg-day	--	--	1.1E-06
	Pyrene	250	mg/kg	250	mg/kg	M	8.0E-06	mg/kg-day	9.3E-03	mg/kg-day	--	--	8.6E-04
	4,4'-DDD	3	mg/kg	3	mg/kg	M	9.6E-08	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	6.2E-06	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.5E-02
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	7.4E-06	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.9E-02
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.0E-08	mg/kg-day	2.5E-05	mg/kg-day	--	--	4.1E-04
	Heptachlor	22	mg/kg	22	mg/kg	M	7.1E-07	mg/kg-day	3.6E-04	mg/kg-day	--	--	2.0E-03
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	1.4E-07	mg/kg-day	9.4E-06	mg/kg-day	--	--	1.5E-02
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	6.8E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	4.4E-07	mg/kg-day	1.8E-05	mg/kg-day	--	--	2.4E-02
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	2.4E-05	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	6.6E-09	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	1.5E-05	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	3.9E-09	mg/kg-day	8.0E-06	mg/kg-day	--	--	4.9E-04
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	3.4E-07	mg/kg-day	1.2E-04	mg/kg-day	--	--	2.7E-03
	Iron	2,260	mg/kg	2,260	mg/kg	M	7.2E-06	mg/kg-day	4.5E-02	mg/kg-day	--	--	1.6E-04
	Thallium	0.31	mg/kg	0.31	mg/kg	M	9.8E-10	mg/kg-day	9.9E-06	mg/kg-day	--	--	9.9E-05
(Total)													8.1E-02
Total Hazard Index Across All Exposure Routes/Pathways													4.0E-01

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.4.1B CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	2.7E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	2.2E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	1.1E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.3E-06	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	8.2E-07	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	4.4E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	3.1E-06	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	3.2E-07	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	7.9E-07	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	2.4E-08	mg/kg-day	5.0E-05	mg/kg-day	--	--	4.8E-04
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	4.4E-05	mg/kg-day	NA	--	--	--	8.0E-03
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	2.4E-06	mg/kg-day	3.0E-04	mg/kg-day	--	--	3.6E-03
	Iron	2,347	mg/kg	2,347	mg/kg	M	1.1E-03	mg/kg-day	3.0E-01	mg/kg-day	--	--	1.2E-02
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	1.9E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	2.0E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	1.0E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.2E-06	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	7.4E-07	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	4.0E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	2.8E-06	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	2.9E-07	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	7.2E-07	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	1.7E-09	mg/kg-day	2.5E-05	mg/kg-day	--	--	6.7E-05
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	4.3E-05	mg/kg-day	NA	--	--	--	4.1E-03
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	5.1E-07	mg/kg-day	1.2E-04	mg/kg-day	--	--	1.7E-04
	Iron	2,347	mg/kg	2,347	mg/kg	M	7.5E-06	mg/kg-day	4.5E-02	mg/kg-day	--	--	4.3E-03
Total Hazard Index Across All Exposure Routes/Pathways													1.6E-02

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.4.1aA CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	2.6E-10	NA	--	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	9.2E-09	NA	--	NA	--	--
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	4.1E-09	NA	--	NA	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	5.4E-09	NA	--	NA	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	2.5E-09	NA	--	NA	--	--
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	4.2E-10	NA	--	NA	--	--
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	1.3E-08	NA	--	NA	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	1.9E-10	NA	--	NA	--	--
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	3.2E-08	4.0E-02	mg/kg-day	NA	--	8.1E-07
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	1.2E-09	NA	--	NA	--	--
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	7.0E-11	8.6E-04	mg/kg-day	3.0E-03	mg/m ³	8.2E-08
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	3.3E-08	3.0E-02	mg/kg-day	NA	--	1.1E-06
	4,4-DDD	3	mg/kg	2.27E-09	mg/m ³	R	4.0E-10	NA	--	NA	--	--
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	7.7E-09	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	3.2E-05
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	6.4E-09	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	3.9E-05
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	4.3E-11	5.0E-05	mg/kg-day	NA	--	8.5E-07
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	2.9E-09	5.0E-04	mg/kg-day	NA	--	5.9E-06
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	6.0E-10	1.3E-05	mg/kg-day	NA	--	4.6E-05
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	2.0E-10	NA	--	NA	--	--
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	1.3E-10	2.0E-05	mg/kg-day	NA	--	6.5E-06
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	7.3E-09	NA	--	NA	--	--
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	2.8E-11	NA	--	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	6.3E-08	NA	--	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	1.6E-10	NA	--	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	4.7E-10	NA	--	NA	--	--
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	3.0E-07	NA	--	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	4.1E-11	NA	--	NA	--	--
Total Hazard Index Across All Exposure Routes/Pathways												
	(Total)											1.3E-04
												1.3E-04

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.4.1aB CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	7.7E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	6.3E-10	mg/kg-day	NA	--	NA	--	--
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	3.3E-10	mg/kg-day	NA	--	NA	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	3.7E-10	mg/kg-day	NA	--	NA	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	2.4E-10	mg/kg-day	NA	--	NA	--	--
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	1.3E-10	mg/kg-day	NA	--	NA	--	--
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	8.9E-10	mg/kg-day	NA	--	NA	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	9.3E-11	mg/kg-day	NA	--	NA	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	2.3E-10	mg/kg-day	NA	--	NA	--	--
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	6.9E-12	mg/kg-day	5.0E-05	mg/kg-day	NA	--	1.4E-07
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	1.3E-08	mg/kg-day	NA	--	NA	--	--
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	7.0E-10	mg/kg-day	NA	--	NA	--	--
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	3.1E-07	mg/kg-day	NA	--	NA	--	--
(Total)													1.4E-07
Total Hazard Index Across All Exposure Routes/Pathways													

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.4.2 CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Tap
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzene	0.0034	mg/L	0.0034	mg/L	M	4.4E-05	mg/kg-day	3.0E-03	mg/kg-day	--	--	1.5E-02
	Chloroform	0.016	mg/L	0.016	mg/L	M	2.1E-04	mg/kg-day	1.0E-02	mg/kg-day	--	--	2.1E-02
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	1.3E-05	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	2.8E-05	mg/kg-day	2.0E-02	mg/kg-day	--	--	1.4E-03
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	2.1E-07	mg/kg-day	1.3E-05	mg/kg-day	--	--	1.6E-02
	MCPA	0.044	mg/L	0.044	mg/L	M	5.6E-04	mg/kg-day	5.0E-04	mg/kg-day	--	--	1.1E+00
	Antimony	0.011	mg/L	0.011	mg/L	M	1.4E-04	mg/kg-day	4.0E-04	mg/kg-day	--	--	3.5E-01
	Arsenic	0.03	mg/L	0.03	mg/L	M	3.8E-04	mg/kg-day	3.0E-04	mg/kg-day	--	--	1.3E+00
	Iron	67.7	mg/L	67.7	mg/L	M	8.7E-01	mg/kg-day	3.0E-01	mg/kg-day	--	--	2.9E+00
	Manganese	0.45	mg/L	0.45	mg/L	M	5.8E-03	mg/kg-day	2.4E-02	mg/kg-day	--	--	2.4E-01
	Thallium	0.0057	mg/L	0.0057	mg/L	M	7.3E-05	mg/kg-day	6.6E-05	mg/kg-day	--	--	1.1E+00
	(Total)												7.1E+00
Dermal	Benzene	0.0034	mg/L	0.0034	mg/L	M	3.3E-06	mg/kg-day	2.8E-03	mg/kg-day	--	--	1.2E-03
	Chloroform	0.016	mg/L	0.016	mg/L	M	6.5E-06	mg/kg-day	2.0E-03	mg/kg-day	--	--	3.3E-03
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	6.8E-06	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	7.0E-06	mg/kg-day	1.6E-02	mg/kg-day	--	--	4.3E-04
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	4.2E-08	mg/kg-day	9.4E-06	mg/kg-day	--	--	4.5E-03
	MCPA	0.044	mg/L	0.044	mg/L	M	9.9E-06	mg/kg-day	2.5E-04	mg/kg-day	--	--	3.9E-02
	Antimony	0.011	mg/L	0.011	mg/L	M	5.0E-07	mg/kg-day	8.0E-06	mg/kg-day	--	--	6.3E-02
	Arsenic	0.03	mg/L	0.03	mg/L	M	1.4E-06	mg/kg-day	1.2E-04	mg/kg-day	--	--	1.1E-02
	Iron	67.7	mg/L	67.7	mg/L	M	3.1E-03	mg/kg-day	4.5E-02	mg/kg-day	--	--	6.9E-02
	Manganese	0.45	mg/L	0.45	mg/L	M	2.1E-05	mg/kg-day	9.6E-04	mg/kg-day	--	--	2.1E-02
	Thallium	0.0057	mg/L	0.0057	mg/L	M	2.6E-07	mg/kg-day	9.9E-06	mg/kg-day	--	--	2.6E-02
	(Total)												2.4E-01
													7.3E+00

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.4.2a CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Tap
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Benzene	0.0034	mg/L	4.81E-03	mg/m ³	R	9.1E-06	mg/kg-day	1.7E-03	mg/kg-day	9.0E-03	mg/m3	5.3E-03
	Chloroform	0.016	mg/L	1.80E-02	mg/m ³	R	3.4E-05	mg/kg-day	8.6E-05	mg/kg-day	NA	--	4.0E-01
Total Hazard Index Across All Exposure Routes/Pathways													
	(Total)												4.0E-01

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.4.3 CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	2.7E-07	mg/kg-day	1.0E-01	mg/kg-day	--	--	2.7E-06
	Toluene	0.0027	mg/L	0.0027	mg/L	M	1.3E-07	mg/kg-day	2.0E-01	mg/kg-day	--	--	6.6E-07
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	1.7E-07	mg/kg-day	2.0E+00	mg/kg-day	--	--	8.5E-08
	(Total)												3.5E-06
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	7.8E-08	mg/kg-day	8.3E-02	mg/kg-day	--	--	9.4E-07
	Toluene	0.0027	mg/L	0.0027	mg/L	M	3.0E-06	mg/kg-day	1.6E-01	mg/kg-day	--	--	1.9E-05
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	8.1E-06	mg/kg-day	1.8E+00	mg/kg-day	--	--	4.4E-06
	(Total)												2.4E-05
Total Hazard Index Across All Exposure Routes/Pathways													
													2.7E-05

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day

TABLE 7.4.4 CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	9.4E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	2.6E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1260	40	mg/kg	40	mg/kg	M	3.8E-06	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	1.1E-03	mg/kg-day	NA	--	--	--	--
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	6.6E-08	mg/kg-day	NA	--	--	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	2.6E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1260	40	mg/kg	40	mg/kg	M	3.7E-06	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	7.6E-05	mg/kg-day	NA	--	--	--	--
Total Hazard Index Across All Exposure Routes/Pathways													

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5.1A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	2.5E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	8.8E-04	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	3.9E-04	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	5.2E-04	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	2.4E-04	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	4.0E-05	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	1.2E-03	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	1.8E-05	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	3.1E-03	mg/kg-day	4.0E-02	mg/kg-day	--	--	7.8E-02
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	1.1E-04	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	3.2E-03	mg/kg-day	2.0E-02	mg/kg-day	--	--	3.4E-04
	Pyrene	250	mg/kg	250	mg/kg	M	3.8E-05	mg/kg-day	3.0E-02	mg/kg-day	--	--	1.1E-01
	4,4'-DDD	3	mg/kg	3	mg/kg	M	6.1E-04	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	7.4E-04	mg/kg-day	5.0E-04	mg/kg-day	--	--	1.2E+00
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	4.1E-06	mg/kg-day	5.0E-04	mg/kg-day	--	--	1.5E+00
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	2.8E-04	mg/kg-day	5.0E-05	mg/kg-day	--	--	8.2E-02
	Heptachlor	22	mg/kg	22	mg/kg	M	5.8E-05	mg/kg-day	1.3E-05	mg/kg-day	--	--	5.6E-01
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	1.9E-05	mg/kg-day	NA	--	--	--	4.4E+00
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	1.2E-05	mg/kg-day	2.0E-05	mg/kg-day	--	--	6.2E-01
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	7.0E-04	mg/kg-day	NA	--	--	--	--
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	2.6E-06	mg/kg-day	NA	--	--	--	--
Gasoline Range Organics	Diesel Range Organics	0.207	mg/kg	0.207	mg/kg	M	6.0E-03	mg/kg-day	NA	--	--	--	--
	Antimony	470	mg/kg	470	mg/kg	M	1.6E-05	mg/kg-day	4.0E-04	mg/kg-day	--	--	3.9E-02
	Arsenic	1.22	mg/kg	1.22	mg/kg	M	4.5E-05	mg/kg-day	3.0E-04	mg/kg-day	--	--	1.5E-01
	Iron	3.49	mg/kg	3.49	mg/kg	M	2.9E-02	mg/kg-day	3.0E-01	mg/kg-day	--	--	9.6E-02
	Thallium	2,260	mg/kg	2,260	mg/kg	M	3.9E-06	mg/kg-day	6.6E-05	mg/kg-day	--	--	5.9E-02
	(total)	0.31	mg/kg	0.31	mg/kg	M							8.9E+00

TABLE 7.5.1A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	7.0E-07	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	3.2E-04	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.4E-04	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.9E-04	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	8.7E-05	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.5E-05	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	4.5E-04	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	6.6E-06	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	8.7E-05	mg/kg-day	1.2E-02	mg/kg-day	--	--	7.0E-03
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	4.1E-05	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	1.9E-07	mg/kg-day	1.6E-02	mg/kg-day	--	--	1.2E-05
	Pyrene	250	mg/kg	250	mg/kg	M	8.9E-05	mg/kg-day	9.3E-03	mg/kg-day	--	--	9.6E-03
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.1E-06	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	6.9E-05	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.7E-01
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	8.3E-05	mg/kg-day	4.0E-04	mg/kg-day	--	--	2.1E-01
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.1E-07	mg/kg-day	2.5E-05	mg/kg-day	--	--	4.6E-03
	Heptachlor	22	mg/kg	22	mg/kg	M	7.9E-06	mg/kg-day	3.6E-04	mg/kg-day	--	--	2.2E-02
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	1.6E-06	mg/kg-day	9.4E-06	mg/kg-day	--	--	1.7E-01
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	7.6E-06	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	4.9E-06	mg/kg-day	1.8E-05	mg/kg-day	--	--	2.7E-01
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	2.7E-04	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	7.4E-08	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	1.7E-04	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	4.4E-08	mg/kg-day	8.0E-06	mg/kg-day	--	--	5.5E-03
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	3.8E-06	mg/kg-day	1.2E-04	mg/kg-day	--	--	3.0E-02
	Iron	2,260	mg/kg	2,260	mg/kg	M	8.1E-05	mg/kg-day	4.5E-02	mg/kg-day	--	--	1.8E-03
	Thallium	0.31	mg/kg	0.31	mg/kg	M	1.1E-08	mg/kg-day	9.9E-06	mg/kg-day	--	--	1.1E-03
	(Total)												9.1E-01
													9.8E+00

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5.1B RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	7.4E-04	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	6.1E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	3.2E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	3.6E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	2.3E-05	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	1.2E-05	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	8.6E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	8.9E-06	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	2.2E-05	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	6.6E-07	mg/kg-day	5.0E-05	mg/kg-day	--	--	1.3E-02
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	1.2E-03	mg/kg-day	NA	--	--	--	--
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	6.7E-05	mg/kg-day	3.0E-04	mg/kg-day	--	--	2.2E-01
	Iron	2,347	mg/kg	2,347	mg/kg	M	3.0E-02	mg/kg-day	3.0E-01	mg/kg-day	--	--	1.0E-01
	(total)												3.4E-01
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	2.1E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	2.2E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	1.2E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.3E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	8.3E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	4.4E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	3.1E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	3.2E-06	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	8.0E-06	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	1.9E-08	mg/kg-day	2.5E-05	mg/kg-day	--	--	7.4E-04
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	4.8E-04	mg/kg-day	NA	--	--	--	--
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	5.6E-06	mg/kg-day	1.2E-04	mg/kg-day	--	--	4.6E-02
	Iron	2,347	mg/kg	2,347	mg/kg	M	8.4E-05	mg/kg-day	4.5E-02	mg/kg-day	--	--	1.9E-03
	(Total)												4.9E-02
Total Hazard Index Across All Exposure Routes/Pathways													3.9E-01

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5.1aA RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	1.4E-09	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	5.0E-08	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	2.2E-08	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	3.0E-08	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	1.4E-08	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	2.3E-09	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	7.0E-08	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	1.0E-09	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	1.8E-07	mg/kg-day	4.0E-02	mg/kg-day	NA	NA	4.4E-06
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	6.4E-09	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	3.8E-10	mg/kg-day	8.6E-04	mg/kg-day	3.0E-03	mg/m ³	4.5E-07
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	1.8E-07	mg/kg-day	3.0E-02	mg/kg-day	NA	NA	6.1E-06
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	2.2E-09	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	3.5E-08	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	1.7E-04
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	4.2E-08	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	2.1E-04
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	2.3E-10	mg/kg-day	5.0E-05	mg/kg-day	NA	NA	4.6E-06
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	1.6E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	NA	3.2E-05
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	3.3E-09	mg/kg-day	1.3E-05	mg/kg-day	NA	NA	2.5E-04
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	1.1E-09	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	7.1E-10	mg/kg-day	2.0E-05	mg/kg-day	NA	NA	3.5E-05
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	4.0E-08	mg/kg-day	NA	mg/kg-day	NA	NA	-
(Total)	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	1.5E-10	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	3.4E-07	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	8.9E-10	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	2.5E-09	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	1.6E-06	mg/kg-day	NA	mg/kg-day	NA	NA	-
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	2.2E-10	mg/kg-day	NA	mg/kg-day	NA	NA	-
Total Hazard Index Across All Exposure Routes/Pathways													7.2E-04
													7.2E-04

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5.1aB RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	4.2E-08	mg/kg-day	NA	--	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	3.5E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	1.8E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	2.0E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	1.3E-09	mg/kg-day	NA	--	NA	--	--
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	6.9E-10	mg/kg-day	NA	--	NA	--	--
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	4.9E-09	mg/kg-day	NA	--	NA	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	5.1E-10	mg/kg-day	NA	--	NA	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	1.2E-09	mg/kg-day	NA	--	NA	--	--
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	3.8E-11	mg/kg-day	5.0E-05	mg/kg-day	NA	--	7.6E-07
	Aroclor 1260	95.6	mg/kg	7.24E-08	mg/m ³	R	6.9E-08	mg/kg-day	NA	--	NA	--	--
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	3.8E-09	mg/kg-day	NA	--	NA	--	--
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	1.7E-06	mg/kg-day	NA	--	NA	--	--
	(Total)												7.6E-07

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

Total Hazard Index Across All Exposure Routes/Pathways

TABLE 7.5.2 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Tap
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient	
Ingestion	Benzene	0.0034	mg/L	0.0034	mg/L	M	2.2E-04	mg/kg-day	3.0E-03	mg/kg-day	--	--	7.2E-02	
	Chloroform	0.016	mg/L	0.016	mg/L	M	1.0E-03	mg/kg-day	1.0E-02	mg/kg-day	--	--	1.0E-01	
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	6.7E-05	mg/kg-day	NA	--	--	--	--	
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	1.4E-04	mg/kg-day	2.0E-02	mg/kg-day	--	--	7.0E-03	
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	1.1E-06	mg/kg-day	1.3E-05	mg/kg-day	--	--	8.2E-02	
	MCPA	0.044	mg/L	0.044	mg/L	M	2.8E-03	mg/kg-day	5.0E-04	mg/kg-day	--	--	5.6E+00	
	Antimony	0.011	mg/L	0.011	mg/L	M	7.0E-04	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.8E+00	
	Arsenic	0.03	mg/L	0.03	mg/L	M	1.9E-03	mg/kg-day	3.0E-04	mg/kg-day	--	--	6.4E+00	
	Iron	67.7	mg/L	67.7	mg/L	M	4.3E+00	mg/kg-day	3.0E-01	mg/kg-day	--	--	1.4E+01	
	Manganese	0.45	mg/L	0.45	mg/L	M	2.9E-02	mg/kg-day	2.4E-02	mg/kg-day	--	--	1.2E+00	
Thallium	0.0057	mg/L	0.0057	mg/L	M	3.6E-04	mg/kg-day	6.6E-05	mg/kg-day	--	--	5.5E+00		
(Total)														3.5E+01
Dermal	Benzene	0.0034	mg/L	0.0034	mg/L	M	7.5E-06	mg/kg-day	2.8E-03	mg/kg-day	--	--	2.7E-03	
	Chloroform	0.016	mg/L	0.016	mg/L	M	1.5E-05	mg/kg-day	2.0E-03	mg/kg-day	--	--	7.5E-03	
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	1.6E-05	mg/kg-day	NA	--	--	--	--	
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	1.6E-05	mg/kg-day	1.6E-02	mg/kg-day	--	--	1.0E-03	
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	9.7E-08	mg/kg-day	9.4E-06	mg/kg-day	--	--	1.0E-02	
	MCPA	0.044	mg/L	0.044	mg/L	M	2.3E-05	mg/kg-day	2.5E-04	mg/kg-day	--	--	9.1E-02	
	Antimony	0.011	mg/L	0.011	mg/L	M	1.2E-06	mg/kg-day	8.0E-06	mg/kg-day	--	--	1.5E-01	
	Arsenic	0.03	mg/L	0.03	mg/L	M	3.2E-06	mg/kg-day	1.2E-04	mg/kg-day	--	--	2.6E-02	
	Iron	67.7	mg/L	67.7	mg/L	M	7.1E-03	mg/kg-day	4.5E-02	mg/kg-day	--	--	1.6E-01	
	Manganese	0.45	mg/L	0.45	mg/L	M	4.7E-05	mg/kg-day	9.6E-04	mg/kg-day	--	--	4.9E-02	
Thallium	0.0057	mg/L	0.0057	mg/L	M	6.0E-07	mg/kg-day	9.9E-06	mg/kg-day	--	--	6.1E-02		
(Total)														5.5E-01
Total Hazard Index Across All Exposure Routes/Pathways														3.6E+01

NOTES:

- EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
- mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day
- (1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5.3 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	6.4E-06	mg/kg-day	1.0E-01	mg/kg-day	--	--	6.4E-05
	Toluene	0.0027	mg/L	0.0027	mg/L	M	3.1E-06	mg/kg-day	2.0E-01	mg/kg-day	--	--	1.5E-05
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	4.0E-06	mg/kg-day	2.0E+00	mg/kg-day	--	--	2.0E-06
	(Total)												8.1E-05
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	2.0E-07	mg/kg-day	8.3E-02	mg/kg-day	--	--	2.5E-06
	Toluene	0.0027	mg/L	0.0027	mg/L	M	7.8E-06	mg/kg-day	1.6E-01	mg/kg-day	--	--	4.8E-05
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	2.1E-05	mg/kg-day	1.8E+00	mg/kg-day	--	--	1.2E-05
	(Total)												6.2E-05
Total Hazard Index Across All Exposure Routes/Pathways													
1.4E-04													

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.

mg/L - milligram per liter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

-- - Not applicable.

TABLE 7.5.4 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	1.8E-05	NA	--	--	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	4.9E-06	NA	--	--	--	--
	Aroclor-1260	40	mg/kg	40	mg/kg	M	7.0E-05	NA	--	--	--	--
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	2.0E-02	NA	--	--	--	--
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	4.9E-07	NA	--	--	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	1.9E-06	NA	--	--	--	--
	Aroclor-1260	40	mg/kg	40	mg/kg	M	2.7E-05	NA	--	--	--	--
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	5.7E-04	NA	--	--	--	--
Total Hazard Index Across All Exposure Routes/Pathways												

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5.1A CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	8.4E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	2.9E-04	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.3E-04	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.7E-04	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	8.0E-05	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.3E-05	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	4.1E-04	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	6.0E-06	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.0E-03	mg/kg-day	4.0E-02	mg/kg-day	--	--	2.6E-02
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	3.8E-05	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	2.2E-06	mg/kg-day	2.0E-02	mg/kg-day	--	--	1.1E-04
	Pyrene	250	mg/kg	250	mg/kg	M	1.1E-03	mg/kg-day	3.0E-02	mg/kg-day	--	--	3.6E-02
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.3E-05	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	2.1E-04	mg/kg-day	5.0E-04	mg/kg-day	--	--	4.1E-01
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	2.5E-04	mg/kg-day	5.0E-04	mg/kg-day	--	--	5.0E-01
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.4E-06	mg/kg-day	5.0E-05	mg/kg-day	--	--	2.7E-02
	Heptachlor	22	mg/kg	22	mg/kg	M	9.4E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	1.9E-01
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	1.9E-05	mg/kg-day	1.3E-05	mg/kg-day	--	--	1.5E+00
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	6.4E-06	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	4.2E-06	mg/kg-day	2.0E-05	mg/kg-day	--	--	2.1E-01
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	2.3E-04	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	8.9E-07	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	2.0E-03	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	5.2E-06	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.3E-02
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	1.5E-05	mg/kg-day	3.0E-04	mg/kg-day	--	--	5.0E-02
	Iron	2,260	mg/kg	2,260	mg/kg	M	9.7E-03	mg/kg-day	3.0E-01	mg/kg-day	--	--	3.2E-02
	Thallium	0.31	mg/kg	0.31	mg/kg	M	1.3E-06	mg/kg-day	6.6E-05	mg/kg-day	--	--	2.0E-02
	(total)												3.0E+00

TABLE 7.5.1A CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	3.3E-07	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	1.5E-04	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	6.8E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	9.1E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	4.1E-05	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	7.0E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	2.1E-04	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	3.1E-06	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	4.2E-05	mg/kg-day	1.2E-02	mg/kg-day	--	--	3.4E-03
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	2.0E-05	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	9.0E-08	mg/kg-day	1.6E-02	mg/kg-day	--	--	5.6E-06
	Pyrene	250	mg/kg	250	mg/kg	M	4.3E-05	mg/kg-day	9.3E-03	mg/kg-day	--	--	4.6E-03
	4,4'-DDD	3	mg/kg	3	mg/kg	M	5.1E-07	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	3.3E-05	mg/kg-day	4.0E-04	mg/kg-day	--	--	8.2E-02
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	4.0E-05	mg/kg-day	4.0E-04	mg/kg-day	--	--	9.9E-02
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	5.5E-08	mg/kg-day	2.5E-05	mg/kg-day	--	--	2.2E-03
	Heptachlor	22	mg/kg	22	mg/kg	M	3.8E-06	mg/kg-day	3.6E-04	mg/kg-day	--	--	1.0E-02
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	7.7E-07	mg/kg-day	9.4E-06	mg/kg-day	--	--	8.2E-02
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	3.6E-06	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	2.3E-06	mg/kg-day	1.8E-05	mg/kg-day	--	--	1.3E-01
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	1.3E-04	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	3.5E-08	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	8.0E-05	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	2.1E-08	mg/kg-day	8.0E-06	mg/kg-day	--	--	2.6E-03
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	1.8E-06	mg/kg-day	1.2E-04	mg/kg-day	--	--	1.5E-02
	Iron	2,260	mg/kg	2,260	mg/kg	M	3.9E-05	mg/kg-day	4.5E-02	mg/kg-day	--	--	8.6E-04
	Thallium	0.31	mg/kg	0.31	mg/kg	M	5.2E-09	mg/kg-day	9.9E-06	mg/kg-day	--	--	5.3E-04
Total Hazard Index Across All Exposure Routes/Pathways													3.4E+00

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5.1B CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	2.5E-04	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	2.0E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	1.1E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.2E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	7.6E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	4.1E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	2.9E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	3.0E-06	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	7.3E-06	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	2.2E-07	mg/kg-day	5.0E-05	mg/kg-day	--	--	4.4E-03
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	4.1E-04	mg/kg-day	NA	--	--	--	--
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	2.2E-05	mg/kg-day	3.0E-04	mg/kg-day	--	--	7.5E-02
	Iron	2,347	mg/kg	2,347	mg/kg	M	1.0E-02	mg/kg-day	3.0E-01	mg/kg-day	--	--	3.3E-02
(total)													
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	9.9E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	1.1E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	5.5E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	6.2E-06	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	4.0E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	2.1E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	1.5E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	1.5E-06	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	3.8E-06	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	8.9E-09	mg/kg-day	2.5E-05	mg/kg-day	--	--	3.6E-04
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	2.3E-04	mg/kg-day	NA	--	--	--	--
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	2.7E-06	mg/kg-day	1.2E-04	mg/kg-day	--	--	2.2E-02
	Iron	2,347	mg/kg	2,347	mg/kg	M	4.0E-05	mg/kg-day	4.5E-02	mg/kg-day	--	--	8.9E-04
(Total)													
Total Hazard Index Across All Exposure Routes/Pathways													
1.4E-01													

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5.1aA CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	9.5E-10	mg/kg-day	NA	--	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	3.4E-08	mg/kg-day	NA	--	NA	--	--
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	1.5E-08	mg/kg-day	NA	--	NA	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	2.0E-08	mg/kg-day	NA	--	NA	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	9.1E-09	mg/kg-day	NA	--	NA	--	--
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	1.5E-09	mg/kg-day	NA	--	NA	--	--
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	4.7E-08	mg/kg-day	NA	--	NA	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	6.9E-10	mg/kg-day	NA	--	NA	--	--
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	1.2E-07	mg/kg-day	4.0E-02	mg/kg-day	NA	--	3.0E-06
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	4.3E-09	mg/kg-day	NA	--	NA	--	--
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	2.6E-10	mg/kg-day	8.6E-04	mg/kg-day	3.0E-03	mg/m ³	3.0E-07
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	1.2E-07	mg/kg-day	3.0E-02	mg/kg-day	NA	--	4.0E-06
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	1.5E-09	mg/kg-day	NA	--	NA	--	--
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	2.3E-08	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	1.2E-04
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	2.8E-08	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	1.4E-04
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	1.6E-10	mg/kg-day	5.0E-05	mg/kg-day	NA	--	3.1E-06
	Heptachlor Epoxide	22	mg/kg	1.67E-08	mg/m ³	R	1.1E-08	mg/kg-day	5.0E-04	mg/kg-day	NA	--	2.1E-05
	Aroclor-1248	4.5	mg/kg	3.41E-09	mg/m ³	R	2.2E-09	mg/kg-day	1.3E-05	mg/kg-day	NA	--	1.7E-04
	Aroclor-1254	1.51	mg/kg	1.14E-09	mg/m ³	R	7.3E-10	mg/kg-day	NA	--	NA	--	--
	Aroclor-1260	0.975	mg/kg	7.39E-10	mg/m ³	R	4.7E-10	mg/kg-day	2.0E-05	mg/kg-day	NA	--	2.4E-05
	Gasoline Range Organics	54.6	mg/kg	4.13E-08	mg/m ³	R	2.6E-08	mg/kg-day	NA	--	NA	--	--
	Diesel Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	1.0E-10	mg/kg-day	NA	--	NA	--	--
	Antimony	470	mg/kg	3.56E-07	mg/m ³	R	2.3E-07	mg/kg-day	NA	--	NA	--	--
	Arsenic	1.22	mg/kg	9.25E-10	mg/m ³	R	5.9E-10	mg/kg-day	NA	--	NA	--	--
	Iron	3.49	mg/kg	2.65E-09	mg/m ³	R	1.7E-09	mg/kg-day	NA	--	NA	--	--
	Thallium	2,260	mg/kg	1.71E-06	mg/m ³	R	1.1E-06	mg/kg-day	NA	--	NA	--	--
	(Total)	0.31	mg/kg	2.32E-10	mg/m ³	R	1.5E-10	mg/kg-day	NA	--	NA	--	4.8E-04
Total Hazard Index Across All Exposure Routes/Pathways													

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5.1aB CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	2.8E-08	mg/kg-day	NA	--	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	2.3E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	1.2E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	1.4E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	8.6E-10	mg/kg-day	NA	--	NA	--	--
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	4.6E-10	mg/kg-day	NA	--	NA	--	--
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	3.3E-09	mg/kg-day	NA	--	NA	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	3.4E-10	mg/kg-day	NA	--	NA	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	8.3E-10	mg/kg-day	NA	--	NA	--	--
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	2.5E-11	mg/kg-day	5.0E-05	mg/kg-day	NA	--	5.1E-07
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	4.6E-08	mg/kg-day	NA	--	NA	--	--
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	2.6E-09	mg/kg-day	NA	--	NA	--	--
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	1.1E-06	mg/kg-day	NA	--	NA	--	--
(Total)													5.1E-07

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

Total Hazard Index Across All Exposure Routes/Pathways

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5.2 CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Tap
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Benzene	0.0034	mg/L	0.0034	mg/L	M	1.3E-04	mg/kg-day	3.0E-03	mg/kg-day	--	--	4.8E-02
	Chloroform	0.016	mg/L	0.016	mg/L	M	6.8E-04	mg/kg-day	1.0E-02	mg/kg-day	--	--	6.8E-02
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	4.5E-05	mg/kg-day	N/A	--	--	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	9.4E-05	mg/kg-day	2.0E-02	mg/kg-day	--	--	4.7E-03
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	7.1E-07	mg/kg-day	1.3E-05	mg/kg-day	--	--	5.5E-02
	MCPA	0.044	mg/L	0.044	mg/L	M	1.9E-03	mg/kg-day	5.0E-04	mg/kg-day	--	--	3.8E+00
	Antimony	0.011	mg/L	0.011	mg/L	M	4.7E-04	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.2E+00
	Arsenic	0.03	mg/L	0.03	mg/L	M	1.3E-03	mg/kg-day	3.0E-04	mg/kg-day	--	--	4.3E+00
	Iron	67.7	mg/L	67.7	mg/L	M	2.9E+00	mg/kg-day	3.0E-01	mg/kg-day	--	--	9.6E+00
	Manganese	0.45	mg/L	0.45	mg/L	M	1.9E-02	mg/kg-day	2.4E-02	mg/kg-day	--	--	8.0E-01
Dermal	Thallium	0.0057	mg/L	0.0057	mg/L	M	2.4E-04	mg/kg-day	6.6E-05	mg/kg-day	--	--	3.7E+00
	(Total)												2.4E+01
	Benzene	0.0034	mg/L	0.0034	mg/L	M	6.0E-06	mg/kg-day	2.8E-03	mg/kg-day	--	--	2.2E-03
	Chloroform	0.016	mg/L	0.016	mg/L	M	1.2E-05	mg/kg-day	2.0E-03	mg/kg-day	--	--	6.0E-03
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	1.3E-05	mg/kg-day	N/A	--	--	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	1.3E-05	mg/kg-day	1.6E-02	mg/kg-day	--	--	8.0E-04
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	7.8E-08	mg/kg-day	9.4E-06	mg/kg-day	--	--	8.3E-03
	MCPA	0.044	mg/L	0.044	mg/L	M	1.8E-05	mg/kg-day	2.5E-04	mg/kg-day	--	--	7.3E-02
	Antimony	0.011	mg/L	0.011	mg/L	M	9.3E-07	mg/kg-day	8.0E-06	mg/kg-day	--	--	1.2E-01
	Arsenic	0.03	mg/L	0.03	mg/L	M	2.5E-06	mg/kg-day	1.2E-04	mg/kg-day	--	--	2.1E-02
(Total)	Iron	67.7	mg/L	67.7	mg/L	M	5.7E-03	mg/kg-day	4.5E-02	mg/kg-day	--	--	1.3E-01
	Manganese	0.45	mg/L	0.45	mg/L	M	3.8E-05	mg/kg-day	9.6E-04	mg/kg-day	--	--	4.0E-02
	Thallium	0.0057	mg/L	0.0057	mg/L	M	4.8E-07	mg/kg-day	9.9E-06	mg/kg-day	--	--	4.9E-02
	(Total)												4.4E-01

Total Hazard Index Across All Exposure Routes/Pathways

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5.3 CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	6.4E-06	1.0E-01	mg/kg-day	--	--	6.4E-05
	Toluene	0.0027	mg/L	0.0027	mg/L	M	3.1E-06	2.0E-01	mg/kg-day	--	--	1.5E-05
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	4.0E-06	2.0E+00	mg/kg-day	--	--	2.0E-06
	(Total)											8.1E-05
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	1.5E-07	8.3E-02	mg/kg-day	--	--	1.8E-06
	Toluene	0.0027	mg/L	0.0027	mg/L	M	5.5E-06	1.6E-01	mg/kg-day	--	--	3.5E-05
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	1.5E-05	1.8E+00	mg/kg-day	--	--	8.2E-06
	(Total)											4.5E-05
Total Hazard Index Across All Exposure Routes/Pathways												
												1.3E-04

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.5.4 CT
CALCULATION OF NON-CANCER HAZARDS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	8.8E-06	NA	--	--	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	2.5E-06	NA	--	--	--	--
	Aroclor-1260	40	mg/kg	40	mg/kg	M	3.5E-05	NA	--	--	--	--
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	1.0E-02	NA	--	--	--	--
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	3.1E-07	NA	--	--	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	1.2E-06	NA	--	--	--	--
	Aroclor-1260	40	mg/kg	40	mg/kg	M	1.7E-05	NA	--	--	--	--
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	3.3E-04	NA	--	--	--	--
Total Hazard Index Across All Exposure Routes/Pathways												

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.6.1A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	9.2E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	3.2E-04	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.4E-04	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.9E-04	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	8.8E-05	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.5E-05	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	4.5E-04	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	6.6E-06	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.1E-03	mg/kg-day	4.0E-02	mg/kg-day	--	--	2.9E-02
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	4.1E-05	mg/kg-day	2.0E-02	mg/kg-day	--	--	1.2E-04
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	2.5E-06	mg/kg-day	3.0E-02	mg/kg-day	--	--	3.9E-02
	Pyrene	250	mg/kg	250	mg/kg	M	1.2E-03	mg/kg-day	NA	--	--	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.4E-05	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	2.3E-04	mg/kg-day	5.0E-04	mg/kg-day	--	--	4.5E-01
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	2.7E-04	mg/kg-day	5.0E-04	mg/kg-day	--	--	5.4E-01
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.5E-06	mg/kg-day	5.0E-05	mg/kg-day	--	--	3.0E-02
	Heptachlor	22	mg/kg	22	mg/kg	M	1.0E-04	mg/kg-day	5.0E-04	mg/kg-day	--	--	2.1E-01
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	2.1E-05	mg/kg-day	1.3E-05	mg/kg-day	--	--	1.6E+00
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	7.1E-06	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	4.6E-06	mg/kg-day	2.0E-05	mg/kg-day	--	--	2.3E-01
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	2.6E-04	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	9.7E-07	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	2.2E-03	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	5.7E-06	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.4E-02
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	1.6E-05	mg/kg-day	3.0E-04	mg/kg-day	--	--	5.5E-02
	Iron	2,260	mg/kg	2,260	mg/kg	M	1.1E-02	mg/kg-day	3.0E-01	mg/kg-day	--	--	3.5E-02
	Thallium	0.31	mg/kg	0.31	mg/kg	M	1.4E-06	mg/kg-day	6.6E-05	mg/kg-day	--	--	2.2E-02
	(total)												3.3E+00

TABLE 7.6.1A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	1.3E-07	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	5.8E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	2.6E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	3.4E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	1.6E-05	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	2.7E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	8.1E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	1.2E-06	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.6E-05	mg/kg-day	1.2E-02	mg/kg-day	--	--	1.3E-03
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	7.4E-06	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	3.4E-08	mg/kg-day	1.6E-02	mg/kg-day	--	--	2.1E-06
	Pyrene	250	mg/kg	250	mg/kg	M	1.6E-05	mg/kg-day	9.3E-03	mg/kg-day	--	--	1.7E-03
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.9E-07	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	1.2E-05	mg/kg-day	4.0E-04	mg/kg-day	--	--	3.1E-02
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	1.5E-05	mg/kg-day	4.0E-04	mg/kg-day	--	--	3.7E-02
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	2.1E-08	mg/kg-day	2.5E-05	mg/kg-day	--	--	8.3E-04
	Heptachlor	22	mg/kg	22	mg/kg	M	1.4E-06	mg/kg-day	3.6E-04	mg/kg-day	--	--	3.9E-03
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	2.9E-07	mg/kg-day	9.4E-06	mg/kg-day	--	--	3.1E-02
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	1.4E-06	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	8.8E-07	mg/kg-day	1.8E-05	mg/kg-day	--	--	4.9E-02
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	4.9E-05	mg/kg-day	NA	--	--	--	--
Gasoline Range Organics	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	1.3E-08	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	3.0E-05	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	7.9E-09	mg/kg-day	8.0E-06	mg/kg-day	--	--	9.9E-04
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	6.8E-07	mg/kg-day	1.2E-04	mg/kg-day	--	--	5.5E-03
	Iron	2,260	mg/kg	2,260	mg/kg	M	1.5E-05	mg/kg-day	4.5E-02	mg/kg-day	--	--	3.2E-04
	Thallium	0.31	mg/kg	0.31	mg/kg	M	2.0E-09	mg/kg-day	9.9E-06	mg/kg-day	--	--	2.0E-04
	(Total)												1.6E-01
Total Hazard Index Across All Exposure Routes/Pathways													
3.4E+00													

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.6.1B RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	2.7E-04	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	2.2E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	1.2E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.3E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	8.4E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	4.5E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	3.1E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	3.3E-06	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	8.1E-06	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	2.4E-07	mg/kg-day	5.0E-05	mg/kg-day	--	--	4.9E-03
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	4.5E-04	mg/kg-day	3.0E-04	mg/kg-day	--	--	8.2E-02
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	2.5E-05	mg/kg-day	3.0E-01	mg/kg-day	--	--	3.7E-02
	Iron	2,347	mg/kg	2,347	mg/kg	M	1.1E-02	mg/kg-day	--	--	--	--	1.2E-01
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	3.7E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	4.0E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	2.1E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	2.4E-06	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	1.5E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	8.0E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	5.6E-06	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	5.8E-07	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	1.4E-06	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	3.4E-09	mg/kg-day	2.5E-05	mg/kg-day	--	--	1.3E-04
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	8.6E-05	mg/kg-day	1.2E-04	mg/kg-day	--	--	8.3E-03
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	1.0E-06	mg/kg-day	4.5E-02	mg/kg-day	--	--	3.4E-04
	Iron	2,347	mg/kg	2,347	mg/kg	M	1.5E-05	mg/kg-day	--	--	--	--	8.8E-03
Total Hazard Index Across All Exposure Routes/Pathways													
1.3E-01													

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.6.1aA RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugative dust
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	9.6E-11	mg/kg-day	NA	--	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	3.4E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	1.5E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	2.0E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	9.2E-10	mg/kg-day	NA	--	NA	--	--
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	1.6E-10	mg/kg-day	NA	--	NA	--	--
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	4.7E-09	mg/kg-day	NA	--	NA	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	7.0E-11	mg/kg-day	NA	--	NA	--	--
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	1.2E-08	mg/kg-day	4.0E-02	mg/kg-day	NA	--	3.0E-07
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	4.3E-10	mg/kg-day	NA	--	NA	--	--
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	2.6E-11	mg/kg-day	8.6E-04	mg/kg-day	3.0E-03	mg/m ³	3.0E-08
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	1.2E-08	mg/kg-day	3.0E-02	mg/kg-day	NA	--	4.1E-07
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	1.5E-10	mg/kg-day	NA	--	NA	--	--
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	2.4E-09	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	1.2E-05
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	2.9E-09	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	1.4E-05
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	1.6E-11	mg/kg-day	5.0E-05	mg/kg-day	NA	--	3.2E-07
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	1.1E-09	mg/kg-day	5.0E-04	mg/kg-day	NA	--	2.2E-06
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	2.2E-10	mg/kg-day	1.3E-05	mg/kg-day	NA	--	1.7E-05
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	7.4E-11	mg/kg-day	NA	--	NA	--	--
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	4.8E-11	mg/kg-day	2.0E-05	mg/kg-day	NA	--	2.4E-06
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	2.7E-09	mg/kg-day	NA	--	NA	--	--
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	1.0E-11	mg/kg-day	NA	--	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	2.3E-08	mg/kg-day	NA	--	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	6.0E-11	mg/kg-day	NA	--	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	1.7E-10	mg/kg-day	NA	--	NA	--	--
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	1.1E-07	mg/kg-day	NA	--	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	1.5E-11	mg/kg-day	NA	--	NA	--	--
	(Total)												4.9E-05

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

Total Hazard Index Across All Exposure Routes/Pathways

- (1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.6.1aB RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	2.8E-09	mg/kg-day	NA	--	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	2.3E-10	mg/kg-day	NA	--	NA	--	--
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	1.2E-10	mg/kg-day	NA	--	NA	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	1.4E-10	mg/kg-day	NA	--	NA	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	8.8E-11	mg/kg-day	NA	--	NA	--	--
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	4.7E-11	mg/kg-day	NA	--	NA	--	--
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	3.3E-10	mg/kg-day	NA	--	NA	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	3.4E-11	mg/kg-day	NA	--	NA	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	8.5E-11	mg/kg-day	NA	--	NA	--	--
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	2.6E-12	mg/kg-day	5.0E-05	mg/kg-day	NA	--	5.1E-08
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	4.7E-09	mg/kg-day	NA	--	NA	--	--
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	2.6E-10	mg/kg-day	NA	--	NA	--	--
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	1.2E-07	mg/kg-day	NA	--	NA	--	--
(Total)													5.1E-08
Total Hazard Index Across All Exposure Routes/Pathways													5.1E-08

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.6.2A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	0.573	mg/kg	0.573	mg/kg	M	2.7E-06	mg/kg-day	NA	mg/kg-day	--	--	--
	Benzo(a)anthracene	0.199	mg/kg	0.199	mg/kg	M	9.3E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Benzo(a)pyrene	0.194	mg/kg	0.194	mg/kg	M	9.1E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Benzo(b)fluoranthene	0.217	mg/kg	0.217	mg/kg	M	1.0E-06	mg/kg-day	NA	mg/kg-day	--	--	--
	Benzo(k)fluoranthene	0.137	mg/kg	0.137	mg/kg	M	6.5E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Bis(2-chloroethoxy)methane	0.0512	mg/kg	0.0512	mg/kg	M	2.4E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Carbazole	0.0845	mg/kg	0.0845	mg/kg	M	4.0E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Chrysene	0.209	mg/kg	0.209	mg/kg	M	9.8E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Dibenz(a,h)anthracene	0.0758	mg/kg	0.0758	mg/kg	M	3.6E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Indeno(1,2,3-cd)pyrene	0.145	mg/kg	0.145	mg/kg	M	6.8E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Naphthalene	0.226	mg/kg	0.226	mg/kg	M	1.1E-06	mg/kg-day	2.0E-02	mg/kg-day	--	--	5.3E-05
	Chlordane, alpha-	1.22	mg/kg	1.22	mg/kg	M	5.7E-06	mg/kg-day	5.0E-04	mg/kg-day	--	--	1.1E-02
	Chlordane, gamma-	1.65	mg/kg	1.65	mg/kg	M	7.7E-06	mg/kg-day	5.0E-04	mg/kg-day	--	--	1.5E-02
	Heptachlor	0.155	mg/kg	0.155	mg/kg	M	7.3E-07	mg/kg-day	5.0E-04	mg/kg-day	--	--	1.5E-03
	Heptachlor Epoxide	0.0161	mg/kg	0.0161	mg/kg	M	7.5E-08	mg/kg-day	1.3E-05	mg/kg-day	--	--	5.8E-03
	Aroclor-1248	0.318	mg/kg	0.318	mg/kg	M	1.5E-06	mg/kg-day	NA	mg/kg-day	--	--	--
	Aroclor-1254	0.333	mg/kg	0.333	mg/kg	M	1.6E-06	mg/kg-day	2.0E-05	mg/kg-day	--	--	7.8E-02
	Aroclor-1260	5.61	mg/kg	5.61	mg/kg	M	2.6E-05	mg/kg-day	NA	mg/kg-day	--	--	--
	Gasoline Range Organics	580	mg/kg	580	mg/kg	M	2.7E-03	mg/kg-day	NA	mg/kg-day	--	--	--
	Diesel Range Organics	5,500	mg/kg	5,500	mg/kg	M	2.6E-02	mg/kg-day	NA	mg/kg-day	--	--	--
	Arsenic	1.11	mg/kg	1.11	mg/kg	M	5.2E-06	mg/kg-day	3.0E-04	mg/kg-day	--	--	1.7E-02
(Total)	Iron	2,754	mg/kg	2,754	mg/kg	M	1.3E-02	mg/kg-day	3.0E-01	mg/kg-day	--	--	4.3E-02
	Thallium	0.405	mg/kg	0.405	mg/kg	M	1.9E-06	mg/kg-day	6.6E-05	mg/kg-day	--	--	2.9E-02
													2.0E-01

TABLE 7.6.2A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	2-Methylnaphthalene	0.573	mg/kg	0.573	mg/kg	M	3.7E-08	mg/kg-day	NA	mg/kg-day	--	--	--
	Benzo(a)anthracene	0.199	mg/kg	0.199	mg/kg	M	1.7E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Benzo(a)pyrene	0.194	mg/kg	0.194	mg/kg	M	1.6E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Benzo(b)fluoranthene	0.217	mg/kg	0.217	mg/kg	M	1.8E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Benzo(k)fluoranthene	0.137	mg/kg	0.137	mg/kg	M	1.2E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Bis(2-chloroethoxy)methane	0.0512	mg/kg	0.0512	mg/kg	M	3.3E-08	mg/kg-day	NA	mg/kg-day	--	--	--
	Carbazole	0.0845	mg/kg	0.0845	mg/kg	M	7.1E-08	mg/kg-day	NA	mg/kg-day	--	--	--
	Chrysene	0.209	mg/kg	0.209	mg/kg	M	1.8E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Dibenz(a,h)anthracene	0.0758	mg/kg	0.0758	mg/kg	M	6.4E-08	mg/kg-day	NA	mg/kg-day	--	--	--
	Indeno(1,2,3-cd)pyrene	0.145	mg/kg	0.145	mg/kg	M	1.2E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Naphthalene	0.226	mg/kg	0.226	mg/kg	M	1.5E-08	mg/kg-day	1.6E-02	mg/kg-day	--	--	9.1E-07
	Chlordane, alpha-	1.22	mg/kg	1.22	mg/kg	M	3.1E-07	mg/kg-day	4.0E-04	mg/kg-day	--	--	7.8E-04
	Chlordane, gamma-	1.65	mg/kg	1.65	mg/kg	M	4.3E-07	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.1E-03
	Heptachlor	0.155	mg/kg	0.155	mg/kg	M	1.0E-08	mg/kg-day	3.6E-04	mg/kg-day	--	--	2.8E-05
	Heptachlor Epoxide	0.0161	mg/kg	0.0161	mg/kg	M	1.0E-09	mg/kg-day	9.4E-06	mg/kg-day	--	--	1.1E-04
	Aroclor-1248	0.318	mg/kg	0.318	mg/kg	M	2.9E-07	mg/kg-day	NA	mg/kg-day	--	--	--
	Aroclor-1254	0.333	mg/kg	0.333	mg/kg	M	3.0E-07	mg/kg-day	1.8E-05	mg/kg-day	--	--	1.7E-02
	Aroclor-1260	5.61	mg/kg	5.61	mg/kg	M	5.1E-06	mg/kg-day	NA	mg/kg-day	--	--	--
	Gasoline Range Organics	580	mg/kg	580	mg/kg	M	3.7E-05	mg/kg-day	NA	mg/kg-day	--	--	--
	Diesel Range Organics	5,500	mg/kg	5,500	mg/kg	M	3.6E-04	mg/kg-day	NA	mg/kg-day	--	--	--
	Arsenic	1.11	mg/kg	1.11	mg/kg	M	2.1E-07	mg/kg-day	1.2E-04	mg/kg-day	--	--	1.7E-03
	Iron	2,754	mg/kg	2,754	mg/kg	M	1.8E-05	mg/kg-day	4.5E-02	mg/kg-day	--	--	4.0E-04
	Thallium	0.405	mg/kg	0.405	mg/kg	M	2.6E-09	mg/kg-day	9.9E-06	mg/kg-day	--	--	2.6E-04
Total Hazard Index Across All Exposure Routes/Pathways													
2.2E-01													

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

- (1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.6.2B RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	6.38	mg/kg	6.38	mg/kg	mg/kg	M	3.0E-05	mg/kg-day	NA	--	--	--	--
	Bis(2-chloroethoxy)methane	0.054	mg/kg	0.054	mg/kg	mg/kg	M	2.5E-07	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.862	mg/kg	0.862	mg/kg	mg/kg	M	4.0E-06	mg/kg-day	2.0E-02	mg/kg-day	--	--	2.0E-04
	Aroclor-1260	27.0	mg/kg	27.0	mg/kg	mg/kg	M	1.3E-04	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	580	mg/kg	580	mg/kg	mg/kg	M	2.7E-03	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	5,500	mg/kg	5,500	mg/kg	mg/kg	M	2.6E-02	mg/kg-day	NA	--	--	--	--
	Arsenic	1.50	mg/kg	1.50	mg/kg	mg/kg	M	7.0E-06	mg/kg-day	3.0E-04	mg/kg-day	--	--	2.3E-02
	Iron	3,007	mg/kg	3,007	mg/kg	mg/kg	M	1.4E-02	mg/kg-day	3.0E-01	mg/kg-day	--	--	4.7E-02
	Thallium	0.488	mg/kg	0.488	mg/kg	mg/kg	M	2.3E-06	mg/kg-day	6.6E-05	mg/kg-day	--	--	3.5E-02
	(Total)													1.1E-01
Dermal	2-Methylnaphthalene	6.38	mg/kg	6.38	mg/kg	mg/kg	M	4.1E-07	mg/kg-day	NA	--	--	--	--
	Bis(2-chloroethoxy)methane	0.054	mg/kg	0.054	mg/kg	mg/kg	M	3.5E-08	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.862	mg/kg	0.862	mg/kg	mg/kg	M	5.6E-08	mg/kg-day	1.6E-02	mg/kg-day	--	--	3.5E-06
	Aroclor-1260	27.0	mg/kg	27.0	mg/kg	mg/kg	M	2.4E-05	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	580	mg/kg	580	mg/kg	mg/kg	M	3.7E-05	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	5,500	mg/kg	5,500	mg/kg	mg/kg	M	3.6E-04	mg/kg-day	NA	--	--	--	--
	Arsenic	1.50	mg/kg	1.50	mg/kg	mg/kg	M	2.9E-07	mg/kg-day	1.2E-04	mg/kg-day	--	--	2.4E-03
	Iron	3,007	mg/kg	3,007	mg/kg	mg/kg	M	1.9E-05	mg/kg-day	4.5E-02	mg/kg-day	--	--	4.3E-04
	Thallium	0.488	mg/kg	0.488	mg/kg	mg/kg	M	3.2E-09	mg/kg-day	9.9E-06	mg/kg-day	--	--	3.2E-04
	(Total)													3.1E-03
Total Hazard Index Across All Exposure Routes/Pathways														
1.1E-01														

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.6.2aA RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	0.573	mg/kg	4.34E-10	mg/m ³	R	2.8E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Benzo(a)anthracene	0.199	mg/kg	1.51E-10	mg/m ³	R	9.8E-12	mg/kg-day	NA	mg/kg-day	NA	--	--
	Benzo(a)pyrene	0.194	mg/kg	1.47E-10	mg/m ³	R	9.5E-12	mg/kg-day	NA	mg/kg-day	NA	--	--
	Benzo(b)fluoranthene	0.217	mg/kg	1.64E-10	mg/m ³	R	1.1E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Benzo(k)fluoranthene	0.137	mg/kg	1.04E-10	mg/m ³	R	6.8E-12	mg/kg-day	NA	mg/kg-day	NA	--	--
	Bis(2-chloroethoxy)methane	0.0512	mg/kg	3.88E-11	mg/m ³	R	2.5E-12	mg/kg-day	NA	mg/kg-day	NA	--	--
	Carbazole	0.0845	mg/kg	6.40E-11	mg/m ³	R	4.2E-12	mg/kg-day	NA	mg/kg-day	NA	--	--
	Chrysene	0.209	mg/kg	1.59E-10	mg/m ³	R	1.0E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Dibenz(a,h)anthracene	0.0758	mg/kg	5.75E-11	mg/m ³	R	3.7E-12	mg/kg-day	NA	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	0.145	mg/kg	1.10E-10	mg/m ³	R	7.1E-12	mg/kg-day	NA	mg/kg-day	NA	--	--
	Naphthalene	0.226	mg/kg	1.71E-10	mg/m ³	R	1.1E-11	mg/kg-day	8.6E-04	mg/kg-day	3.0E-03	mg/m3	1.3E-08
	Chlordane, alpha-	1.22	mg/kg	9.21E-10	mg/m ³	R	6.0E-11	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m3	3.0E-07
	Chlordane, gamma-	1.65	mg/kg	1.25E-09	mg/m ³	R	8.1E-11	mg/kg-day	2.0E-04	mg/kg-day	7.0E-04	mg/m3	4.1E-07
	Heptachlor	0.155	mg/kg	1.17E-10	mg/m ³	R	7.6E-12	mg/kg-day	5.0E-04	mg/kg-day	NA	--	1.5E-08
	Heptachlor Epoxide	0.0161	mg/kg	1.22E-11	mg/m ³	R	7.9E-13	mg/kg-day	1.3E-05	mg/kg-day	NA	--	6.1E-08
	Aroclor-1248	0.318	mg/kg	2.41E-10	mg/m ³	R	1.6E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Aroclor-1254	0.333	mg/kg	2.52E-10	mg/m ³	R	1.6E-11	mg/kg-day	2.0E-05	mg/kg-day	NA	--	8.2E-07
	Aroclor-1260	5.61	mg/kg	4.25E-09	mg/m ³	R	2.8E-10	mg/kg-day	NA	mg/kg-day	NA	--	--
	Gasoline Range Organics	580	mg/kg	4.39E-07	mg/m ³	R	2.9E-08	mg/kg-day	NA	mg/kg-day	NA	--	--
	Diesel Range Organics	5,500	mg/kg	4.17E-06	mg/m ³	R	2.7E-07	mg/kg-day	NA	mg/kg-day	NA	--	--
	Arsenic	1.11	mg/kg	8.41E-10	mg/m ³	R	5.5E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
	Iron	2,754	mg/kg	2.09E-06	mg/m ³	R	1.4E-07	mg/kg-day	NA	mg/kg-day	NA	--	--
	Thallium	0.405	mg/kg	3.07E-10	mg/m ³	R	2.0E-11	mg/kg-day	NA	mg/kg-day	NA	--	--
Total Hazard Index Across All Exposure Routes/Pathways													
													1.6E-06
													1.6E-06

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 7.6.2aB RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	6.38	mg/kg	4.83E-09	mg/m ³	R	3.1E-10	mg/kg-day	NA	--	NA	--	--
	Bis(2-chloroethoxy)methane	0.054	mg/kg	4.09E-11	mg/m ³	R	2.7E-12	mg/kg-day	NA	--	NA	--	--
	Naphthalene	0.862	mg/kg	6.53E-10	mg/m ³	R	4.2E-11	mg/kg-day	8.6E-04	mg/kg-day	3.0E-03	mg/m ³	5.0E-08
	Atroclor-1260	27.0	mg/kg	2.05E-08	mg/m ³	R	1.3E-09	mg/kg-day	NA	--	NA	--	--
	Gasoline Range Organics	580	mg/kg	4.39E-07	mg/m ³	R	2.9E-08	mg/kg-day	NA	--	NA	--	--
	Diesel Range Organics	5,500	mg/kg	4.17E-06	mg/m ³	R	2.7E-07	mg/kg-day	NA	--	NA	--	--
	Arsenic	1.50	mg/kg	1.14E-09	mg/m ³	R	7.4E-11	mg/kg-day	NA	--	NA	--	--
	Iron	3,007	mg/kg	2.28E-06	mg/m ³	R	1.5E-07	mg/kg-day	NA	--	NA	--	--
	Thallium	0.488	mg/kg	3.70E-10	mg/m ³	R	2.4E-11	mg/kg-day	NA	--	NA	--	--
	(Total)												5.0E-08
Total Hazard Index Across All Exposure Routes/Pathways													

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

TABLE 7.6.3 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	Benzene	0.0034	mg/L	0.0034	mg/L	M	1.8E-05	mg/kg-day	2.8E-03	mg/kg-day	--	--	6.6E-03
	Chloroform	0.016	mg/L	0.016	mg/L	M	3.7E-05	mg/kg-day	2.0E-03	mg/kg-day	--	--	1.8E-02
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	3.9E-05	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	3.9E-05	mg/kg-day	1.6E-02	mg/kg-day	--	--	2.5E-03
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	2.4E-07	mg/kg-day	9.4E-06	mg/kg-day	--	--	2.5E-02
	MCPA	0.044	mg/L	0.044	mg/L	M	5.6E-05	mg/kg-day	2.5E-04	mg/kg-day	--	--	2.2E-01
	Antimony	0.011	mg/L	0.011	mg/L	M	2.8E-06	mg/kg-day	8.0E-06	mg/kg-day	--	--	3.6E-01
	Arsenic	0.03	mg/L	0.03	mg/L	M	7.7E-06	mg/kg-day	1.2E-04	mg/kg-day	--	--	6.3E-02
	Iron	67.7	mg/L	67.7	mg/L	M	1.7E-02	mg/kg-day	4.5E-02	mg/kg-day	--	--	3.9E-01
	Manganese	0.45	mg/L	0.45	mg/L	M	1.2E-04	mg/kg-day	9.6E-04	mg/kg-day	--	--	1.2E-01
	Thallium	0.0057	mg/L	0.0057	mg/L	M	1.5E-06	mg/kg-day	9.9E-06	mg/kg-day	--	--	1.5E-01
	(Total)												1.4E+00
Total Hazard Index Across All Exposure Routes/Pathways													
1.4E+00													

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/L - milligram per liter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 7.6.4 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	8.2E-07	mg/kg-day	8.3E-02	mg/kg-day	--	--	9.9E-06
	Toluene	0.0027	mg/L	0.0027	mg/L	M	3.1E-05	mg/kg-day	1.6E-01	mg/kg-day	--	--	2.0E-04
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	8.6E-05	mg/kg-day	1.8E+00	mg/kg-day	--	--	4.7E-05
	(Total)												2.5E-04
Total Hazard Index Across All Exposure Routes/Pathways													

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.6.5 RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	6.5E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	2.5E-06	mg/kg-day	NA	--	--	--	--
	Aroclor-1260	40	mg/kg	40	mg/kg	M	3.6E-05	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	7.5E-04	mg/kg-day	NA	--	--	--	--
Total Hazard Index Across All Exposure Routes/Pathways													

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 7.7.1A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	9.6E-07	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	3.4E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.5E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	2.0E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	9.1E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.5E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	4.7E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	6.9E-07	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.2E-04	mg/kg-day	4.0E-02	mg/kg-day	--	--	3.0E-03
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	4.3E-06	mg/kg-day	2.0E-02	mg/kg-day	--	--	1.3E-05
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	2.6E-07	mg/kg-day	3.0E-02	mg/kg-day	--	--	4.1E-03
	Pyrene	250	mg/kg	250	mg/kg	M	1.2E-04	mg/kg-day	NA	--	--	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.5E-06	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	2.3E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	4.7E-02
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	2.8E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	5.7E-02
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.6E-07	mg/kg-day	5.0E-05	mg/kg-day	--	--	3.1E-03
	Heptachlor	22	mg/kg	22	mg/kg	M	1.1E-05	mg/kg-day	5.0E-04	mg/kg-day	--	--	2.2E-02
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	2.2E-06	mg/kg-day	1.3E-05	mg/kg-day	--	--	1.7E-01
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	7.4E-07	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	4.8E-07	mg/kg-day	2.0E-05	mg/kg-day	--	--	2.4E-02
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	2.7E-05	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	1.0E-07	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	2.3E-04	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	6.0E-07	mg/kg-day	4.0E-04	mg/kg-day	--	--	1.5E-03
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	1.7E-06	mg/kg-day	3.0E-04	mg/kg-day	--	--	5.7E-03
	Iron	2,260	mg/kg	2,260	mg/kg	M	1.1E-03	mg/kg-day	3.0E-01	mg/kg-day	--	--	3.7E-03
	Thallium	0.31	mg/kg	0.31	mg/kg	M	1.5E-07	mg/kg-day	6.6E-05	mg/kg-day	--	--	2.3E-03
	(total)												3.4E-01

TABLE 7.7.1A RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	1.3E-07	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	5.8E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	2.6E-05	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	3.4E-05	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	1.6E-05	mg/kg-day	NA	--	--	--	--
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	2.7E-06	mg/kg-day	NA	--	--	--	--
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	8.1E-05	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	1.2E-06	mg/kg-day	NA	--	--	--	--
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.6E-05	mg/kg-day	1.2E-02	mg/kg-day	--	--	1.3E-03
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	7.4E-06	mg/kg-day	NA	--	--	--	--
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	3.4E-08	mg/kg-day	1.6E-02	mg/kg-day	--	--	2.1E-06
	Pyrene	250	mg/kg	250	mg/kg	M	1.6E-05	mg/kg-day	9.3E-03	mg/kg-day	--	--	1.7E-03
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.9E-07	mg/kg-day	NA	--	--	--	--
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	1.2E-05	mg/kg-day	4.0E-04	mg/kg-day	--	--	3.1E-02
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	1.5E-05	mg/kg-day	4.0E-04	mg/kg-day	--	--	3.7E-02
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	2.1E-08	mg/kg-day	2.5E-05	mg/kg-day	--	--	8.3E-04
	Heptachlor	22	mg/kg	22	mg/kg	M	1.4E-06	mg/kg-day	3.6E-04	mg/kg-day	--	--	3.9E-03
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	2.9E-07	mg/kg-day	9.4E-06	mg/kg-day	--	--	3.1E-02
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	1.4E-06	mg/kg-day	NA	--	--	--	--
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	8.8E-07	mg/kg-day	1.8E-05	mg/kg-day	--	--	4.9E-02
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	4.9E-05	mg/kg-day	NA	--	--	--	--
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	1.3E-08	mg/kg-day	NA	--	--	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	3.0E-05	mg/kg-day	NA	--	--	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	7.9E-09	mg/kg-day	8.0E-06	mg/kg-day	--	--	9.9E-04
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	6.8E-07	mg/kg-day	1.2E-04	mg/kg-day	--	--	5.5E-03
	Iron	2,260	mg/kg	2,260	mg/kg	M	1.5E-05	mg/kg-day	4.5E-02	mg/kg-day	--	--	3.2E-04
	Thallium	0.31	mg/kg	0.31	mg/kg	M	2.0E-09	mg/kg-day	9.9E-06	mg/kg-day	--	--	2.0E-04
(Total)													5.1E-01

NOTES:

- EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
- mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
- (1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

Total Hazard Index Across All Exposure Routes/Pathways

TABLE 7.7.1B RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	2.8E-05	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	2.3E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	1.2E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.4E-06	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	8.7E-07	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	4.6E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	3.3E-06	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	3.4E-07	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	8.4E-07	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	2.5E-08	mg/kg-day	5.0E-05	mg/kg-day	--	--	5.1E-04
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	4.7E-05	mg/kg-day	NA	--	--	--	8.6E-03
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	2.6E-06	mg/kg-day	3.0E-04	mg/kg-day	--	--	3.8E-03
	Iron	2,347	mg/kg	2,347	mg/kg	M	1.1E-03	mg/kg-day	3.0E-01	mg/kg-day	--	--	1.3E-02
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	3.7E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	4.0E-06	mg/kg-day	NA	--	--	--	--
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	2.1E-06	mg/kg-day	NA	--	--	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	2.4E-06	mg/kg-day	NA	--	--	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	1.5E-06	mg/kg-day	NA	--	--	--	--
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	8.0E-07	mg/kg-day	NA	--	--	--	--
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	5.6E-06	mg/kg-day	NA	--	--	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	5.8E-07	mg/kg-day	NA	--	--	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	1.4E-06	mg/kg-day	NA	--	--	--	--
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	3.4E-09	mg/kg-day	2.5E-05	mg/kg-day	--	--	1.3E-04
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	8.6E-05	mg/kg-day	NA	--	--	--	8.3E-03
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	1.0E-06	mg/kg-day	1.2E-04	mg/kg-day	--	--	3.4E-04
	Iron	2,347	mg/kg	2,347	mg/kg	M	1.5E-05	mg/kg-day	4.5E-02	mg/kg-day	--	--	8.8E-03
Total Hazard Index Across All Exposure Routes/Pathways													
2.2E-02													

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.7.1aa RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	9.6E-11	NA	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	3.4E-09	NA	mg/kg-day	NA	--	--
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	1.5E-09	NA	mg/kg-day	NA	--	--
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	2.0E-09	NA	mg/kg-day	NA	--	--
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	9.2E-10	NA	mg/kg-day	NA	--	--
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	1.6E-10	NA	mg/kg-day	NA	--	--
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	4.7E-09	NA	mg/kg-day	NA	--	--
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	7.0E-11	NA	mg/kg-day	NA	--	--
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	1.2E-08	4.0E-02	mg/kg-day	NA	--	3.0E-07
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	4.3E-10	NA	mg/kg-day	NA	--	--
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	2.6E-11	8.6E-04	mg/kg-day	3.0E-03	mg/m ³	3.0E-08
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	1.2E-08	3.0E-02	mg/kg-day	NA	--	4.1E-07
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	1.5E-10	NA	mg/kg-day	NA	--	--
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	2.4E-09	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	1.2E-05
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	2.9E-09	2.0E-04	mg/kg-day	7.0E-04	mg/m ³	1.4E-05
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	1.6E-11	5.0E-05	mg/kg-day	NA	--	3.2E-07
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	1.1E-09	5.0E-04	mg/kg-day	NA	--	2.2E-06
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	2.2E-10	1.3E-05	mg/kg-day	NA	--	1.7E-05
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	7.4E-11	NA	mg/kg-day	NA	--	--
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	4.8E-11	2.0E-05	mg/kg-day	NA	--	2.4E-06
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	2.7E-09	NA	mg/kg-day	NA	--	--
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	1.0E-11	NA	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	2.3E-08	NA	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	6.0E-11	NA	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	1.7E-10	NA	mg/kg-day	NA	--	--
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	1.1E-07	NA	mg/kg-day	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	1.5E-11	NA	mg/kg-day	NA	--	--
	(Total)											4.9E-05

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

Total Hazard Index Across All Exposure Routes/Pathways

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.7.1aB RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	2.8E-09	NA	--	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	2.3E-10	NA	--	NA	--	--
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	1.2E-10	NA	--	NA	--	--
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	1.4E-10	NA	--	NA	--	--
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	8.8E-11	NA	--	NA	--	--
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	4.7E-11	NA	--	NA	--	--
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	3.3E-10	NA	--	NA	--	--
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	3.4E-11	NA	--	NA	--	--
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	8.5E-11	NA	--	NA	--	--
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	2.6E-12	5.0E-05	mg/kg-day	NA	--	5.1E-08
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	4.7E-09	NA	--	NA	--	--
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	2.6E-10	NA	--	NA	--	--
	Iron	2.347	mg/kg	1.78E-06	mg/m ³	R	1.2E-07	NA	--	NA	--	--
	(Total)											5.1E-08
Total Hazard Index Across All Exposure Routes/Pathways												

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.
(2) Specify if subchronic.

TABLE 7.7.2a RME
CALCULATION OF NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Shower
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer) Units	Intake (Non-Cancer) Units	Reference Dose (2)	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Benzene	0.0034	mg/L	4.81E-03	mg/m ³	R	9.8E-06	mg/kg-day	1.7E-03	mg/kg-day	9.0E-03	mg/m3	5.7E-03
	Chloroform	0.016	mg/L	1.80E-02	mg/m ³	R	3.7E-05	mg/kg-day	8.6E-05	mg/kg-day	NA	--	4.3E-01
Total Hazard Index Across All Exposure Routes/Pathways													4.3E-01

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/L - milligram per liter

mg/m³ - milligram per cubic meter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

(2) Specify if subchronic.

TABLE 8.1.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	1.1E-07	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	3.9E-06	7.3E-01	(mg/kg-day) -1	2.8E-06
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.7E-06	7.3E+00	(mg/kg-day) -1	1.2E-05
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	2.3E-06	7.3E-01	(mg/kg-day) -1	1.7E-06
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	1.0E-06	7.3E-02	(mg/kg-day) -1	7.6E-08
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.8E-07	2.0E-02	(mg/kg-day) -1	3.5E-09
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	5.4E-06	7.3E-03	(mg/kg-day) -1	3.9E-08
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	7.9E-08	7.3E+00	(mg/kg-day) -1	5.8E-07
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.4E-05	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	4.9E-07	7.3E-01	(mg/kg-day) -1	3.6E-07
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	2.9E-08	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	1.4E-05	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.7E-07	2.4E-01	(mg/kg-day) -1	4.0E-08
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	2.7E-06	3.5E-01	(mg/kg-day) -1	9.4E-07
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	3.2E-06	3.5E-01	(mg/kg-day) -1	1.1E-06
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.8E-08	1.6E+01	(mg/kg-day) -1	2.9E-07
	Heptachlor	22	mg/kg	22	mg/kg	M	1.2E-06	4.5E+00	(mg/kg-day) -1	5.5E-06
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	2.5E-07	9.1E+00	(mg/kg-day) -1	2.3E-06
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	8.4E-08	2.0E+00	(mg/kg-day) -1	1.7E-07
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	5.5E-08	2.0E+00	(mg/kg-day) -1	1.1E-07
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	3.1E-06	2.0E+00	(mg/kg-day) -1	6.1E-06
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	1.2E-08	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	2.6E-05	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	6.8E-08	1.5E+00	(mg/kg-day) -1	2.9E-07
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	2.0E-07	NA	--	--
	Iron	2,260	mg/kg	2,260	mg/kg	M	1.3E-04	NA	--	--
	Thallium	0.31	mg/kg	0.31	mg/kg	M	1.7E-08	NA	--	--
	(total)									3.5E-05

TABLE 8.1.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEIUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current

Medium: Surface Soil

Exposure Medium: Surface Soil

Exposure Point: Surface Soil

Receptor Population: Military Base Personnel

Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	7.2E-09	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	3.3E-06	2.4E+00	(mg/kg-day) ⁻¹	7.8E-06
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.5E-06	1.5E+01	(mg/kg-day) ⁻¹	2.1E-05
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	2.0E-06	1.5E+00	(mg/kg-day) ⁻¹	2.9E-06
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	8.9E-07	1.5E-01	(mg/kg-day) ⁻¹	1.3E-07
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.5E-07	4.0E-02	(mg/kg-day) ⁻¹	6.1E-09
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	4.6E-06	2.4E-02	(mg/kg-day) ⁻¹	1.1E-07
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	6.8E-08	2.4E+01	(mg/kg-day) ⁻¹	1.6E-06
	Fluoranthene	24.3	mg/kg	24.3	mg/kg	M	9.0E-07	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	4.2E-07	2.4E+00	(mg/kg-day) ⁻¹	9.9E-07
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	1.9E-09	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	9.2E-07	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.1E-08	3.4E-01	(mg/kg-day) ⁻¹	3.8E-09
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	7.1E-07	4.4E-01	(mg/kg-day) ⁻¹	3.1E-07
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	8.6E-07	4.4E-01	(mg/kg-day) ⁻¹	3.7E-07
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.2E-09	3.2E+01	(mg/kg-day) ⁻¹	3.8E-08
	Heptachlor	22	mg/kg	22	mg/kg	M	8.1E-08	6.3E+00	(mg/kg-day) ⁻¹	5.1E-07
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	1.7E-08	1.3E+01	(mg/kg-day) ⁻¹	2.1E-07
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	7.8E-08	2.2E+00	(mg/kg-day) ⁻¹	1.7E-07
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	5.0E-08	2.2E+00	(mg/kg-day) ⁻¹	1.1E-07
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	2.8E-06	2.2E+00	(mg/kg-day) ⁻¹	6.3E-06
(Total)	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	7.6E-10	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	1.7E-06	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	4.5E-10	NA	--	--
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	3.9E-08	3.7E+00	(mg/kg-day) ⁻¹	1.4E-07
	Iron	2,260	mg/kg	2,260	mg/kg	M	8.3E-07	NA	--	--
	Thallium	0.31	mg/kg	0.31	mg/kg	M	1.1E-10	NA	--	--
(Total)										4.3E-05
Total Risk Across All Exposure Routes/Pathways										7.8E-05

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.1.1B RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	3.2E-06	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	2.7E-07	7.3E-01	(mg/kg-day) ⁻¹	1.9E-07
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	1.4E-07	7.3E-00	(mg/kg-day) ⁻¹	1.0E-06
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.6E-07	7.3E-01	(mg/kg-day) ⁻¹	1.1E-07
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	1.0E-07	7.3E-02	(mg/kg-day) ⁻¹	7.3E-09
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	5.3E-08	2.0E-02	(mg/kg-day) ⁻¹	1.1E-09
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	3.7E-07	7.3E-03	(mg/kg-day) ⁻¹	2.7E-09
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	3.9E-08	7.3E-00	(mg/kg-day) ⁻¹	2.8E-07
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	9.6E-08	7.3E-01	(mg/kg-day) ⁻¹	7.0E-08
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	2.9E-09	1.6E+01	(mg/kg-day) ⁻¹	4.7E-08
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	5.3E-06	2.0E+00	(mg/kg-day) ⁻¹	1.1E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	2.9E-07	1.5E+00	(mg/kg-day) ⁻¹	4.4E-07
	Iron	2,347	mg/kg	2,347	mg/kg	M	1.3E-04	NA	--	--
(total)										
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	2.1E-07	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	2.3E-07	2.4E+00	(mg/kg-day) ⁻¹	5.4E-07
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	1.2E-07	1.5E+01	(mg/kg-day) ⁻¹	1.7E-06
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.3E-07	1.5E+00	(mg/kg-day) ⁻¹	2.0E-07
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	8.5E-08	1.5E-01	(mg/kg-day) ⁻¹	1.2E-08
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	4.6E-08	4.0E-02	(mg/kg-day) ⁻¹	1.8E-09
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	3.2E-07	2.4E-02	(mg/kg-day) ⁻¹	7.6E-09
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	3.3E-08	2.4E+01	(mg/kg-day) ⁻¹	7.9E-07
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	8.2E-08	2.4E+00	(mg/kg-day) ⁻¹	1.9E-07
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	1.9E-10	3.2E+01	(mg/kg-day) ⁻¹	6.1E-09
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	4.9E-06	2.2E+00	(mg/kg-day) ⁻¹	1.1E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	5.8E-08	3.7E+00	(mg/kg-day) ⁻¹	2.1E-07
	Iron	2,347	mg/kg	2,347	mg/kg	M	8.7E-07	NA	--	--
(Total)										
Total Risk Across All Exposure Routes/Pathways										
1.5E-05										
2.8E-05										

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.1.1a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugative dust
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	mg/m ³	R	5.5E-12	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	mg/m ³	R	1.9E-10	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	6.0E-11
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	mg/m ³	R	8.6E-11	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	2.7E-10
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	mg/m ³	R	1.1E-10	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	3.6E-11
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	mg/m ³	R	5.2E-11	mg/kg-day	3.1E-02	(mg/kg-day) ⁻¹	1.6E-12
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	mg/m ³	R	8.9E-12	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	1.8E-13
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	mg/m ³	R	2.7E-10	mg/kg-day	3.1E-03	(mg/kg-day) ⁻¹	8.4E-13
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	mg/m ³	R	4.0E-12	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	1.2E-11
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	mg/m ³	R	6.8E-10	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	mg/m ³	R	2.5E-11	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	7.7E-12
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	mg/m ³	R	1.5E-12	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	mg/m ³	R	7.0E-10	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	mg/m ³	R	8.4E-12	mg/kg-day	2.4E-01	(mg/kg-day) ⁻¹	2.0E-12
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	mg/m ³	R	1.4E-10	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	4.7E-11
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	mg/m ³	R	1.6E-10	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	5.7E-11
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	mg/m ³	R	9.0E-13	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	1.4E-11
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	mg/m ³	R	6.2E-11	mg/kg-day	4.6E+00	(mg/kg-day) ⁻¹	2.8E-10
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	mg/m ³	R	1.3E-11	mg/kg-day	9.1E+00	(mg/kg-day) ⁻¹	1.2E-10
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	mg/m ³	R	4.2E-12	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	8.5E-12
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	mg/m ³	R	2.7E-12	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	5.5E-12
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	mg/m ³	R	1.5E-10	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	3.1E-10
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	mg/m ³	R	5.8E-13	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	mg/m ³	R	1.3E-09	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	mg/m ³	R	3.4E-12	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	mg/m ³	R	9.8E-12	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	1.5E-10
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	mg/m ³	R	6.4E-09	mg/kg-day	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	mg/m ³	R	8.6E-13	mg/kg-day	NA	--	--
	(Total)											
Total Risk Across All Exposure Routes/Pathways												1.4E-09

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.1.1aB RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	1.6E-10	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	1.3E-11	3.1E-01	(mg/kg-day) ⁻¹	4.2E-12
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	7.0E-12	3.1E+00	(mg/kg-day) ⁻¹	2.2E-11
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	7.9E-12	3.1E-01	(mg/kg-day) ⁻¹	2.4E-12
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	5.0E-12	3.1E-02	(mg/kg-day) ⁻¹	1.6E-13
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	2.7E-12	2.0E-02	(mg/kg-day) ⁻¹	5.3E-14
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	1.9E-11	3.1E-03	(mg/kg-day) ⁻¹	5.8E-14
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	2.0E-12	3.1E+00	(mg/kg-day) ⁻¹	6.1E-12
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	4.8E-12	3.1E-01	(mg/kg-day) ⁻¹	1.5E-12
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	1.5E-13	1.6E+01	(mg/kg-day) ⁻¹	2.4E-12
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	2.7E-10	2.0E+00	(mg/kg-day) ⁻¹	5.4E-10
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	1.5E-11	1.5E+01	(mg/kg-day) ⁻¹	2.2E-10
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	6.6E-09	NA	--	--
	(Total)									8.0E-10

Total Risk Across All Exposure Routes/Pathways

NOTES:

- EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.1.2 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	8.1E-08	mg/kg-day	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	3.9E-08	mg/kg-day	NA	--	--
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	5.1E-08	mg/kg-day	NA	--	--
(total)											
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	1.5E-08	mg/kg-day	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	5.8E-07	mg/kg-day	NA	--	--
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	1.6E-06	mg/kg-day	NA	--	--
(Total)											
Total Risk Across All Exposure Routes/Pathways											

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/L - milligram per liter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.1.3 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Military Base Personnel
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	5.6E-07	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	1.6E-07	2.0E+00	(mg/kg-day) ⁻¹	3.1E-07
	Aroclor-1260	40	mg/kg	40	mg/kg	M	2.2E-06	2.0E+00	(mg/kg-day) ⁻¹	4.5E-06
	Diesel Range Organics (total)	11,600	mg/kg	11,600	mg/kg	M	6.5E-04	NA	--	4.8E-06
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	3.7E-08	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	1.4E-07	2.2E+00	(mg/kg-day) ⁻¹	3.3E-07
	Aroclor-1260	40	mg/kg	40	mg/kg	M	2.1E-06	2.2E+00	(mg/kg-day) ⁻¹	4.6E-06
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	4.3E-05	NA	--	4.9E-06
Total Risk Across All Exposure Routes/Pathways										9.7E-06

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.2.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current											
Medium: Surface Soil											
Exposure Medium: Surface Soil											
Exposure Point: Surface Soil											
Receptor Population: Recreational Users											
Receptor Age: Adult											
Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	1.3E-07	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	4.4E-06	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	3.2E-06
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	2.0E-06	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	1.4E-05
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	2.6E-06	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	1.9E-06
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	1.2E-06	mg/kg-day	7.3E-02	(mg/kg-day) ⁻¹	8.8E-08
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	2.0E-07	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	4.1E-09
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	6.2E-06	mg/kg-day	7.3E-03	(mg/kg-day) ⁻¹	4.5E-08
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	9.1E-08	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	6.6E-07
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.6E-05	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	5.7E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	4.1E-07
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	3.4E-08	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	1.6E-05	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.9E-07	mg/kg-day	2.4E-01	(mg/kg-day) ⁻¹	4.6E-08
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	3.1E-06	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	1.1E-06
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	3.7E-06	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	1.3E-06
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	2.1E-08	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	3.3E-07
	Heptachlor	22	mg/kg	22	mg/kg	M	1.4E-06	mg/kg-day	4.5E+00	(mg/kg-day) ⁻¹	6.4E-06
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	2.9E-07	mg/kg-day	9.1E+00	(mg/kg-day) ⁻¹	2.6E-06
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	9.7E-08	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.9E-07
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	6.3E-08	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.3E-07
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	3.5E-06	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	7.0E-06
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	1.3E-08	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	3.0E-05	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	7.9E-08	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	2.2E-07	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	3.4E-07
	Iron	2,260	mg/kg	2,260	mg/kg	M	1.5E-04	mg/kg-day	NA	--	--
	Thallium	0.31	mg/kg	0.31	mg/kg	M	2.0E-08	mg/kg-day	NA	--	--
		(total)									

TABLE 8.2.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	1.4E-08	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	6.6E-06	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	1.6E-05
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	2.9E-06	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	4.2E-05
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	3.9E-06	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	5.7E-06
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	1.8E-06	mg/kg-day	1.3E-01	(mg/kg-day) ⁻¹	2.6E-07
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	3.0E-07	mg/kg-day	4.0E-02	(mg/kg-day) ⁻¹	1.2E-08
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	9.2E-06	mg/kg-day	2.4E-02	(mg/kg-day) ⁻¹	2.2E-07
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	1.3E-07	mg/kg-day	2.4E+01	(mg/kg-day) ⁻¹	3.2E-06
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.8E-06	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	8.4E-07	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	2.0E-06
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	3.9E-09	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	1.8E-06	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	2.2E-08	mg/kg-day	3.4E-01	(mg/kg-day) ⁻¹	7.6E-09
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	1.4E-06	mg/kg-day	4.4E-01	(mg/kg-day) ⁻¹	6.2E-07
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	1.7E-06	mg/kg-day	4.4E-01	(mg/kg-day) ⁻¹	7.5E-07
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	2.3E-09	mg/kg-day	3.2E+01	(mg/kg-day) ⁻¹	7.5E-08
	Heptachlor	22	mg/kg	22	mg/kg	M	1.6E-07	mg/kg-day	6.3E+00	(mg/kg-day) ⁻¹	1.0E-06
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	3.3E-08	mg/kg-day	1.3E+01	(mg/kg-day) ⁻¹	4.2E-07
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	1.5E-07	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	3.5E-07
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	1.0E-07	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	2.2E-07
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	5.6E-06	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	1.2E-05
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	1.5E-09	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	3.5E-06	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	9.0E-10	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	7.7E-08	mg/kg-day	3.7E+00	(mg/kg-day) ⁻¹	2.8E-07
	Iron	2.260	mg/kg	2.260	mg/kg	M	1.7E-06	mg/kg-day	NA	--	--
	Thallium	0.31	mg/kg	0.31	mg/kg	M	2.3E-10	mg/kg-day	NA	--	--
(Total)											8.5E-05
Total Risk Across All Exposure Routes/Pathways											1.3E-04

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.2.1B RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	3.7E-06	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	3.1E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	2.2E-07
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	1.6E-07	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	1.2E-06
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.8E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	1.3E-07
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	1.1E-07	mg/kg-day	7.3E-02	(mg/kg-day) ⁻¹	8.4E-09
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	6.1E-08	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	1.2E-09
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	4.3E-07	mg/kg-day	7.3E-03	(mg/kg-day) ⁻¹	3.2E-09
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	4.5E-08	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	3.3E-07
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	1.1E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	8.1E-08
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	3.3E-09	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	5.4E-08
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	6.2E-06	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.2E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	3.4E-07	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	5.1E-07
	Iron	2,347	mg/kg	2,347	mg/kg	M	1.5E-04	mg/kg-day	NA	--	--
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	4.3E-07	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	4.5E-07	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	1.1E-06
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	2.4E-07	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	3.5E-06
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	2.7E-07	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	3.9E-07
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	1.7E-07	mg/kg-day	1.5E-01	(mg/kg-day) ⁻¹	2.5E-08
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	9.1E-08	mg/kg-day	4.0E-02	(mg/kg-day) ⁻¹	3.6E-09
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	6.4E-07	mg/kg-day	2.4E-02	(mg/kg-day) ⁻¹	1.5E-08
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	6.6E-08	mg/kg-day	2.4E+01	(mg/kg-day) ⁻¹	1.6E-06
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	1.6E-07	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	3.9E-07
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	3.8E-10	mg/kg-day	3.2E+01	(mg/kg-day) ⁻¹	1.2E-08
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	9.8E-06	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	2.2E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	1.2E-07	mg/kg-day	3.7E+00	(mg/kg-day) ⁻¹	4.2E-07
	Iron	2,347	mg/kg	2,347	mg/kg	M	1.7E-06	mg/kg-day	NA	--	--
(Total)											2.9E-05
Total Risk Across All Exposure Routes/Pathways											4.4E-05

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.2.1a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugative dust
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	6.3E-12	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	2.2E-10	3.1E-01	(mg/kg-day) ⁻¹	6.9E-11
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	9.9E-11	3.1E+00	(mg/kg-day) ⁻¹	3.1E-10
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	1.3E-10	3.1E-01	(mg/kg-day) ⁻¹	4.1E-11
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	6.0E-11	3.1E-02	(mg/kg-day) ⁻¹	1.9E-12
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	1.0E-11	2.0E-02	(mg/kg-day) ⁻¹	2.0E-13
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	3.1E-10	3.1E-03	(mg/kg-day) ⁻¹	9.6E-13
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	4.6E-12	3.1E+00	(mg/kg-day) ⁻¹	1.4E-11
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	7.9E-10	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	2.8E-11	3.1E-01	(mg/kg-day) ⁻¹	8.8E-12
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	1.7E-12	NA	--	--
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	8.1E-10	NA	--	--
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	9.7E-12	2.4E-01	(mg/kg-day) ⁻¹	2.3E-12
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	1.6E-10	3.5E-01	(mg/kg-day) ⁻¹	5.4E-11
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	1.9E-10	3.5E-01	(mg/kg-day) ⁻¹	6.6E-11
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	1.0E-12	1.6E+01	(mg/kg-day) ⁻¹	1.7E-11
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	7.1E-11	4.6E+00	(mg/kg-day) ⁻¹	3.2E-10
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	1.5E-11	9.1E+00	(mg/kg-day) ⁻¹	1.3E-10
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	4.9E-12	2.0E+00	(mg/kg-day) ⁻¹	9.8E-12
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	3.2E-12	2.0E+00	(mg/kg-day) ⁻¹	6.3E-12
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	1.8E-10	2.0E+00	(mg/kg-day) ⁻¹	3.5E-10
Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	6.7E-13	NA	--	--	
Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	1.5E-09	NA	--	--	
Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	4.0E-12	NA	--	--	
Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	1.1E-11	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	1.7E-10
Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	7.3E-09	mg/kg-day	NA	--	--
Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	9.9E-13	mg/kg-day	NA	--	1.6E-09
(Total)										1.6E-09
Total Risk Across All Exposure Routes/Pathways										1.6E-09

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.2.1aB RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current											
Medium: Surface Soil											
Exposure Medium: Air											
Exposure Point: Fugative dust											
Receptor Population: Recreational Users											
Receptor Age: Adult											
Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk	
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	1.9E-10	NA	--	--	
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	1.5E-11	3.1E-01	(mg/kg-day) ⁻¹	4.8E-12	
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	8.0E-12	3.1E+00	(mg/kg-day) ⁻¹	2.5E-11	
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	9.1E-12	3.1E-01	(mg/kg-day) ⁻¹	2.8E-12	
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	5.8E-12	3.1E-02	(mg/kg-day) ⁻¹	1.8E-13	
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	3.1E-12	2.0E-02	(mg/kg-day) ⁻¹	6.2E-14	
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	2.2E-11	3.1E-03	(mg/kg-day) ⁻¹	6.7E-14	
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	2.3E-12	3.1E+00	(mg/kg-day) ⁻¹	7.0E-12	
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	5.6E-12	3.1E-01	(mg/kg-day) ⁻¹	1.7E-12	
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	1.7E-13	1.6E+01	(mg/kg-day) ⁻¹	2.7E-12	
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	3.1E-10	2.0E+00	(mg/kg-day) ⁻¹	6.2E-10	
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	1.7E-11	1.5E+01	(mg/kg-day) ⁻¹	2.6E-10	
Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	7.6E-09	mg/kg-day	NA	--	--	
(Total)										9.2E-10	
Total Risk Across All Exposure Routes/Pathways											9.2E-10

NOTES:

- EPC - Exposure Point Concentration
 NA - Toxicity criterion not available.
 -- - Not applicable.
 (1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.2.2 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	9.4E-08	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	4.5E-08	NA	--	--
	Xylenes, total (total)	0.0035	mg/L	0.0035	mg/L	M	5.9E-08	NA	--	--
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	3.0E-08	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	1.2E-06	NA	--	--
	Xylenes, total (Total)	0.0035	mg/L	0.0035	mg/L	M	3.2E-06	NA	--	--
Total Risk Across All Exposure Routes/Pathways										

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.2.3 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Recreational Users
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	6.4E-07	mg/kg-day	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	1.8E-07	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	3.6E-07
	Aroclor-1260	40	mg/kg	40	mg/kg	M	2.6E-06	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	5.2E-06
	Diesel Range Organics (total)	11,600	mg/kg	11,600	mg/kg	M	7.5E-04	mg/kg-day	NA	--	5.5E-06
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	7.3E-08	mg/kg-day	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	2.9E-07	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	6.5E-07
	Aroclor-1260	40	mg/kg	40	mg/kg	M	4.1E-06	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	9.1E-06
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	8.5E-05	mg/kg-day	NA	--	9.8E-06
Total Risk Across All Exposure Routes/Pathways											1.5E-05

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.3.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current										
Medium: Surface Soil										
Exposure Medium: Surface Soil										
Exposure Point: Surface Soil										
Receptor Population: Recreational Users										
Receptor Age: Adolescent										
Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	7.4E-08	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	2.6E-06	7.3E-01	(mg/kg-day) ⁻¹	1.9E-06
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.1E-06	7.3E+00	(mg/kg-day) ⁻¹	8.4E-06
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.5E-06	7.3E-01	(mg/kg-day) ⁻¹	1.1E-06
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	7.0E-07	7.3E-02	(mg/kg-day) ⁻¹	5.1E-08
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.2E-07	2.0E-02	(mg/kg-day) ⁻¹	2.4E-09
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	3.6E-06	7.3E-03	(mg/kg-day) ⁻¹	2.6E-08
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	5.3E-08	7.3E+00	(mg/kg-day) ⁻¹	3.9E-07
	Fluoranthene	243	mg/kg	243	mg/kg	M	9.1E-06	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	3.3E-07	7.3E-01	(mg/kg-day) ⁻¹	2.4E-07
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	2.0E-08	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	9.4E-06	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.1E-07	2.4E-01	(mg/kg-day) ⁻¹	2.7E-08
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	1.8E-06	3.5E-01	(mg/kg-day) ⁻¹	6.3E-07
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	2.2E-06	3.5E-01	(mg/kg-day) ⁻¹	7.6E-07
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.2E-08	1.6E+01	(mg/kg-day) ⁻¹	1.9E-07
	Heptachlor	22	mg/kg	22	mg/kg	M	8.3E-07	4.5E+00	(mg/kg-day) ⁻¹	3.7E-06
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	1.7E-07	9.1E+00	(mg/kg-day) ⁻¹	1.5E-06
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	5.7E-08	2.0E+00	(mg/kg-day) ⁻¹	1.1E-07
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	3.7E-08	2.0E+00	(mg/kg-day) ⁻¹	7.3E-08
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	2.1E-06	2.0E+00	(mg/kg-day) ⁻¹	4.1E-06
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	7.8E-09	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	1.8E-05	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	4.6E-08	NA	--	--
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	1.3E-07	1.5E+00	(mg/kg-day) ⁻¹	2.0E-07
	Iron	2,260	mg/kg	2,260	mg/kg	M	8.5E-05	NA	--	--
	Thallium	0.31	mg/kg	0.31	mg/kg	M	1.2E-08	NA	--	--
	(total)									2.3E-05

TABLE 8.3.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Surface Soil
 Receptor Population: Recreational Users
 Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	7.8E-09	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	3.6E-06	2.4E+00	(mg/kg-day) ⁻¹	8.4E-06
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.6E-06	1.5E+01	(mg/kg-day) ⁻¹	2.3E-05
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	2.1E-06	1.5E+00	(mg/kg-day) ⁻¹	3.1E-06
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	9.7E-07	1.5E-01	(mg/kg-day) ⁻¹	1.4E-07
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.6E-07	4.0E-02	(mg/kg-day) ⁻¹	6.5E-09
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	5.0E-06	2.4E-02	(mg/kg-day) ⁻¹	1.2E-07
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	7.3E-08	2.4E+01	(mg/kg-day) ⁻¹	1.7E-06
	Fluoranthene	243	mg/kg	243	mg/kg	M	9.7E-07	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	4.6E-07	2.4E+00	(mg/kg-day) ⁻¹	1.1E-06
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	2.1E-09	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	1.0E-06	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.2E-08	3.4E-01	(mg/kg-day) ⁻¹	4.1E-09
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	7.6E-07	4.4E-01	(mg/kg-day) ⁻¹	3.3E-07
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	9.2E-07	4.4E-01	(mg/kg-day) ⁻¹	4.0E-07
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.3E-09	3.2E+01	(mg/kg-day) ⁻¹	4.1E-08
	Heptachlor	22	mg/kg	22	mg/kg	M	8.8E-08	6.3E+00	(mg/kg-day) ⁻¹	5.5E-07
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	1.8E-08	1.3E+01	(mg/kg-day) ⁻¹	2.3E-07
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	8.4E-08	2.2E+00	(mg/kg-day) ⁻¹	1.9E-07
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	5.4E-08	2.2E+00	(mg/kg-day) ⁻¹	1.2E-07
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	3.0E-06	2.2E+00	(mg/kg-day) ⁻¹	6.8E-06
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	8.2E-10	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	1.9E-06	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	4.9E-10	NA	--	--
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	4.2E-08	3.7E+00	(mg/kg-day) ⁻¹	1.5E-07
	Iron	2,260	mg/kg	2,260	mg/kg	M	9.0E-07	NA	--	--
	Thallium	0.31	mg/kg	0.31	mg/kg	M	1.2E-10	NA	--	--
(Total)										4.6E-05
Total Risk Across All Exposure Routes/Pathways										7.0E-05

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.3.1B RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	2.2E-06	NA		--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	1.8E-07	7.3E-01	(mg/kg-day)	1.3E-07
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	9.3E-08	7.3E+00	(mg/kg-day)	6.8E-07
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.1E-07	7.3E-01	(mg/kg-day)	7.7E-08
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	6.7E-08	7.3E-02	(mg/kg-day)	4.9E-09
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	3.6E-08	2.0E-02	(mg/kg-day)	7.1E-10
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	2.5E-07	7.3E-03	(mg/kg-day)	1.8E-09
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	2.6E-08	7.3E+00	(mg/kg-day)	1.9E-07
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	6.5E-08	7.3E-01	(mg/kg-day)	4.7E-08
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	2.0E-09	1.6E+01	(mg/kg-day)	3.1E-08
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	3.6E-06	2.0E+00	(mg/kg-day)	7.2E-06
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	2.0E-07	1.5E+00	(mg/kg-day)	3.0E-07
	Iron	2,347	mg/kg	2,347	mg/kg	M	8.8E-05	NA	--	--
	(total)									8.6E-06
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	2.3E-07	NA		--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	2.5E-07	2.4E+00	(mg/kg-day)	5.8E-07
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	1.3E-07	1.5E+01	(mg/kg-day)	1.9E-06
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.5E-07	1.5E+00	(mg/kg-day)	2.1E-07
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	9.2E-08	1.5E-01	(mg/kg-day)	1.3E-08
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	4.9E-08	4.0E-02	(mg/kg-day)	2.0E-09
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	3.5E-07	2.4E-02	(mg/kg-day)	8.2E-09
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	3.6E-08	2.4E+01	(mg/kg-day)	8.5E-07
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	8.9E-08	2.4E+00	(mg/kg-day)	2.1E-07
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	2.1E-10	3.2E+01	(mg/kg-day)	6.6E-09
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	5.3E-06	2.2E+00	(mg/kg-day)	1.2E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	6.3E-08	3.7E+00	(mg/kg-day)	2.3E-07
	Iron	2,347	mg/kg	2,347	mg/kg	M	9.3E-07	NA	--	--
	(Total)									1.6E-05
Total Risk Across All Exposure Routes/Pathways										2.4E-05

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.3.1a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Air
 Exposure Point: Fugitive dust
 Receptor Population: Recreational Users
 Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	3.7E-12	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	1.3E-10	3.1E-01	(mg/kg-day) ⁻¹	4.0E-11
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	5.8E-11	3.1E+00	(mg/kg-day) ⁻¹	1.8E-10
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	7.7E-11	3.1E-01	(mg/kg-day) ⁻¹	2.4E-11
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	3.5E-11	3.1E-02	(mg/kg-day) ⁻¹	1.1E-12
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	6.0E-12	2.0E-02	(mg/kg-day) ⁻¹	1.2E-13
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	1.8E-10	3.1E-03	(mg/kg-day) ⁻¹	5.6E-13
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	2.7E-12	3.1E+00	(mg/kg-day) ⁻¹	8.3E-12
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	4.6E-10	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	1.7E-11	3.1E-01	(mg/kg-day) ⁻¹	5.2E-12
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	9.9E-13	NA	--	--
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	4.7E-10	NA	--	--
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	5.7E-12	2.4E-01	(mg/kg-day) ⁻¹	1.4E-12
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	9.1E-11	3.5E-01	(mg/kg-day) ⁻¹	3.2E-11
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	1.1E-10	3.5E-01	(mg/kg-day) ⁻¹	3.8E-11
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	6.0E-13	1.6E+01	(mg/kg-day) ⁻¹	9.7E-12
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	4.2E-11	4.6E+00	(mg/kg-day) ⁻¹	1.9E-10
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	8.5E-12	9.1E+00	(mg/kg-day) ⁻¹	7.7E-11
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	2.8E-12	2.0E+00	(mg/kg-day) ⁻¹	5.7E-12
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	1.8E-12	2.0E+00	(mg/kg-day) ⁻¹	3.7E-12
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	1.0E-10	2.0E+00	(mg/kg-day) ⁻¹	2.1E-10
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	3.9E-13	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	8.9E-10	NA	--	--
Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	2.3E-12	NA	--	--	
Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	6.6E-12	1.5E+01	(mg/kg-day) ⁻¹	1.0E-10	
Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	4.3E-09	NA	--	--	
Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	5.8E-13	NA	--	--	
(Total)							Total Risk Across All Exposure Routes/Pathways			9.2E-10

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.3.1aB RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Air Exposure Point: Fugative dust Receptor Population: Recreational Users Receptor Age: Adolescent										
Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	1.1E-10	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	9.0E-12	3.1E-01	(mg/kg-day) ⁻¹	2.8E-12
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	4.7E-12	3.1E+00	(mg/kg-day) ⁻¹	1.5E-11
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	5.3E-12	3.1E-01	(mg/kg-day) ⁻¹	1.6E-12
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	3.4E-12	3.1E-02	(mg/kg-day) ⁻¹	1.0E-13
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	1.8E-12	2.0E-02	(mg/kg-day) ⁻¹	3.6E-14
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	1.3E-11	3.1E-03	(mg/kg-day) ⁻¹	3.9E-14
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	1.3E-12	3.1E+00	(mg/kg-day) ⁻¹	4.1E-12
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	3.2E-12	3.1E-01	(mg/kg-day) ⁻¹	1.0E-12
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	9.8E-14	1.6E+01	(mg/kg-day) ⁻¹	1.6E-12
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	1.8E-10	2.0E+00	(mg/kg-day) ⁻¹	3.6E-10
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	9.9E-12	1.5E+01	(mg/kg-day) ⁻¹	1.5E-10
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	4.4E-09	NA	--	--
(Total)										5.4E-10
Total Risk Across All Exposure Routes/Pathways										

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

mg/kg - milligram per kilogram

mg/m³ - milligram per cubic meter

mg/kg-day - milligram per kilogram per day

TABLE 8.3.2 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	5.5E-08	mg/kg-day	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	2.6E-08	mg/kg-day	NA	--	--
	Xylenes, total (total)	0.0035	mg/L	0.0035	mg/L	M	3.4E-08	mg/kg-day	NA	--	--
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	1.7E-08	mg/kg-day	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	6.3E-07	mg/kg-day	NA	--	--
	Xylenes, total (Total)	0.0035	mg/L	0.0035	mg/L	M	1.7E-06	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/L - milligram per liter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.3.3 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Recreational Users
Receptor Age: Adolescent

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	3.8E-07	mg/kg-day	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	1.1E-07	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	2.1E-07
	Aroclor-1260	40	mg/kg	40	mg/kg	M	1.5E-06	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	3.0E-06
	Diesel Range Organics (total)	11,600	mg/kg	11,600	mg/kg	M	4.4E-04	mg/kg-day	NA	--	3.2E-06
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	4.0E-08	mg/kg-day	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	1.6E-07	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	3.5E-07
	Aroclor-1260	40	mg/kg	40	mg/kg	M	2.2E-06	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	5.0E-06
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	4.6E-05	mg/kg-day	NA	--	5.3E-06
Total Risk Across All Exposure Routes/Pathways											8.5E-06

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	9.2E-07	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	3.2E-05	7.3E-01	(mg/kg-day) ⁻¹	2.4E-05
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.4E-05	7.3E+00	(mg/kg-day) ⁻¹	1.0E-04
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.9E-05	7.3E-01	(mg/kg-day) ⁻¹	1.4E-05
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	8.8E-06	7.3E-02	(mg/kg-day) ⁻¹	6.4E-07
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.5E-06	2.0E-02	(mg/kg-day) ⁻¹	3.0E-08
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	4.5E-05	7.3E-03	(mg/kg-day) ⁻¹	3.3E-07
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	6.6E-07	7.3E+00	(mg/kg-day) ⁻¹	4.8E-06
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.1E-04	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	4.1E-06	7.3E-01	(mg/kg-day) ⁻¹	3.0E-06
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	2.5E-07	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	1.2E-04	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.4E-06	2.4E-01	(mg/kg-day) ⁻¹	3.4E-07
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	2.3E-05	3.5E-01	(mg/kg-day) ⁻¹	7.9E-06
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	2.7E-05	3.5E-01	(mg/kg-day) ⁻¹	9.5E-06
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.5E-07	1.6E+01	(mg/kg-day) ⁻¹	2.4E-06
	Heptachlor	22	mg/kg	22	mg/kg	M	1.0E-05	4.5E+00	(mg/kg-day) ⁻¹	4.6E-05
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	2.1E-06	9.1E+00	(mg/kg-day) ⁻¹	1.9E-05
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	7.1E-07	2.0E+00	(mg/kg-day) ⁻¹	1.4E-06
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	4.6E-07	2.0E+00	(mg/kg-day) ⁻¹	9.2E-07
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	2.6E-05	2.0E+00	(mg/kg-day) ⁻¹	5.1E-05
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	9.7E-08	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	2.2E-04	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	5.7E-07	NA	--	--
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	1.6E-06	1.5E+00	(mg/kg-day) ⁻¹	2.5E-06
	Iron	2,260	mg/kg	2,260	mg/kg	M	1.1E-03	NA	--	--
	Thallium	0.31	mg/kg	0.31	mg/kg	M	1.4E-07	NA	--	--
	(total)									2.9E-04

TABLE 8.4.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	3.7E-08	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	1.7E-05	mg/kg-day	2.4E+00	(mg/kg-day) -1	4.0E-05
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	7.4E-06	mg/kg-day	1.5E+01	(mg/kg-day) -1	1.1E-04
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.0E-05	mg/kg-day	1.5E+00	(mg/kg-day) -1	1.5E-05
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	4.5E-06	mg/kg-day	1.5E-01	(mg/kg-day) -1	6.6E-07
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	7.7E-07	mg/kg-day	4.0E-02	(mg/kg-day) -1	3.1E-08
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	2.3E-05	mg/kg-day	2.4E-02	(mg/kg-day) -1	5.5E-07
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	3.4E-07	mg/kg-day	2.4E+01	(mg/kg-day) -1	8.1E-06
	Fluoranthene	243	mg/kg	243	mg/kg	M	4.6E-06	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	2.1E-06	mg/kg-day	2.4E+00	(mg/kg-day) -1	5.0E-06
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	9.8E-09	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	4.7E-06	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	5.6E-08	mg/kg-day	3.4E-01	(mg/kg-day) -1	1.9E-08
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	3.6E-06	mg/kg-day	4.4E-01	(mg/kg-day) -1	1.6E-06
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	4.3E-06	mg/kg-day	4.4E-01	(mg/kg-day) -1	1.9E-06
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	6.0E-09	mg/kg-day	3.2E+01	(mg/kg-day) -1	1.9E-07
	Heptachlor	22	mg/kg	22	mg/kg	M	4.1E-07	mg/kg-day	6.3E+00	(mg/kg-day) -1	2.6E-06
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	8.4E-08	mg/kg-day	1.3E+01	(mg/kg-day) -1	1.1E-06
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	4.0E-07	mg/kg-day	2.2E+00	(mg/kg-day) -1	8.9E-07
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	2.6E-07	mg/kg-day	2.2E+00	(mg/kg-day) -1	5.7E-07
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	1.4E-05	mg/kg-day	2.2E+00	(mg/kg-day) -1	3.2E-05
Gasoline Range Organics Diesel Range Organics Antimony Arsenic Iron Thallium (Total)		0.207	mg/kg	0.207	mg/kg	M	3.9E-09	mg/kg-day	NA	--	--
		470	mg/kg	470	mg/kg	M	8.8E-06	mg/kg-day	NA	--	--
		1.22	mg/kg	1.22	mg/kg	M	2.3E-09	mg/kg-day	NA	--	--
		3.49	mg/kg	3.49	mg/kg	M	2.0E-07	mg/kg-day	3.7E+00	(mg/kg-day) -1	7.2E-07
		2,260	mg/kg	2,260	mg/kg	M	4.2E-06	mg/kg-day	NA	--	--
		0.31	mg/kg	0.31	mg/kg	M	5.7E-10	mg/kg-day	NA	--	--
											2.2E-04
Total Risk Across All Exposure Routes/Pathways											5.1E-04

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.1B RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	Route EPC	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	mg/kg	M	2.7E-05	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	mg/kg	M	2.2E-06	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	1.6E-06
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	mg/kg	M	1.2E-06	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	8.5E-06
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	mg/kg	M	1.3E-06	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	9.6E-07
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	mg/kg	M	8.4E-07	mg/kg-day	7.3E-02	(mg/kg-day) ⁻¹	6.1E-08
	Carbazole	0.95	mg/kg	0.95	mg/kg	mg/kg	M	4.5E-07	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	8.9E-09
	Chrysene	6.7	mg/kg	6.7	mg/kg	mg/kg	M	3.1E-06	mg/kg-day	7.3E-03	(mg/kg-day) ⁻¹	2.3E-08
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	mg/kg	M	8.1E-07	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	2.4E-06
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	mg/kg	M	3.3E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	5.9E-07
	Dieldrin	0.052	mg/kg	0.052	mg/kg	mg/kg	M	2.4E-08	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	3.9E-07
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	mg/kg	M	4.5E-05	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	9.0E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	mg/kg	M	2.5E-06	mg/kg-day	1.3E+00	(mg/kg-day) ⁻¹	3.7E-06
	Iron	2,347	mg/kg	2,347	mg/kg	mg/kg	M	1.1E-03	mg/kg-day	NA	--	--
	(Total)											1.1E-04
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	mg/kg	M	1.1E-06	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	mg/kg	M	1.2E-06	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	2.7E-06
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	mg/kg	M	6.0E-07	mg/kg-day	1.3E+01	(mg/kg-day) ⁻¹	8.8E-06
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	mg/kg	M	6.8E-07	mg/kg-day	1.3E+00	(mg/kg-day) ⁻¹	1.0E-06
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	mg/kg	M	4.3E-07	mg/kg-day	1.5E-01	(mg/kg-day) ⁻¹	6.3E-08
	Carbazole	0.95	mg/kg	0.95	mg/kg	mg/kg	M	2.3E-07	mg/kg-day	4.0E-02	(mg/kg-day) ⁻¹	9.3E-09
	Chrysene	6.7	mg/kg	6.7	mg/kg	mg/kg	M	1.6E-06	mg/kg-day	2.4E-02	(mg/kg-day) ⁻¹	3.8E-08
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	mg/kg	M	1.7E-07	mg/kg-day	2.4E+01	(mg/kg-day) ⁻¹	4.0E-06
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	mg/kg	M	4.2E-07	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	9.9E-07
	Dieldrin	0.052	mg/kg	0.052	mg/kg	mg/kg	M	9.7E-10	mg/kg-day	3.2E+01	(mg/kg-day) ⁻¹	3.1E-08
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	mg/kg	M	2.5E-05	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	5.6E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	mg/kg	M	3.0E-07	mg/kg-day	3.7E+00	(mg/kg-day) ⁻¹	1.1E-06
	Iron	2,347	mg/kg	2,347	mg/kg	mg/kg	M	4.4E-06	mg/kg-day	NA	--	--
	(Total)											7.4E-05
Total Risk Across All Exposure Routes/Pathways												1.8E-04

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.1aA RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future Medium: Surface Soil Exposure Medium: Air Exposure Point: Fugitive dust Receptor Population: Residents Receptor Age: Adult											
Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	1.4E-10	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	4.9E-09	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	1.5E-09
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	2.2E-09	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	6.7E-09
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	2.9E-09	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	9.0E-10
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	1.3E-09	mg/kg-day	3.1E-02	(mg/kg-day) ⁻¹	4.1E-11
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	2.2E-10	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	4.5E-12
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	6.8E-09	mg/kg-day	3.1E-03	(mg/kg-day) ⁻¹	2.1E-11
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	1.0E-10	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	3.1E-10
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	1.7E-08	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	6.2E-10	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	1.9E-10
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	3.7E-11	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	1.8E-08	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	2.1E-10	mg/kg-day	2.4E-01	(mg/kg-day) ⁻¹	5.1E-11
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	3.4E-09	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	1.2E-09
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	4.1E-09	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	1.4E-09
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	2.3E-11	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	3.7E-10
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	1.6E-09	mg/kg-day	4.6E+00	(mg/kg-day) ⁻¹	7.1E-09
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	3.2E-10	mg/kg-day	9.1E+00	(mg/kg-day) ⁻¹	2.9E-09
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	1.1E-10	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	2.1E-10
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	6.9E-11	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.4E-10
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	3.9E-09	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	7.7E-09
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	1.5E-11	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	3.3E-08	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	8.7E-11	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	2.5E-10	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	3.7E-09
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	1.6E-07	mg/kg-day	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	2.2E-11	mg/kg-day	NA	--	--
(Total)											3.5E-08
Total Risk Across All Exposure Routes/Pathways											3.5E-08

NOTES:

- EPC - Exposure Point Concentration
 NA - Toxicity criterion not available.
 -- - Not applicable.
 (1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.1aB RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	4.1E-09	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	3.4E-10	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	1.0E-10
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	1.8E-10	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	5.4E-10
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	2.0E-10	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	6.2E-11
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	1.3E-10	mg/kg-day	3.1E-02	(mg/kg-day) ⁻¹	3.9E-12
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	6.7E-11	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	1.3E-12
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	4.7E-10	mg/kg-day	3.1E-03	(mg/kg-day) ⁻¹	1.5E-12
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	4.9E-11	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	1.5E-10
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	1.2E-10	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	3.8E-11
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	3.7E-12	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	5.9E-11
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	6.8E-09	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.4E-08
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	3.7E-10	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	5.6E-09
	Iron	2.347	mg/kg	1.78E-06	mg/m ³	R	1.7E-07	mg/kg-day	NA	--	--
(Total)											2.0E-08
Total Risk Across All Exposure Routes/Pathways											2.0E-08

NOTES:

- EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.2 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Tap
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzene	0.0034	mg/L	0.0034	mg/L	M	3.2E-05	mg/kg-day	5.5E-02	(mg/kg-day) -1	1.8E-06
	Chloroform	0.016	mg/L	0.016	mg/L	M	1.5E-04	mg/kg-day	6.1E-03	(mg/kg-day) -1	9.2E-07
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	9.9E-06	mg/kg-day	NA	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	2.1E-05	mg/kg-day	NA	--	--
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	1.6E-07	mg/kg-day	9.1E+00	(mg/kg-day) -1	1.4E-06
	MCPA	0.044	mg/L	0.044	mg/L	M	4.1E-04	mg/kg-day	NA	--	--
	Antimony	0.011	mg/L	0.011	mg/L	M	1.0E-04	mg/kg-day	NA	--	--
	Arsenic	0.03	mg/L	0.03	mg/L	M	2.8E-04	mg/kg-day	1.5E+00	(mg/kg-day) -1	4.2E-04
	Iron	67.7	mg/L	67.7	mg/L	M	6.4E-01	mg/kg-day	NA	--	--
	Manganese	0.45	mg/L	0.45	mg/L	M	4.2E-03	mg/kg-day	NA	--	--
Dermal	Thallium	0.0057	mg/L	0.0057	mg/L	M	5.4E-05	mg/kg-day	NA	--	--
	(total)										4.3E-04
	Benzene	0.0034	mg/L	0.0034	mg/L	M	1.5E-06	mg/kg-day	5.9E-02	(mg/kg-day) -1	8.9E-08
	Chloroform	0.016	mg/L	0.016	mg/L	M	3.0E-06	mg/kg-day	3.1E-02	(mg/kg-day) -1	9.2E-08
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	3.2E-06	mg/kg-day	NA	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	3.2E-06	mg/kg-day	NA	--	--
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	1.9E-08	mg/kg-day	1.3E+01	(mg/kg-day) -1	2.5E-07
	MCPA	0.044	mg/L	0.044	mg/L	M	4.6E-06	mg/kg-day	NA	--	--
	Antimony	0.011	mg/L	0.011	mg/L	M	2.3E-07	mg/kg-day	NA	--	--
	Arsenic	0.03	mg/L	0.03	mg/L	M	6.3E-07	mg/kg-day	3.7E+00	(mg/kg-day) -1	2.3E-06
(Total)	Iron	67.7	mg/L	67.7	mg/L	M	1.4E-03	mg/kg-day	NA	--	--
	Manganese	0.45	mg/L	0.45	mg/L	M	9.5E-06	mg/kg-day	NA	--	--
	Thallium	0.0057	mg/L	0.0057	mg/L	M	1.2E-07	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											4.3E-04

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.2a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Tap
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Benzene	0.0034	mg/L	4.81E-03	mg/m ³	R	4.7E-06	mg/kg-day	2.7E-02	(mg/kg-day) ⁻¹	1.3E-07
	Chloroform	0.016	mg/L	1.80E-02	mg/m ³	R	1.8E-05	mg/kg-day	8.1E-02	(mg/kg-day) ⁻¹	1.4E-06
Total Risk Across All Exposure Routes/Pathways											1.5E-06

NOTES:

- EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.3 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	9.4E-08	mg/kg-day	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	4.5E-08	mg/kg-day	NA	--	--
	Xylenes, total (total)	0.0035	mg/L	0.0035	mg/L	M	5.9E-08	mg/kg-day	NA	--	--
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	3.0E-08	mg/kg-day	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	1.2E-06	mg/kg-day	NA	--	--
	Xylenes, total (Total)	0.0035	mg/L	0.0035	mg/L	M	3.2E-06	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.4 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	6.4E-07	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	1.8E-07	2.0E+00	(mg/kg-day) ⁻¹	3.6E-07
	Aroclor-1260	40	mg/kg	40	mg/kg	M	2.6E-06	2.0E+00	(mg/kg-day) ⁻¹	5.2E-06
	Diesel Range Organics (total)	11,600	mg/kg	11,600	mg/kg	M	7.5E-04	NA	--	--
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	2.6E-08	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	1.0E-07	2.2E+00	(mg/kg-day) ⁻¹	2.3E-07
	Aroclor-1260	40	mg/kg	40	mg/kg	M	1.4E-06	2.2E+00	(mg/kg-day) ⁻¹	3.2E-06
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	3.0E-05	NA	--	--
Total Risk Across All Exposure Routes/Pathways										8.9E-06

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.

-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.1A CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	1.2E-07	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	4.1E-06	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	3.0E-06
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.8E-06	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	1.3E-05
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	2.4E-06	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	1.8E-06
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	1.1E-06	mg/kg-day	7.3E-02	(mg/kg-day) ⁻¹	8.0E-08
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.9E-07	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	3.7E-09
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	5.7E-06	mg/kg-day	7.3E-03	(mg/kg-day) ⁻¹	4.1E-08
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	8.3E-08	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	6.1E-07
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.4E-05	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	5.2E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	3.8E-07
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	3.1E-08	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	1.5E-05	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.8E-07	mg/kg-day	2.4E-01	(mg/kg-day) ⁻¹	4.2E-08
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	2.8E-06	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	9.9E-07
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	3.8E-06	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	1.2E-06
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.9E-08	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	3.0E-07
	Heptachlor	22	mg/kg	22	mg/kg	M	1.3E-06	mg/kg-day	4.5E+00	(mg/kg-day) ⁻¹	5.8E-06
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	2.6E-07	mg/kg-day	9.1E+00	(mg/kg-day) ⁻¹	2.4E-06
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	8.9E-08	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.8E-07
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	5.7E-08	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.1E-07
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	3.2E-06	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	6.4E-06
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	1.2E-08	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	2.8E-05	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	7.2E-08	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	3.1E-07
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	2.1E-07	mg/kg-day	NA	--	--
	Iron	2,260	mg/kg	2,260	mg/kg	M	1.3E-04	mg/kg-day	NA	--	--
	Thallium	0.31	mg/kg	0.31	mg/kg	M	1.8E-08	mg/kg-day	NA	--	--
	(total)										3.7E-05

TABLE 8.4.1A CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future												
Medium: Surface Soil												
Exposure Medium: Surface Soil												
Exposure Point: Surface Soil												
Receptor Population: Residents												
Receptor Age: Adult												
Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk		
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	8.1E-09	NA	--	--		
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	3.7E-06	2.4E+00	(mg/kg-day) ⁻¹	8.7E-06		
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.6E-06	1.5E+01	(mg/kg-day) ⁻¹	2.4E-05		
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	2.2E-06	1.5E+00	(mg/kg-day) ⁻¹	3.2E-06		
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	1.0E-06	1.5E-01	(mg/kg-day) ⁻¹	1.5E-07		
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.7E-07	4.0E-02	(mg/kg-day) ⁻¹	6.8E-09		
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	5.1E-06	2.4E-02	(mg/kg-day) ⁻¹	1.2E-07		
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	7.6E-08	2.4E+01	(mg/kg-day) ⁻¹	1.8E-06		
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.0E-06	NA	--	--		
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	4.7E-07	2.4E+00	(mg/kg-day) ⁻¹	1.1E-06		
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	2.2E-09	NA	--	--		
	Pyrene	250	mg/kg	250	mg/kg	M	1.0E-06	NA	--	--		
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.2E-08	3.4E-01	(mg/kg-day) ⁻¹	4.2E-09		
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	7.9E-07	4.4E-01	(mg/kg-day) ⁻¹	3.5E-07		
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	9.6E-07	4.4E-01	(mg/kg-day) ⁻¹	4.2E-07		
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.3E-09	3.2E+01	(mg/kg-day) ⁻¹	4.2E-08		
	Heptachlor	22	mg/kg	22	mg/kg	M	9.1E-08	6.3E+00	(mg/kg-day) ⁻¹	5.7E-07		
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	1.9E-08	1.3E+01	(mg/kg-day) ⁻¹	2.3E-07		
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	8.7E-08	2.2E+00	(mg/kg-day) ⁻¹	2.0E-07		
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	5.6E-08	2.2E+00	(mg/kg-day) ⁻¹	1.3E-07		
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	3.1E-06	2.2E+00	(mg/kg-day) ⁻¹	7.0E-06		
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	8.5E-10	NA	--	--		
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	1.9E-06	NA	--	--		
	Antimony	1.22	mg/kg	1.22	mg/kg	M	5.0E-10	NA	--	--		
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	4.3E-08	3.7E+00	(mg/kg-day) ⁻¹	1.6E-07		
	Iron	2,260	mg/kg	2,260	mg/kg	M	9.3E-07	NA	--	--		
	Thallium	0.31	mg/kg	0.31	mg/kg	M	1.3E-10	NA	--	--		
	(Total)											4.8E-05
Total Risk Across All Exposure Routes/Pathways											8.5E-05	

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.1B CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	mg/kg	M	3.4E-06	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	mg/kg	M	2.8E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	2.0E-07
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	mg/kg	M	1.5E-07	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	1.1E-06
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	mg/kg	M	1.7E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	1.2E-07
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	mg/kg	M	1.0E-07	mg/kg-day	7.3E-02	(mg/kg-day) ⁻¹	7.7E-09
	Carbazole	0.95	mg/kg	0.95	mg/kg	mg/kg	M	5.6E-08	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	1.1E-09
	Chrysene	6.7	mg/kg	6.7	mg/kg	mg/kg	M	3.9E-07	mg/kg-day	7.3E-03	(mg/kg-day) ⁻¹	2.9E-09
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	mg/kg	M	4.1E-08	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	3.0E-07
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	mg/kg	M	1.0E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	7.4E-08
	Dieldrin	0.052	mg/kg	0.052	mg/kg	mg/kg	M	3.1E-09	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	4.9E-08
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	mg/kg	M	5.6E-06	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.1E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	mg/kg	M	3.1E-07	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	4.6E-07
	Iron	2,347	mg/kg	2,347	mg/kg	mg/kg	M	1.4E-04	mg/kg-day	NA	--	--
(total)												
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	mg/kg	M	2.4E-07	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	mg/kg	M	2.6E-07	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	6.0E-07
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	mg/kg	M	1.3E-07	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	1.9E-06
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	mg/kg	M	1.5E-07	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	2.2E-07
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	mg/kg	M	9.5E-08	mg/kg-day	1.5E-01	(mg/kg-day) ⁻¹	1.4E-08
	Carbazole	0.95	mg/kg	0.95	mg/kg	mg/kg	M	5.1E-08	mg/kg-day	4.0E-02	(mg/kg-day) ⁻¹	2.0E-09
	Chrysene	6.7	mg/kg	6.7	mg/kg	mg/kg	M	3.6E-07	mg/kg-day	2.4E-02	(mg/kg-day) ⁻¹	8.5E-09
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	mg/kg	M	3.7E-08	mg/kg-day	2.4E+01	(mg/kg-day) ⁻¹	8.8E-07
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	mg/kg	M	9.2E-08	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	2.2E-07
	Dieldrin	0.052	mg/kg	0.052	mg/kg	mg/kg	M	2.1E-10	mg/kg-day	3.2E+01	(mg/kg-day) ⁻¹	6.9E-09
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	mg/kg	M	5.5E-06	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	1.2E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	mg/kg	M	6.5E-08	mg/kg-day	3.7E+00	(mg/kg-day) ⁻¹	2.4E-07
	Iron	2,347	mg/kg	2,347	mg/kg	mg/kg	M	9.7E-07	mg/kg-day	NA	--	--
(Total)												
Total Risk Across All Exposure Routes/Pathways												
1.6E-05												
3.0E-05												

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.1aa CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	3.4E-11	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	1.2E-09	3.1E-01	(mg/kg-day) ⁻¹	3.7E-10
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	5.2E-10	3.1E+00	(mg/kg-day) ⁻¹	1.6E-09
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	7.0E-10	3.1E-01	(mg/kg-day) ⁻¹	2.2E-10
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	3.2E-10	3.1E-02	(mg/kg-day) ⁻¹	9.9E-12
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	5.4E-11	2.0E-02	(mg/kg-day) ⁻¹	1.1E-12
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	1.6E-09	3.1E-03	(mg/kg-day) ⁻¹	5.1E-12
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	2.4E-11	3.1E+00	(mg/kg-day) ⁻¹	7.5E-11
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	4.2E-09	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	1.5E-10	3.1E-01	(mg/kg-day) ⁻¹	4.7E-11
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	9.0E-12	NA	--	--
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	4.3E-09	NA	--	--
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	5.1E-11	2.4E-01	(mg/kg-day) ⁻¹	1.2E-11
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	8.2E-10	3.5E-01	(mg/kg-day) ⁻¹	2.9E-10
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	9.9E-10	3.5E-01	(mg/kg-day) ⁻¹	3.5E-10
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	5.5E-12	1.6E+01	(mg/kg-day) ⁻¹	8.8E-11
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	3.8E-10	4.6E+00	(mg/kg-day) ⁻¹	1.7E-09
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	7.7E-11	9.1E+00	(mg/kg-day) ⁻¹	7.0E-10
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	2.6E-11	2.0E+00	(mg/kg-day) ⁻¹	5.2E-11
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	1.7E-11	2.0E+00	(mg/kg-day) ⁻¹	3.3E-11
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	9.3E-10	2.0E+00	(mg/kg-day) ⁻¹	1.9E-09
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	3.5E-12	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	8.0E-09	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	2.1E-11	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	6.0E-11	1.5E+01	(mg/kg-day) ⁻¹	9.0E-10
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	3.9E-08	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	5.3E-12	NA	--	--
(Total)							Total Risk Across All Exposure Routes/Pathways			8.3E-09

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

TABLE 8.4.1aB CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	9.9E-10	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	8.2E-11	3.1E-01	(mg/kg-day) ⁻¹	2.5E-11
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	4.2E-11	3.1E+00	(mg/kg-day) ⁻¹	1.3E-10
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	4.8E-11	3.1E-01	(mg/kg-day) ⁻¹	1.5E-11
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	3.0E-11	3.1E-02	(mg/kg-day) ⁻¹	9.5E-13
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	1.6E-11	2.0E-02	(mg/kg-day) ⁻¹	3.3E-13
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	1.1E-10	3.1E-03	(mg/kg-day) ⁻¹	3.6E-13
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	1.2E-11	3.1E+00	(mg/kg-day) ⁻¹	3.7E-11
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	2.9E-11	3.1E-01	(mg/kg-day) ⁻¹	9.1E-12
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	8.9E-13	1.6E+01	(mg/kg-day) ⁻¹	1.4E-11
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	1.6E-09	2.0E+00	(mg/kg-day) ⁻¹	3.3E-09
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	9.0E-11	1.5E+01	(mg/kg-day) ⁻¹	1.4E-09
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	4.0E-08	NA	--	--
(Total)										4.9E-09
Total Risk Across All Exposure Routes/Pathways										

NOTES:

- EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.2 CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Tap
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	Route EPC Calculation (1)	Intake (Cancer) Units	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzene	0.0034	mg/L	0.0034	mg/L	M	5.6E-06	mg/kg-day	5.5E-02	(mg/kg-day) ⁻¹	3.1E-07
	Chloroform	0.016	mg/L	0.016	mg/L	M	2.6E-05	mg/kg-day	6.1E-03	(mg/kg-day) ⁻¹	1.6E-07
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	1.7E-06	mg/kg-day	NA	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	3.6E-06	mg/kg-day	NA	--	--
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	2.8E-08	mg/kg-day	9.1E+00	(mg/kg-day) ⁻¹	2.3E-07
	MCPA	0.044	mg/L	0.044	mg/L	M	7.3E-05	mg/kg-day	NA	--	--
	Antimony	0.011	mg/L	0.011	mg/L	M	1.8E-05	mg/kg-day	NA	--	--
	Arsenic	0.03	mg/L	0.03	mg/L	M	4.9E-05	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	7.4E-05
	Iron	67.7	mg/L	67.7	mg/L	M	1.1E-01	mg/kg-day	NA	--	--
	Manganese	0.45	mg/L	0.45	mg/L	M	7.4E-04	mg/kg-day	NA	--	--
Dermal	Thallium (total)	0.0057	mg/L	0.0057	mg/L	M	9.4E-06	mg/kg-day	NA	--	7.5E-05
	Benzene	0.0034	mg/L	0.0034	mg/L	M	4.2E-07	mg/kg-day	5.9E-02	(mg/kg-day) ⁻¹	2.5E-08
	Chloroform	0.016	mg/L	0.016	mg/L	M	8.4E-07	mg/kg-day	3.1E-02	(mg/kg-day) ⁻¹	2.6E-08
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	8.8E-07	mg/kg-day	NA	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	8.9E-07	mg/kg-day	NA	--	--
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	5.4E-09	mg/kg-day	1.3E+01	(mg/kg-day) ⁻¹	6.8E-08
	MCPA	0.044	mg/L	0.044	mg/L	M	1.3E-06	mg/kg-day	NA	--	--
	Antimony	0.011	mg/L	0.011	mg/L	M	6.5E-08	mg/kg-day	NA	--	--
	Arsenic	0.03	mg/L	0.03	mg/L	M	1.8E-07	mg/kg-day	3.7E+00	(mg/kg-day) ⁻¹	6.5E-07
	Iron	67.7	mg/L	67.7	mg/L	M	4.0E-04	mg/kg-day	NA	--	--
(Total)	Manganese	0.45	mg/L	0.45	mg/L	M	2.6E-06	mg/kg-day	NA	--	--
	Thallium	0.0057	mg/L	0.0057	mg/L	M	3.4E-08	mg/kg-day	NA	--	7.6E-07
Total Risk Across All Exposure Routes/Pathways											7.6E-05

Total Risk Across All Exposure Routes/Pathways

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.2a CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Tap
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Benzene	0.0034	mg/L	4.81E-03	mg/m ³	R	1.2E-06	mg/kg-day	2.7E-02	(mg/kg-day) ⁻¹	3.2E-08
	Chloroform	0.016	mg/L	1.80E-02	mg/m ³	R	4.4E-06	mg/kg-day	8.1E-02	(mg/kg-day) ⁻¹	3.5E-07
Total Risk Across All Exposure Routes/Pathways											3.9E-07

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.3 CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	3.5E-08	mg/kg-day	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	1.7E-08	mg/kg-day	NA	--	--
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	2.2E-08	mg/kg-day	NA	--	--
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	1.0E-08	mg/kg-day	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	3.8E-07	mg/kg-day	NA	--	--
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	1.0E-06	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											
--											

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.4.4 CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Residents
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	1.2E-07	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	3.4E-08	2.0E+00	(mg/kg-day) ⁻¹	6.8E-08
	Aroclor-1260	40	mg/kg	40	mg/kg	M	4.8E-07	2.0E+00	(mg/kg-day) ⁻¹	9.7E-07
	Diesel Range Organics (total)	11,600	mg/kg	11,600	mg/kg	M	1.4E-04	NA	--	1.0E-06
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	8.5E-09	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	3.3E-08	2.2E+00	(mg/kg-day) ⁻¹	7.4E-08
	Aroclor-1260	40	mg/kg	40	mg/kg	M	4.7E-07	2.2E+00	(mg/kg-day) ⁻¹	1.1E-06
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	9.8E-06	NA	--	1.1E-06
Total Risk Across All Exposure Routes/Pathways										2.2E-06

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.5.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future											
Medium: Surface Soil											
Exposure Medium: Surface Soil											
Exposure Point: Surface Soil											
Receptor Population: Residents											
Receptor Age: Young Child											
Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	2.1E-06	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	7.6E-05	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	5.5E-05
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	3.3E-05	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	2.4E-04
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	4.5E-05	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	3.3E-05
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	2.0E-05	mg/kg-day	7.3E-02	(mg/kg-day) ⁻¹	1.5E-06
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	3.5E-06	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	6.9E-08
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	1.1E-04	mg/kg-day	7.3E-03	(mg/kg-day) ⁻¹	7.7E-07
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	1.5E-06	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	1.1E-05
	Fluoranthene	243	mg/kg	243	mg/kg	M	2.7E-04	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	9.6E-06	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	7.0E-06
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	5.8E-07	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	2.7E-04	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	3.3E-06	mg/kg-day	2.4E-01	(mg/kg-day) ⁻¹	7.9E-07
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	5.3E-05	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	1.8E-05
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	6.4E-05	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	2.2E-05
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	3.5E-07	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	5.6E-06
	Heptachlor	22	mg/kg	22	mg/kg	M	2.4E-05	mg/kg-day	4.5E+00	(mg/kg-day) ⁻¹	1.1E-04
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	4.9E-06	mg/kg-day	9.1E+00	(mg/kg-day) ⁻¹	4.5E-05
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	1.7E-06	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	3.3E-06
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	1.1E-06	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	2.1E-06
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	6.0E-05	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.2E-04
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	2.3E-07	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	5.2E-04	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	1.3E-06	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	3.8E-06	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	5.7E-06
	Iron	2,260	mg/kg	2,260	mg/kg	M	2.5E-03	mg/kg-day	NA	--	--
	Thallium (total)	0.31	mg/kg	0.31	mg/kg	M	3.4E-07	mg/kg-day	NA	--	6.8E-04

TABLE 8.5.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	6.0E-08	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	2.8E-05	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	6.5E-05
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.2E-05	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	1.8E-04
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.6E-05	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	2.4E-05
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	7.4E-06	mg/kg-day	1.5E-01	(mg/kg-day) ⁻¹	1.1E-06
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.3E-06	mg/kg-day	4.0E-02	(mg/kg-day) ⁻¹	5.0E-08
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	3.8E-05	mg/kg-day	2.4E-02	(mg/kg-day) ⁻¹	9.0E-07
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	5.6E-07	mg/kg-day	2.4E+01	(mg/kg-day) ⁻¹	1.3E-05
	Fluoranthene	243	mg/kg	243	mg/kg	M	7.5E-06	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	3.5E-06	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	8.3E-06
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	1.6E-08	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	7.7E-06	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	9.2E-08	mg/kg-day	3.4E-01	(mg/kg-day) ⁻¹	3.2E-08
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	5.9E-06	mg/kg-day	4.4E-01	(mg/kg-day) ⁻¹	2.6E-06
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	7.1E-06	mg/kg-day	4.4E-01	(mg/kg-day) ⁻¹	3.1E-07
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	9.8E-09	mg/kg-day	3.2E+01	(mg/kg-day) ⁻¹	3.1E-07
	Heptachlor	22	mg/kg	22	mg/kg	M	6.8E-07	mg/kg-day	6.3E+00	(mg/kg-day) ⁻¹	4.2E-06
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	1.4E-07	mg/kg-day	1.3E+01	(mg/kg-day) ⁻¹	1.7E-06
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	6.5E-07	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	1.5E-06
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	4.2E-07	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	9.3E-07
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	2.3E-05	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	5.2E-05
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	6.4E-09	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	1.4E-05	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	3.7E-09	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	3.2E-07	mg/kg-day	3.7E+00	(mg/kg-day) ⁻¹	1.2E-06
	Iron	2,260	mg/kg	2,260	mg/kg	M	6.9E-06	mg/kg-day	NA	--	--
	Thallium	0.31	mg/kg	0.31	mg/kg	M	9.4E-10	mg/kg-day	NA	--	--
(Total)											3.6E-04
Total Risk Across All Exposure Routes/Pathways											1.0E-03

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.5.1B RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	6.3E-05	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	5.2E-06	7.3E-01	(mg/kg-day) ⁻¹	3.8E-06
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	2.7E-06	7.3E+00	(mg/kg-day) ⁻¹	2.0E-05
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	3.1E-06	7.3E-01	(mg/kg-day) ⁻¹	2.2E-06
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	2.0E-06	7.3E-02	(mg/kg-day) ⁻¹	1.4E-07
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	1.0E-06	2.0E-02	(mg/kg-day) ⁻¹	2.1E-08
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	7.3E-06	7.3E-03	(mg/kg-day) ⁻¹	5.4E-08
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	7.6E-07	7.3E+00	(mg/kg-day) ⁻¹	5.6E-06
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	1.9E-06	7.3E-01	(mg/kg-day) ⁻¹	1.4E-06
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	5.7E-08	1.6E+01	(mg/kg-day) ⁻¹	9.1E-07
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	1.0E-04	2.0E+00	(mg/kg-day) ⁻¹	2.1E-04
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	5.8E-06	1.5E+00	(mg/kg-day) ⁻¹	8.6E-06
	Iron	2,347	mg/kg	2,347	mg/kg	M	2.6E-03	NA	--	--
	(total)									2.5E-04
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	1.8E-06	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	1.9E-06	2.4E+00	(mg/kg-day) ⁻¹	4.5E-06
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	9.9E-07	1.5E+01	(mg/kg-day) ⁻¹	1.4E-05
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.1E-06	1.5E+00	(mg/kg-day) ⁻¹	1.6E-06
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	7.1E-07	1.5E-01	(mg/kg-day) ⁻¹	1.0E-07
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	3.8E-07	4.0E-02	(mg/kg-day) ⁻¹	1.5E-08
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	2.7E-06	2.4E-02	(mg/kg-day) ⁻¹	6.3E-08
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	2.8E-07	2.4E+01	(mg/kg-day) ⁻¹	6.5E-06
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	6.9E-07	2.4E+00	(mg/kg-day) ⁻¹	1.6E-06
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	1.6E-09	3.2E+01	(mg/kg-day) ⁻¹	5.1E-08
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	4.1E-05	2.2E+00	(mg/kg-day) ⁻¹	9.1E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	4.8E-07	3.7E+00	(mg/kg-day) ⁻¹	1.8E-06
	Iron	2,347	mg/kg	2,347	mg/kg	M	7.2E-06	NA	--	--
	(Total)									1.2E-04
Total Risk Across All Exposure Routes/Pathways										3.7E-04

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.5.1aA RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future Medium: Surface Soil Exposure Medium: Air Exposure Point: Fugative dust Receptor Population: Residents Receptor Age: Young Child											
Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk	
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	1.2E-10	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	4.3E-09	mg/kg-day	3.1E-01	(mg/kg-day) -1	1.3E-09
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	1.9E-09	mg/kg-day	3.1E+00	(mg/kg-day) -1	5.9E-09
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	2.5E-09	mg/kg-day	3.1E-01	(mg/kg-day) -1	7.9E-10
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	1.2E-09	mg/kg-day	3.1E-02	(mg/kg-day) -1	3.6E-11
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	2.0E-10	mg/kg-day	2.0E-02	(mg/kg-day) -1	3.9E-12
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	6.0E-09	mg/kg-day	3.1E-03	(mg/kg-day) -1	1.9E-11
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	8.8E-11	mg/kg-day	3.1E+00	(mg/kg-day) -1	2.7E-10
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	1.5E-08	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	5.5E-10	mg/kg-day	3.1E-01	(mg/kg-day) -1	1.7E-10
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	3.3E-11	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	1.6E-08	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	1.9E-10	mg/kg-day	2.4E-01	(mg/kg-day) -1	4.5E-11
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	3.0E-09	mg/kg-day	3.5E-01	(mg/kg-day) -1	1.0E-09
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	3.6E-09	mg/kg-day	3.5E-01	(mg/kg-day) -1	1.3E-09
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	2.0E-11	mg/kg-day	1.6E+01	(mg/kg-day) -1	3.2E-10
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	1.4E-09	mg/kg-day	4.6E+00	(mg/kg-day) -1	6.2E-09
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	2.8E-10	mg/kg-day	9.1E+00	(mg/kg-day) -1	2.5E-09
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	9.4E-11	mg/kg-day	2.0E+00	(mg/kg-day) -1	1.9E-10
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	6.1E-11	mg/kg-day	2.0E+00	(mg/kg-day) -1	1.2E-10
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	3.4E-09	mg/kg-day	2.0E+00	(mg/kg-day) -1	6.8E-09
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	1.3E-11	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	2.9E-08	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	7.6E-11	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	2.2E-10	mg/kg-day	1.5E+01	(mg/kg-day) -1	3.3E-09
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	1.4E-07	mg/kg-day	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	1.9E-11	mg/kg-day	NA	--	--
(Total)											3.0E-08
Total Risk Across All Exposure Routes/Pathways											3.0E-08

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.5.1aB RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	3.6E-09	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	3.0E-10	3.1E-01	(mg/kg-day) ⁻¹	9.2E-11
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	1.5E-10	3.1E+00	(mg/kg-day) ⁻¹	4.8E-10
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	1.7E-10	3.1E-01	(mg/kg-day) ⁻¹	5.4E-11
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	1.1E-10	3.1E-02	(mg/kg-day) ⁻¹	3.4E-12
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	5.9E-11	2.0E-02	(mg/kg-day) ⁻¹	1.2E-12
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	4.2E-10	3.1E-03	(mg/kg-day) ⁻¹	1.3E-12
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	4.3E-11	3.1E+00	(mg/kg-day) ⁻¹	1.3E-10
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	1.1E-10	3.1E-01	(mg/kg-day) ⁻¹	3.3E-11
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	3.2E-12	1.6E+01	(mg/kg-day) ⁻¹	5.2E-11
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	6.0E-09	2.0E+00	(mg/kg-day) ⁻¹	1.2E-08
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	3.3E-10	1.5E+01	(mg/kg-day) ⁻¹	4.9E-09
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	1.5E-07	NA	--	--
(Total)										
							Total Risk Across All Exposure Routes/Pathways			
							1.8E-08			

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.
mg/kg - milligram per kilogram
mg/m³ - milligram per cubic meter
mg/kg-day - milligram per kilogram per day

TABLE 8.5.2 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Tap
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzene	0.0034	mg/L	0.0034	mg/L	M	1.9E-05	mg/kg-day	5.5E-02	(mg/kg-day) -1	1.0E-06
	Chloroform	0.016	mg/L	0.016	mg/L	M	8.8E-05	mg/kg-day	6.1E-03	(mg/kg-day) -1	5.3E-07
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	5.8E-06	mg/kg-day	NA	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	1.2E-05	mg/kg-day	NA	--	--
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	9.2E-08	mg/kg-day	9.1E+00	(mg/kg-day) -1	8.3E-07
	MCPA	0.044	mg/L	0.044	mg/L	M	2.4E-04	mg/kg-day	NA	--	--
	Antimony	0.011	mg/L	0.011	mg/L	M	6.0E-05	mg/kg-day	NA	--	--
	Arsenic	0.03	mg/L	0.03	mg/L	M	1.6E-04	mg/kg-day	1.5E+00	(mg/kg-day) -1	2.5E-04
	Iron	67.7	mg/L	67.7	mg/L	M	3.7E-01	mg/kg-day	NA	--	--
	Manganese	0.45	mg/L	0.45	mg/L	M	2.5E-03	mg/kg-day	NA	--	--
Dermal	Thallium	0.0057	mg/L	0.0057	mg/L	M	3.1E-05	mg/kg-day	NA	--	--
	(total)										2.5E-04
	Benzene	0.0034	mg/L	0.0034	mg/L	M	6.5E-07	mg/kg-day	5.9E-02	(mg/kg-day) -1	3.8E-08
	Chloroform	0.016	mg/L	0.016	mg/L	M	1.3E-06	mg/kg-day	3.1E-02	(mg/kg-day) -1	3.9E-08
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	1.4E-06	mg/kg-day	NA	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	1.4E-06	mg/kg-day	NA	--	--
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	8.3E-09	mg/kg-day	1.3E+01	(mg/kg-day) -1	1.0E-07
	MCPA	0.044	mg/L	0.044	mg/L	M	1.9E-06	mg/kg-day	NA	--	--
	Antimony	0.011	mg/L	0.011	mg/L	M	9.9E-08	mg/kg-day	NA	--	--
	Arsenic	0.03	mg/L	0.03	mg/L	M	2.7E-07	mg/kg-day	3.7E+00	(mg/kg-day) -1	9.9E-07
(Total)	Iron	67.7	mg/L	67.7	mg/L	M	6.1E-04	mg/kg-day	NA	--	--
	Manganese	0.45	mg/L	0.45	mg/L	M	4.1E-06	mg/kg-day	NA	--	--
	Thallium	0.0057	mg/L	0.0057	mg/L	M	5.2E-08	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											1.2E-06
2.5E-04											

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.5.3 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	5.5E-07	mg/kg-day	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	2.6E-07	mg/kg-day	NA	--	--
	Xylenes, total (total)	0.0035	mg/L	0.0035	mg/L	M	3.4E-07	mg/kg-day	NA	--	--
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	1.7E-08	mg/kg-day	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	6.6E-07	mg/kg-day	NA	--	--
	Xylenes, total (Total)	0.0035	mg/L	0.0035	mg/L	M	1.8E-06	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											--

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.5.4 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	1.5E-06	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	4.2E-07	2.0E+00	(mg/kg-day) ⁻¹	8.4E-07
	Aroclor-1260	40	mg/kg	40	mg/kg	M	6.0E-06	2.0E+00	(mg/kg-day) ⁻¹	1.2E-05
	Diesel Range Organics (total)	11,600	mg/kg	11,600	mg/kg	M	1.7E-03	NA	--	1.3E-05
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	4.2E-08	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	1.6E-07	2.2E+00	(mg/kg-day) ⁻¹	3.7E-07
	Aroclor-1260	40	mg/kg	40	mg/kg	M	2.4E-06	2.2E+00	(mg/kg-day) ⁻¹	5.2E-06
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	4.9E-05	NA	--	5.6E-06
Total Risk Across All Exposure Routes/Pathways										1.8E-05

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.5.1A CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	7.2E-07	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	2.5E-05	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	1.8E-05
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	1.1E-05	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	8.1E-05
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.5E-05	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	1.1E-05
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	6.8E-06	mg/kg-day	7.3E-02	(mg/kg-day) ⁻¹	5.0E-07
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	1.2E-06	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	2.3E-08
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	3.5E-05	mg/kg-day	7.3E-03	(mg/kg-day) ⁻¹	2.6E-07
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	5.2E-07	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	3.8E-06
	Fluoranthene	243	mg/kg	243	mg/kg	M	8.9E-05	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	3.2E-06	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	2.4E-06
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	1.9E-07	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	9.2E-05	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	1.1E-06	mg/kg-day	2.4E-01	(mg/kg-day) ⁻¹	2.6E-07
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	1.8E-05	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	6.2E-06
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	2.1E-05	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	7.4E-06
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	1.2E-07	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	1.9E-06
	Heptachlor	22	mg/kg	22	mg/kg	M	8.1E-06	mg/kg-day	4.5E+00	(mg/kg-day) ⁻¹	3.6E-05
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	1.6E-06	mg/kg-day	9.1E+00	(mg/kg-day) ⁻¹	1.5E-05
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	5.5E-07	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.1E-06
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	3.6E-07	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	7.1E-07
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	2.0E-05	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	4.0E-05
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	7.6E-08	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	1.7E-04	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	4.5E-07	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	1.3E-06	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	1.9E-06
	Iron	2,260	mg/kg	2,260	mg/kg	M	8.3E-04	mg/kg-day	NA	--	--
	Thallium (total)	0.31	mg/kg	0.31	mg/kg	M	1.1E-07	mg/kg-day	NA	--	2.3E-04

TABLE 8.5.1A CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	2.9E-08	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	1.3E-05	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	3.1E-05
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	5.8E-06	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	8.5E-05
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	7.8E-06	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	1.1E-05
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	3.6E-06	mg/kg-day	1.5E-01	(mg/kg-day) ⁻¹	5.2E-07
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	6.0E-07	mg/kg-day	4.0E-02	(mg/kg-day) ⁻¹	2.4E-08
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	1.8E-05	mg/kg-day	2.4E-02	(mg/kg-day) ⁻¹	4.3E-07
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	2.7E-07	mg/kg-day	2.4E+01	(mg/kg-day) ⁻¹	6.3E-06
	Fluoranthene	243	mg/kg	243	mg/kg	M	3.6E-06	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	1.7E-06	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	3.9E-06
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	7.7E-09	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	3.7E-06	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	4.4E-08	mg/kg-day	3.4E-01	(mg/kg-day) ⁻¹	1.5E-08
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	2.8E-06	mg/kg-day	4.4E-01	(mg/kg-day) ⁻¹	1.2E-06
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	3.4E-06	mg/kg-day	4.4E-01	(mg/kg-day) ⁻¹	1.5E-06
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	4.7E-09	mg/kg-day	3.2E+01	(mg/kg-day) ⁻¹	1.5E-07
	Heptachlor	22	mg/kg	22	mg/kg	M	3.2E-07	mg/kg-day	6.3E+00	(mg/kg-day) ⁻¹	2.0E-06
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	6.6E-08	mg/kg-day	1.3E+01	(mg/kg-day) ⁻¹	8.3E-07
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	3.1E-07	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	6.9E-07
	Aroclor-1260	0.975	mg/kg	0.975	mg/kg	M	2.0E-07	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	4.4E-07
	Gasoline Range Organics	54.6	mg/kg	54.6	mg/kg	M	1.1E-05	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	2.5E-05
	Diesel Range Organics	0.207	mg/kg	0.207	mg/kg	M	3.0E-09	mg/kg-day	NA	--	--
	Antimony	470	mg/kg	470	mg/kg	M	6.9E-06	mg/kg-day	NA	--	--
	Arsenic	1.22	mg/kg	1.22	mg/kg	M	1.8E-09	mg/kg-day	NA	--	--
	Iron	3.49	mg/kg	3.49	mg/kg	M	1.5E-07	mg/kg-day	3.7E+00	(mg/kg-day) ⁻¹	5.6E-07
	Thallium	2,260	mg/kg	2,260	mg/kg	M	3.3E-06	mg/kg-day	NA	--	--
	(Total)	0.31	mg/kg	0.31	mg/kg	M	4.5E-10	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											1.7E-04 4.0E-04

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.3.1B CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	2.1E-05	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	1.7E-06	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	1.3E-06
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	9.1E-07	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	6.6E-06
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.0E-06	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	7.5E-07
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	6.5E-07	mg/kg-day	7.3E-02	(mg/kg-day) ⁻¹	4.8E-08
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	3.5E-07	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	7.0E-09
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	2.5E-06	mg/kg-day	7.3E-03	(mg/kg-day) ⁻¹	1.8E-08
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	2.5E-07	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	1.9E-06
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	6.3E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	4.6E-07
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	1.9E-08	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	3.0E-07
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	3.5E-05	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	7.0E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	1.9E-06	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	2.9E-06
	Iron	2,347	mg/kg	2,347	mg/kg	M	8.6E-04	mg/kg-day	NA	--	--
	(total)										8.4E-05
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	8.5E-07	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	9.1E-07	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	2.1E-06
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	4.7E-07	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	6.9E-06
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	5.3E-07	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	7.8E-07
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	3.4E-07	mg/kg-day	1.5E-01	(mg/kg-day) ⁻¹	5.0E-08
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	1.8E-07	mg/kg-day	4.0E-02	(mg/kg-day) ⁻¹	7.2E-09
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	1.3E-06	mg/kg-day	2.4E-02	(mg/kg-day) ⁻¹	3.0E-08
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	1.3E-07	mg/kg-day	2.4E+01	(mg/kg-day) ⁻¹	3.1E-06
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	3.3E-07	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	7.7E-07
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	7.6E-10	mg/kg-day	3.2E+01	(mg/kg-day) ⁻¹	2.4E-08
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	2.0E-05	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	4.4E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	2.3E-07	mg/kg-day	3.7E+00	(mg/kg-day) ⁻¹	8.5E-07
	Iron	2,347	mg/kg	2,347	mg/kg	M	3.4E-06	mg/kg-day	NA	--	--
	(Total)										5.8E-05
Total Risk Across All Exposure Routes/Pathways											
1.4E-04											

NOTES:

EPC - Exposure Point Concentration

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

-- - Not applicable.

TABLE 8.5.1aA CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	8.2E-11	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	2.9E-09	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	8.9E-10
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	1.3E-09	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	3.9E-09
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	1.7E-09	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	5.3E-10
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	7.8E-10	mg/kg-day	3.1E-02	(mg/kg-day) ⁻¹	2.4E-11
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	1.3E-10	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	2.6E-12
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	4.0E-09	mg/kg-day	3.1E-03	(mg/kg-day) ⁻¹	1.2E-11
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	5.9E-11	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	1.8E-10
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	1.0E-08	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	3.7E-10	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	1.1E-10
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	2.2E-11	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	1.0E-08	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	1.2E-10	mg/kg-day	2.4E-01	(mg/kg-day) ⁻¹	3.0E-11
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	2.0E-09	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	7.0E-10
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	2.4E-09	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	8.5E-10
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	1.3E-11	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	2.1E-10
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	9.2E-10	mg/kg-day	4.6E+00	(mg/kg-day) ⁻¹	4.2E-09
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	1.9E-10	mg/kg-day	9.1E+00	(mg/kg-day) ⁻¹	1.7E-09
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	6.3E-11	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.3E-10
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	4.1E-11	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	8.1E-11
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	2.3E-09	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	4.5E-09
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	8.6E-12	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	2.0E-08	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	5.1E-11	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	1.5E-10	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	2.2E-09
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	9.4E-08	mg/kg-day	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	1.3E-11	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											
											2.0E-08
											2.0E-08

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.5.1aB CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	2.4E-09	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	2.0E-10	3.1E-01	(mg/kg-day) ⁻¹	6.1E-11
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	1.0E-10	3.1E+00	(mg/kg-day) ⁻¹	3.2E-10
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	1.2E-10	3.1E-01	(mg/kg-day) ⁻¹	3.6E-11
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	7.4E-11	3.1E-02	(mg/kg-day) ⁻¹	2.3E-12
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	4.0E-11	2.0E-02	(mg/kg-day) ⁻¹	7.9E-13
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	2.8E-10	3.1E-03	(mg/kg-day) ⁻¹	8.6E-13
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	2.9E-11	3.1E+00	(mg/kg-day) ⁻¹	9.0E-11
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	7.2E-11	3.1E-01	(mg/kg-day) ⁻¹	2.2E-11
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	2.2E-12	1.6E+01	(mg/kg-day) ⁻¹	3.5E-11
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	4.0E-09	2.0E+00	(mg/kg-day) ⁻¹	8.0E-09
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	2.2E-10	1.5E+01	(mg/kg-day) ⁻¹	3.3E-09
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	9.8E-08	NA	--	--
	(Total)									1.2E-08
Total Risk Across All Exposure Routes/Pathways										1.2E-08

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.5.2 CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Tap
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzene	0.0034	mg/L	0.0034	mg/L	M	1.2E-05	5.5E-02	(mg/kg-day) ⁻¹	6.9E-07
	Chloroform	0.016	mg/L	0.016	mg/L	M	5.9E-05	6.1E-03	(mg/kg-day) ⁻¹	3.6E-07
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	3.8E-06	NA	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	8.1E-06	NA	--	--
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	6.1E-08	9.1E+00	(mg/kg-day) ⁻¹	5.6E-07
	MCPA	0.044	mg/L	0.044	mg/L	M	1.6E-04	NA	--	--
	Antimony	0.011	mg/L	0.011	mg/L	M	4.0E-05	NA	--	--
	Arsenic	0.03	mg/L	0.03	mg/L	M	1.1E-04	1.5E+00	(mg/kg-day) ⁻¹	1.6E-04
	Iron	67.7	mg/L	67.7	mg/L	M	2.5E-01	NA	--	--
	Manganese	0.45	mg/L	0.45	mg/L	M	1.6E-03	NA	--	--
	Thallium	0.0057	mg/L	0.0057	mg/L	M	2.1E-05	NA	--	--
	(total)									1.7E-04
Dermal	Benzene	0.0034	mg/L	0.0034	mg/L	M	5.2E-07	5.9E-02	(mg/kg-day) ⁻¹	3.1E-08
	Chloroform	0.016	mg/L	0.016	mg/L	M	1.0E-06	3.1E-02	(mg/kg-day) ⁻¹	3.2E-08
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	1.1E-06	NA	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	1.1E-06	NA	--	--
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	6.7E-09	1.3E+01	(mg/kg-day) ⁻¹	8.4E-08
	MCPA	0.044	mg/L	0.044	mg/L	M	1.6E-06	NA	--	--
	Antimony	0.011	mg/L	0.011	mg/L	M	8.0E-08	NA	--	--
	Arsenic	0.03	mg/L	0.03	mg/L	M	2.2E-07	3.7E+00	(mg/kg-day) ⁻¹	8.0E-07
	Iron	67.7	mg/L	67.7	mg/L	M	4.9E-04	NA	--	--
	Manganese	0.45	mg/L	0.45	mg/L	M	3.3E-06	NA	--	--
	Thallium	0.0057	mg/L	0.0057	mg/L	M	4.1E-08	NA	--	--
	(Total)									9.4E-07
Total Risk Across All Exposure Routes/Pathways										
1.7E-04										

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.5.3 CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Acetone	0.0056	mg/L	0.0056	mg/L	M	5.5E-07	mg/kg-day	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	2.6E-07	mg/kg-day	NA	--	--
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	3.4E-07	mg/kg-day	NA	--	--
	(total)										--
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	1.2E-08	mg/kg-day	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	4.7E-07	mg/kg-day	NA	--	--
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	1.3E-06	mg/kg-day	NA	--	--
	(Total)										--
Total Risk Across All Exposure Routes/Pathways											

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.5.4 CT
CALCULATION OF CANCER RISKS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Residents
Receptor Age: Young Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Intake (Cancer) mg/kg-day	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	7.5E-07	mg/kg-day	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	2.1E-07	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	4.2E-07
	Aroclor-1260	40	mg/kg	40	mg/kg	M	3.0E-06	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	6.0E-06
	Diesel Range Organics (total)	11,600	mg/kg	11,600	mg/kg	M	8.7E-04	mg/kg-day	NA	--	--
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	2.6E-08	mg/kg-day	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	1.0E-07	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	2.3E-07
	Aroclor-1260	40	mg/kg	40	mg/kg	M	1.5E-06	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	3.3E-06
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	3.0E-05	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											9.9E-06

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.6.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	1.3E-07	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	4.6E-06	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	3.4E-06
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	2.0E-06	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	1.5E-05
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	2.7E-06	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	2.0E-06
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	1.3E-06	mg/kg-day	7.3E-02	(mg/kg-day) ⁻¹	9.1E-08
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	2.1E-07	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	4.2E-09
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	6.4E-06	mg/kg-day	7.3E-03	(mg/kg-day) ⁻¹	4.7E-08
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	9.5E-08	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	6.9E-07
	Fluoranthene	243	mg/kg	243	mg/kg	M	1.6E-05	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	5.9E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	4.3E-07
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	3.5E-08	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	1.7E-05	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	2.0E-07	mg/kg-day	2.4E-01	(mg/kg-day) ⁻¹	4.8E-08
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	3.2E-06	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	1.1E-06
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	3.9E-06	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	1.4E-06
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	2.1E-08	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	3.4E-07
	Heptachlor	22	mg/kg	22	mg/kg	M	1.5E-06	mg/kg-day	4.5E+00	(mg/kg-day) ⁻¹	6.6E-06
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	3.0E-07	mg/kg-day	9.1E+00	(mg/kg-day) ⁻¹	2.7E-06
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	1.0E-07	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	2.0E-07
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	6.5E-08	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.3E-07
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	3.7E-06	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	7.3E-06
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	1.4E-08	mg/kg-day	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	3.2E-05	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	8.2E-08	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	2.3E-07	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	3.5E-07
	Iron	2,260	mg/kg	2,260	mg/kg	M	1.5E-04	mg/kg-day	NA	--	--
	Thallium	0.31	mg/kg	0.31	mg/kg	M	2.1E-08	mg/kg-day	NA	--	--
	(total)										4.2E-05

TABLE 8.6.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	1.8E-09	NA	mg/kg-day	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	8.3E-07	2.4E+00	(mg/kg-day)	1.9E-06
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	3.7E-07	1.5E+01	(mg/kg-day)	5.3E-06
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	4.9E-07	1.5E+00	(mg/kg-day)	7.2E-07
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	2.2E-07	1.5E-01	(mg/kg-day)	3.3E-08
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	3.8E-08	4.0E-02	(mg/kg-day)	1.5E-09
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	1.2E-06	2.4E-02	(mg/kg-day)	2.7E-08
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	1.7E-08	2.4E+01	(mg/kg-day)	4.0E-07
	Fluoranthene	243	mg/kg	243	mg/kg	M	2.2E-07	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	1.1E-07	2.4E+00	(mg/kg-day)	2.5E-07
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	4.8E-10	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	2.3E-07	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	2.8E-09	3.4E-01	(mg/kg-day)	9.5E-10
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	1.8E-07	4.4E-01	(mg/kg-day)	7.7E-08
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	2.1E-07	4.4E-01	(mg/kg-day)	9.4E-08
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	3.0E-10	3.2E+01	(mg/kg-day)	9.4E-09
	Heptachlor	22	mg/kg	22	mg/kg	M	2.0E-08	6.3E+00	(mg/kg-day)	1.3E-07
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	4.2E-09	1.3E+01	(mg/kg-day)	5.2E-08
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	1.9E-08	2.2E+00	(mg/kg-day)	4.4E-08
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	1.3E-08	2.2E+00	(mg/kg-day)	2.8E-08
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	7.0E-07	2.2E+00	(mg/kg-day)	1.6E-06
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	1.9E-10	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	4.3E-07	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	1.1E-10	NA	--	--
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	9.7E-09	3.7E+00	(mg/kg-day)	3.5E-08
	Iron	2,260	mg/kg	2,260	mg/kg	M	2.1E-07	NA	--	--
	Thallium	0.31	mg/kg	0.31	mg/kg	M	2.8E-11	NA	--	--
(Total)										1.1E-05
Total Risk Across All Exposure Routes/Pathways										5.3E-05

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.6.1B RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	3.9E-06	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	3.2E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	2.3E-07
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	1.7E-07	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	1.2E-06
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	1.9E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	1.4E-07
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	1.2E-07	mg/kg-day	7.3E-02	(mg/kg-day) ⁻¹	8.7E-09
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	6.4E-08	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	1.3E-09
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	4.5E-07	mg/kg-day	7.3E-03	(mg/kg-day) ⁻¹	3.3E-09
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	4.7E-08	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	3.4E-07
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	1.2E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	8.4E-08
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	3.5E-09	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	5.6E-08
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	6.4E-06	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.3E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	3.5E-07	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	5.3E-07
	Iron	2,347	mg/kg	2,347	mg/kg	M	1.6E-04	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	5.3E-08	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	5.7E-08	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	1.3E-07
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	3.0E-08	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	4.3E-07
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	3.4E-08	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	4.9E-08
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	2.1E-08	mg/kg-day	1.5E-01	(mg/kg-day) ⁻¹	3.1E-09
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	1.1E-08	mg/kg-day	4.0E-02	(mg/kg-day) ⁻¹	4.6E-10
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	8.0E-08	mg/kg-day	2.4E-02	(mg/kg-day) ⁻¹	1.9E-09
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	8.3E-09	mg/kg-day	2.4E+01	(mg/kg-day) ⁻¹	2.0E-07
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	2.1E-08	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	4.9E-08
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	4.8E-11	mg/kg-day	3.2E+01	(mg/kg-day) ⁻¹	1.5E-09
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	1.2E-06	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	2.7E-06
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	1.5E-08	mg/kg-day	3.7E+00	(mg/kg-day) ⁻¹	5.3E-08
	Iron	2,347	mg/kg	2,347	mg/kg	M	2.2E-07	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											
1.9E-05											

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.6.1a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugative dust
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Intake (Cancer) Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	1.4E-12	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	4.9E-11	3.1E-01	(mg/kg-day)	1.5E-11
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	2.1E-11	3.1E+00	(mg/kg-day)	6.6E-11
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	2.9E-11	3.1E-01	(mg/kg-day)	8.9E-12
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	1.3E-11	3.1E-02	(mg/kg-day)	4.1E-13
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	2.2E-12	2.0E-02	(mg/kg-day)	4.4E-14
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	6.8E-11	3.1E-03	(mg/kg-day)	2.1E-13
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	9.9E-13	3.1E+00	(mg/kg-day)	3.1E-12
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	1.7E-10	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	6.2E-12	3.1E-01	(mg/kg-day)	1.9E-12
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	3.7E-13	NA	--	--
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	1.8E-10	NA	--	--
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	2.1E-12	2.4E-01	(mg/kg-day)	5.1E-13
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	3.4E-11	3.5E-01	(mg/kg-day)	1.2E-11
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	4.1E-11	3.5E-01	(mg/kg-day)	1.4E-11
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	2.3E-13	1.6E+01	(mg/kg-day)	3.6E-12
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	1.5E-11	4.6E+00	(mg/kg-day)	7.0E-11
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	3.2E-12	9.1E+00	(mg/kg-day)	2.9E-11
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	1.1E-12	2.0E+00	(mg/kg-day)	2.1E-12
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	6.9E-13	2.0E+00	(mg/kg-day)	1.4E-12
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	3.8E-11	2.0E+00	(mg/kg-day)	7.7E-11
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	1.5E-13	NA	--	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	3.3E-10	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	8.6E-13	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	2.5E-12	1.5E+01	(mg/kg-day)	3.7E-11
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	1.6E-09	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	2.2E-13	NA	--	--
(Total)										
Total Risk Across All Exposure Routes/Pathways										
3.4E-10										

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation

mg/kg - milligram per kilogram

mg/m³ - milligram per cubic meter

mg/kg-day - milligram per kilogram per day

TABLE 8.6.1aB RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	4.1E-11	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	3.3E-12	3.1E-01	(mg/kg-day) ⁻¹	1.0E-12
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	1.7E-12	3.1E+00	(mg/kg-day) ⁻¹	5.4E-12
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	2.0E-12	3.1E-01	(mg/kg-day) ⁻¹	6.1E-13
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	1.3E-12	3.1E-02	(mg/kg-day) ⁻¹	3.9E-14
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	6.7E-13	2.0E-02	(mg/kg-day) ⁻¹	1.3E-14
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	4.7E-12	3.1E-03	(mg/kg-day) ⁻¹	1.5E-14
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	4.9E-13	3.1E+00	(mg/kg-day) ⁻¹	1.5E-12
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	1.2E-12	3.1E-01	(mg/kg-day) ⁻¹	3.7E-13
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	3.7E-14	1.6E+01	(mg/kg-day) ⁻¹	5.9E-13
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	6.7E-11	2.0E+00	(mg/kg-day) ⁻¹	1.3E-10
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	3.7E-12	1.5E+01	(mg/kg-day) ⁻¹	5.6E-11
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	1.7E-09	NA	--	--
	(Total)									2.0E-10
Total Risk Across All Exposure Routes/Pathways										
2.0E-10										

NOTES:

- EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.6.2A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future Medium: Subsurface Soil Exposure Medium: Subsurface Soil Exposure Point: Subsurface Soil Receptor Population: Construction Workers Receptor Age: Adult											
Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	0.573	mg/kg	0.573	mg/kg	M	3.8E-08	mg/kg-day	NA	--	--
	Benzo(a)anthracene	0.199	mg/kg	0.199	mg/kg	M	1.3E-08	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	9.7E-09
	Benzo(a)pyrene	0.194	mg/kg	0.194	mg/kg	M	1.3E-08	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	9.3E-08
	Benzo(b)fluoranthene	0.217	mg/kg	0.217	mg/kg	M	1.5E-08	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	1.1E-08
	Benzo(k)fluoranthene	0.137	mg/kg	0.137	mg/kg	M	9.2E-09	mg/kg-day	7.3E-02	(mg/kg-day) ⁻¹	6.7E-10
	Bis(2-chloroethoxy)methane	0.0512	mg/kg	0.0512	mg/kg	M	3.4E-09	mg/kg-day	NA	--	--
	Carbazole	0.0845	mg/kg	0.0845	mg/kg	M	5.7E-09	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	1.1E-10
	Chrysene	0.209	mg/kg	0.209	mg/kg	M	1.4E-08	mg/kg-day	7.3E-03	(mg/kg-day) ⁻¹	1.0E-10
	Dibenz(a,h)anthracene	0.0758	mg/kg	0.0758	mg/kg	M	5.1E-09	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	3.7E-08
	Indeno(1,2,3-cd)pyrene	0.145	mg/kg	0.145	mg/kg	M	9.7E-09	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	7.1E-09
	Naphthalene	0.226	mg/kg	0.226	mg/kg	M	1.5E-08	mg/kg-day	NA	--	--
	Chlordane, alpha-	1.22	mg/kg	1.22	mg/kg	M	8.2E-08	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	2.9E-08
	Chlordane, gamma-	1.65	mg/kg	1.65	mg/kg	M	1.1E-07	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	3.9E-08
	Heptachlor	0.155	mg/kg	0.155	mg/kg	M	1.0E-08	mg/kg-day	4.5E+00	(mg/kg-day) ⁻¹	4.7E-08
	Heptachlor Epoxide	0.0161	mg/kg	0.0161	mg/kg	M	1.1E-09	mg/kg-day	9.1E+00	(mg/kg-day) ⁻¹	9.8E-09
	Aroclor-1248	0.318	mg/kg	0.318	mg/kg	M	2.1E-08	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	4.3E-08
	Aroclor-1254	0.333	mg/kg	0.333	mg/kg	M	2.2E-08	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	4.5E-08
	Aroclor-1260	5.61	mg/kg	5.61	mg/kg	M	3.8E-07	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	7.3E-07
	Gasoline Range Organics	580	mg/kg	580	mg/kg	M	3.9E-05	mg/kg-day	NA	--	--
	Diesel Range Organics	5,500	mg/kg	5,500	mg/kg	M	3.7E-04	mg/kg-day	NA	--	--
	Arsenic	1.11	mg/kg	1.11	mg/kg	M	7.4E-08	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	1.1E-07
	Iron	2,754	mg/kg	2,754	mg/kg	M	1.8E-04	mg/kg-day	NA	--	--
	Thallium	0.405	mg/kg	0.405	mg/kg	M	2.7E-08	mg/kg-day	NA	--	--
(total)											1.2E-06

TABLE 8.6.2A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	2-Methylnaphthalene	0.573	mg/kg	0.573	mg/kg	M	5.3E-10	mg/kg-day	NA	--	--
	Benzo(a)anthracene	0.199	mg/kg	0.199	mg/kg	M	2.4E-09	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	5.6E-09
	Benzo(a)pyrene	0.194	mg/kg	0.194	mg/kg	M	2.3E-09	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	3.4E-08
	Benzo(b)fluoranthene	0.217	mg/kg	0.217	mg/kg	M	2.6E-09	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	3.8E-09
	Benzo(k)fluoranthene	0.137	mg/kg	0.137	mg/kg	M	1.6E-09	mg/kg-day	1.5E-01	(mg/kg-day) ⁻¹	2.4E-10
	Bis(2-chloroethoxy)methane	0.0512	mg/kg	0.0512	mg/kg	M	4.7E-10	mg/kg-day	NA	--	--
	Carbazole	0.0845	mg/kg	0.0845	mg/kg	M	1.0E-09	mg/kg-day	4.0E-02	(mg/kg-day) ⁻¹	4.1E-11
	Chrysene	0.209	mg/kg	0.209	mg/kg	M	2.5E-09	mg/kg-day	2.4E-02	(mg/kg-day) ⁻¹	5.9E-11
	Dibenz(a,h)anthracene	0.0758	mg/kg	0.0758	mg/kg	M	9.1E-10	mg/kg-day	2.4E+01	(mg/kg-day) ⁻¹	2.1E-08
	Indeno(1,2,3-cd)pyrene	0.145	mg/kg	0.145	mg/kg	M	1.7E-09	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	4.1E-09
	Naphthalene	0.226	mg/kg	0.226	mg/kg	M	2.1E-10	mg/kg-day	NA	--	--
	Chlordane, alpha-	1.22	mg/kg	1.22	mg/kg	M	4.5E-09	mg/kg-day	4.4E-01	(mg/kg-day) ⁻¹	2.0E-09
	Chlordane, gamma-	1.65	mg/kg	1.65	mg/kg	M	6.1E-09	mg/kg-day	4.4E-01	(mg/kg-day) ⁻¹	2.7E-09
	Heptachlor	0.155	mg/kg	0.155	mg/kg	M	1.4E-10	mg/kg-day	6.3E+00	(mg/kg-day) ⁻¹	8.9E-10
	Heptachlor Epoxide	0.0161	mg/kg	0.0161	mg/kg	M	1.5E-11	mg/kg-day	1.3E+01	(mg/kg-day) ⁻¹	1.9E-10
	Aroclor-1248	0.318	mg/kg	0.318	mg/kg	M	4.1E-09	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	9.2E-09
	Aroclor-1254	0.333	mg/kg	0.333	mg/kg	M	4.3E-09	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	9.6E-09
	Aroclor-1260	5.61	mg/kg	5.61	mg/kg	M	7.2E-08	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	1.6E-07
	Gasoline Range Organics	580	mg/kg	580	mg/kg	M	5.4E-07	mg/kg-day	NA	--	--
	Diesel Range Organics	5,500	mg/kg	5,500	mg/kg	M	5.1E-06	mg/kg-day	NA	--	--
	Arsenic	1.11	mg/kg	1.11	mg/kg	M	3.1E-09	mg/kg-day	3.7E+00	(mg/kg-day) ⁻¹	1.1E-08
	Iron	2,754	mg/kg	2,754	mg/kg	M	2.5E-07	mg/kg-day	NA	--	--
	Thallium	0.405	mg/kg	0.405	mg/kg	M	3.7E-11	mg/kg-day	NA	--	--
(Total)											2.7E-07
Total Risk Across All Exposure Routes/Pathways											1.5E-06

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.62B RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Subsurface Soil
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	6.38	mg/kg	6.38	mg/kg	M	4.3E-07	mg/kg-day	NA	--	--
	Bis(2-chloroethoxy)methane	0.054	mg/kg	0.054	mg/kg	M	3.6E-09	mg/kg-day	NA	--	--
	Naphthalene	0.862	mg/kg	0.862	mg/kg	M	5.8E-08	mg/kg-day	NA	--	--
	Aroclor-1260	27.0	mg/kg	27.0	mg/kg	M	1.8E-06	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	3.6E-06
	Gasoline Range Organics	580	mg/kg	580	mg/kg	M	3.9E-05	mg/kg-day	NA	--	--
	Diesel Range Organics	5,500	mg/kg	5,500	mg/kg	M	3.7E-04	mg/kg-day	NA	--	--
	Arsenic	1.50	mg/kg	1.50	mg/kg	M	1.0E-07	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	1.5E-07
	Iron	3,007	mg/kg	3,007	mg/kg	M	2.0E-04	mg/kg-day	NA	--	--
Dermal	Thallium	0.488	mg/kg	0.488	mg/kg	M	3.3E-08	mg/kg-day	NA	--	--
	(total)										3.8E-06
	2-Methylnaphthalene	6.38	mg/kg	6.38	mg/kg	M	5.9E-09	mg/kg-day	NA	--	--
	Bis(2-chloroethoxy)methane	0.054	mg/kg	0.054	mg/kg	M	5.0E-10	mg/kg-day	NA	--	--
	Naphthalene	0.862	mg/kg	0.862	mg/kg	M	8.0E-10	mg/kg-day	NA	--	--
	Aroclor-1260	27.0	mg/kg	27.0	mg/kg	M	3.5E-07	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	7.8E-07
	Gasoline Range Organics	580	mg/kg	580	mg/kg	M	5.4E-07	mg/kg-day	NA	--	--
	Diesel Range Organics	5,500	mg/kg	5,500	mg/kg	M	5.1E-06	mg/kg-day	NA	--	--
	Arsenic	1.50	mg/kg	1.50	mg/kg	M	4.2E-09	mg/kg-day	3.7E+00	(mg/kg-day) ⁻¹	1.5E-08
	Iron	3,007	mg/kg	3,007	mg/kg	M	2.8E-07	mg/kg-day	NA	--	--
	Thallium	0.488	mg/kg	0.488	mg/kg	M	4.5E-11	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											
4.6E-06											

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.6.2aA RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	0.573	mg/kg	4.34E-10	mg/m ³	R	4.0E-13	mg/kg-day	NA	--	--
	Benzo(a)anthracene	0.199	mg/kg	1.51E-10	mg/m ³	R	1.4E-13	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	4.3E-14
	Benzo(a)pyrene	0.194	mg/kg	1.47E-10	mg/m ³	R	1.4E-13	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	4.2E-13
	Benzo(b)fluoranthene	0.217	mg/kg	1.64E-10	mg/m ³	R	1.5E-13	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	4.7E-14
	Benzo(k)fluoranthene	0.137	mg/kg	1.04E-10	mg/m ³	R	9.7E-14	mg/kg-day	3.1E-02	(mg/kg-day) ⁻¹	3.0E-15
	Bis(2-chloroethoxy)methane	0.0512	mg/kg	3.88E-11	mg/m ³	R	3.6E-14	mg/kg-day	NA	--	--
	Carbazole	0.0845	mg/kg	6.40E-11	mg/m ³	R	5.9E-14	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	1.2E-15
	Chrysene	0.209	mg/kg	1.59E-10	mg/m ³	R	1.5E-13	mg/kg-day	3.1E-03	(mg/kg-day) ⁻¹	4.6E-16
	Dibenz(a,h)anthracene	0.0758	mg/kg	5.75E-11	mg/m ³	R	5.3E-14	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	1.7E-13
	Indeno(1,2,3-cd)pyrene	0.145	mg/kg	1.10E-10	mg/m ³	R	1.0E-13	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	3.2E-14
	Naphthalene	0.226	mg/kg	1.71E-10	mg/m ³	R	1.6E-13	mg/kg-day	NA	--	--
	Chlordane, alpha-	1.22	mg/kg	9.21E-10	mg/m ³	R	8.5E-13	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	3.0E-13
	Chlordane, gamma-	1.65	mg/kg	1.25E-09	mg/m ³	R	1.2E-12	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	4.1E-13
	Heptachlor	0.155	mg/kg	1.17E-10	mg/m ³	R	1.1E-13	mg/kg-day	4.6E+00	(mg/kg-day) ⁻¹	5.0E-13
	Heptachlor Epoxide	0.0161	mg/kg	1.22E-11	mg/m ³	R	1.1E-14	mg/kg-day	9.1E+00	(mg/kg-day) ⁻¹	1.0E-13
	Aroclor-1248	0.333	mg/kg	2.41E-10	mg/m ³	R	2.2E-13	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	4.5E-13
	Aroclor-1254	0.561	mg/kg	2.52E-10	mg/m ³	R	2.3E-13	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	4.7E-13
	Aroclor-1260	5.61	mg/kg	4.23E-09	mg/m ³	R	3.9E-12	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	7.9E-12
	Gasoline Range Organics	580	mg/kg	4.39E-07	mg/m ³	R	4.1E-10	mg/kg-day	NA	--	--
	Diesel Range Organics	5,500	mg/kg	4.17E-06	mg/m ³	R	3.9E-09	mg/kg-day	NA	--	--
	Arsenic	1.11	mg/kg	8.41E-10	mg/m ³	R	7.8E-13	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	1.2E-11
	Iron	2,754	mg/kg	2.09E-06	mg/m ³	R	1.9E-09	mg/kg-day	NA	--	--
	Thallium	0.405	mg/kg	3.07E-10	mg/m ³	R	2.9E-13	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											2.3E-11
2.3E-11											2.3E-11

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.6.2aB RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	6.38	mg/kg	4.83E-09	mg/m ³	R	4.5E-12	mg/kg-day	NA	--	--
	Bis(2-chloroethoxy)methane	0.054	mg/kg	4.09E-11	mg/m ³	R	3.8E-14	mg/kg-day	NA	--	--
	Naphthalene	0.862	mg/kg	6.53E-10	mg/m ³	R	6.1E-13	mg/kg-day	NA	--	--
	Aroclor-1260	27.0	mg/kg	2.05E-08	mg/m ³	R	1.9E-11	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	3.8E-11
	Gasoline Range Organics	580	mg/kg	4.39E-07	mg/m ³	R	4.1E-10	mg/kg-day	NA	--	--
	Diesel Range Organics	5,500	mg/kg	4.17E-06	mg/m ³	R	3.9E-09	mg/kg-day	NA	--	--
	Arsenic	1.50	mg/kg	1.14E-09	mg/m ³	R	1.1E-12	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	1.6E-11
	Iron	3,007	mg/kg	2.28E-06	mg/m ³	R	2.1E-09	mg/kg-day	NA	--	--
	Thallium	0.488	mg/kg	3.70E-10	mg/m ³	R	3.4E-13	mg/kg-day	NA	--	--
	(Total)										5.4E-11
Total Risk Across All Exposure Routes/Pathways											

NOTES:

- EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.6.3 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future											
Medium: Groundwater											
Exposure Medium: Groundwater											
Exposure Point: Groundwater											
Receptor Population: Construction Workers											
Receptor Age: Adult											
Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	Benzene	0.0034	mg/L	0.0034	mg/L	M	2.6E-07	mg/kg-day	5.9E-02	(mg/kg-day) ⁻¹	1.6E-08
	Chloroform	0.016	mg/L	0.016	mg/L	M	5.3E-07	mg/kg-day	3.1E-02	(mg/kg-day) ⁻¹	1.6E-08
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	5.5E-07	mg/kg-day	NA	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	5.6E-07	mg/kg-day	NA	--	--
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	3.4E-09	mg/kg-day	1.3E+01	(mg/kg-day) ⁻¹	4.3E-08
	MCPA	0.044	mg/L	0.044	mg/L	M	8.0E-07	mg/kg-day	NA	--	--
	Antimony	0.011	mg/L	0.011	mg/L	M	4.1E-08	mg/kg-day	NA	--	--
	Arsenic	0.03	mg/L	0.03	mg/L	M	1.1E-07	mg/kg-day	3.7E+00	(mg/kg-day) ⁻¹	4.1E-07
	Iron	67.7	mg/L	67.7	mg/L	M	2.5E-04	mg/kg-day	NA	--	--
	Manganese	0.45	mg/L	0.45	mg/L	M	1.7E-06	mg/kg-day	NA	--	--
Thallium (Total)		0.0057	mg/L	0.0057	mg/L	M	2.1E-08	mg/kg-day	NA	--	4.8E-07
Total Risk Across All Exposure Routes/Pathways											4.8E-07

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/L - milligram per liter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.6.4 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Surface Water
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	Acetone	0.0056	mg/L	0.0056	mg/L	M	1.2E-08	mg/kg-day	NA	--	--
	Toluene	0.0027	mg/L	0.0027	mg/L	M	4.5E-07	mg/kg-day	NA	--	--
	Xylenes, total	0.0035	mg/L	0.0035	mg/L	M	1.2E-06	mg/kg-day	NA	--	--
	(Total)										--
Total Risk Across All Exposure Routes/Pathways											

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/L - milligram per liter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.6.5 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Sediment
Receptor Population: Construction Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	2-Methylnaphthalene	10	mg/kg	10	mg/kg	M	9.2E-09	mg/kg-day	NA	--	--
	Aroclor-1248	2.8	mg/kg	2.8	mg/kg	M	3.6E-08	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	8.1E-08
	Aroclor-1260	40	mg/kg	40	mg/kg	M	5.2E-07	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	1.1E-06
	Diesel Range Organics (Total)	11,600	mg/kg	11,600	mg/kg	M	1.1E-05	mg/kg-day	NA	--	--
Total Risk Across All Exposure Routes/Pathways											
1.2E-06											

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.7.1B RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEIUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	1.0E-05	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	8.3E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	6.1E-07
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	4.3E-07	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	3.2E-06
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	4.9E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	3.6E-07
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	3.1E-07	mg/kg-day	7.3E-02	(mg/kg-day) ⁻¹	2.3E-08
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	1.7E-07	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	3.3E-09
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	1.2E-06	mg/kg-day	7.3E-03	(mg/kg-day) ⁻¹	8.5E-09
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	1.2E-07	mg/kg-day	7.3E+00	(mg/kg-day) ⁻¹	8.9E-07
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	3.0E-07	mg/kg-day	7.3E-01	(mg/kg-day) ⁻¹	2.2E-07
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	9.1E-09	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	1.5E-07
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	1.7E-05	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	3.3E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	9.2E-07	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	1.4E-06
	Iron	2,347	mg/kg	2,347	mg/kg	M	4.1E-04	mg/kg-day	NA	--	--
(total)											
Dermal	2-Methylnaphthalene	57.9	mg/kg	57.9	mg/kg	M	1.3E-06	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	4.76	mg/kg	M	1.4E-06	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	3.4E-06
	Benzo(a)pyrene	2.48	mg/kg	2.48	mg/kg	M	7.4E-07	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	1.1E-05
	Benzo(b)fluoranthene	2.81	mg/kg	2.81	mg/kg	M	8.4E-07	mg/kg-day	1.5E+00	(mg/kg-day) ⁻¹	1.2E-06
	Benzo(k)fluoranthene	1.78	mg/kg	1.78	mg/kg	M	5.3E-07	mg/kg-day	1.5E-01	(mg/kg-day) ⁻¹	7.8E-08
	Carbazole	0.95	mg/kg	0.95	mg/kg	M	2.8E-07	mg/kg-day	4.0E-02	(mg/kg-day) ⁻¹	1.1E-08
	Chrysene	6.7	mg/kg	6.7	mg/kg	M	2.0E-06	mg/kg-day	2.4E-02	(mg/kg-day) ⁻¹	4.7E-08
	Dibenz(a,h)anthracene	0.695	mg/kg	0.695	mg/kg	M	2.1E-07	mg/kg-day	2.4E+01	(mg/kg-day) ⁻¹	4.9E-06
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.72	mg/kg	M	5.2E-07	mg/kg-day	2.4E+00	(mg/kg-day) ⁻¹	1.2E-06
	Dieldrin	0.052	mg/kg	0.052	mg/kg	M	1.2E-09	mg/kg-day	3.2E+01	(mg/kg-day) ⁻¹	3.8E-08
	Aroclor-1260	95.6	mg/kg	95.6	mg/kg	M	3.1E-05	mg/kg-day	2.2E+00	(mg/kg-day) ⁻¹	6.9E-05
	Arsenic	5.26	mg/kg	5.26	mg/kg	M	3.6E-07	mg/kg-day	3.7E+00	(mg/kg-day) ⁻¹	1.3E-06
	Iron	2,347	mg/kg	2,347	mg/kg	M	5.4E-06	mg/kg-day	NA	--	--
(Total)											
Total Risk Across All Exposure Routes/Pathways											
9.2E-05											
1.3E-04											

NOTES:

EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.7.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Surface Soil
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	3.4E-07	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	1.2E-05	7.3E-01	(mg/kg-day) ⁻¹	8.8E-06
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	5.3E-06	7.3E+00	(mg/kg-day) ⁻¹	3.9E-05
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	7.1E-06	7.3E-01	(mg/kg-day) ⁻¹	5.2E-06
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	3.3E-06	7.3E-02	(mg/kg-day) ⁻¹	2.4E-07
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	5.5E-07	2.0E-02	(mg/kg-day) ⁻¹	1.1E-08
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	1.7E-05	7.3E-03	(mg/kg-day) ⁻¹	1.2E-07
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	2.5E-07	7.3E+00	(mg/kg-day) ⁻¹	1.8E-06
	Fluoranthene	243	mg/kg	243	mg/kg	M	4.2E-05	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	1.5E-06	7.3E-01	(mg/kg-day) ⁻¹	1.1E-06
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	9.2E-08	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	4.4E-05	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	5.2E-07	2.4E-01	(mg/kg-day) ⁻¹	1.3E-07
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	8.4E-06	3.5E-01	(mg/kg-day) ⁻¹	2.9E-06
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	1.0E-05	3.5E-01	(mg/kg-day) ⁻¹	3.5E-06
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	5.6E-08	1.6E+01	(mg/kg-day) ⁻¹	8.9E-07
	Heptachlor	22	mg/kg	22	mg/kg	M	3.8E-06	4.5E+00	(mg/kg-day) ⁻¹	1.7E-05
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	7.9E-07	9.1E+00	(mg/kg-day) ⁻¹	7.2E-06
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	2.6E-07	2.0E+00	(mg/kg-day) ⁻¹	5.3E-07
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	1.7E-07	2.0E+00	(mg/kg-day) ⁻¹	3.4E-07
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	9.5E-06	2.0E+00	(mg/kg-day) ⁻¹	1.9E-05
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	3.6E-08	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	8.2E-05	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	2.1E-07	NA	--	--
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	6.1E-07	1.5E+00	(mg/kg-day) ⁻¹	9.2E-07
	Iron	2,260	mg/kg	2,260	mg/kg	M	3.9E-04	NA	--	--
	Thallium	0.31	mg/kg	0.31	mg/kg	M	5.4E-08	NA	--	--
		(total)								

TABLE 8.7.1A RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Surface Soil
 Receptor Population: Industrial / Commercial Workers
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal	2-Methylnaphthalene	1.96	mg/kg	1.96	mg/kg	M	4.5E-08	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	69.0	mg/kg	M	2.1E-05	2.4E+00	(mg/kg-day) ⁻¹	4.9E-05
	Benzo(a)pyrene	30.5	mg/kg	30.5	mg/kg	M	9.1E-06	1.5E+01	(mg/kg-day) ⁻¹	1.3E-04
	Benzo(b)fluoranthene	40.9	mg/kg	40.9	mg/kg	M	1.2E-05	1.5E+00	(mg/kg-day) ⁻¹	1.8E-05
	Benzo(k)fluoranthene	18.7	mg/kg	18.7	mg/kg	M	5.6E-06	1.5E-01	(mg/kg-day) ⁻¹	8.2E-07
	Carbazole	3.16	mg/kg	3.16	mg/kg	M	9.5E-07	4.0E-02	(mg/kg-day) ⁻¹	3.8E-08
	Chrysene	96.0	mg/kg	96.0	mg/kg	M	2.9E-05	2.4E-02	(mg/kg-day) ⁻¹	6.8E-07
	Dibenz(a,h)anthracene	1.41	mg/kg	1.41	mg/kg	M	4.2E-07	2.4E+01	(mg/kg-day) ⁻¹	1.0E-05
	Fluoranthene	243	mg/kg	243	mg/kg	M	5.6E-06	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	8.79	mg/kg	M	2.6E-06	2.4E+00	(mg/kg-day) ⁻¹	6.2E-06
	Naphthalene	0.525	mg/kg	0.525	mg/kg	M	1.2E-08	NA	--	--
	Pyrene	250	mg/kg	250	mg/kg	M	5.8E-06	NA	--	--
	4,4'-DDD	3	mg/kg	3	mg/kg	M	6.9E-08	3.4E-01	(mg/kg-day) ⁻¹	2.4E-08
	Chlordane, alpha-	48	mg/kg	48	mg/kg	M	4.4E-06	4.4E-01	(mg/kg-day) ⁻¹	1.9E-06
	Chlordane, gamma-	58	mg/kg	58	mg/kg	M	5.4E-06	4.4E-01	(mg/kg-day) ⁻¹	2.3E-06
	Dieldrin	0.32	mg/kg	0.32	mg/kg	M	7.4E-09	3.2E+01	(mg/kg-day) ⁻¹	2.4E-07
	Heptachlor	22	mg/kg	22	mg/kg	M	5.1E-07	6.3E+00	(mg/kg-day) ⁻¹	3.2E-06
	Heptachlor Epoxide	4.5	mg/kg	4.5	mg/kg	M	1.0E-07	1.3E+01	(mg/kg-day) ⁻¹	1.3E-06
	Aroclor-1248	1.51	mg/kg	1.51	mg/kg	M	3.1E-07	2.2E+00	(mg/kg-day) ⁻¹	1.1E-06
	Aroclor-1254	0.975	mg/kg	0.975	mg/kg	M	4.9E-07	2.2E+00	(mg/kg-day) ⁻¹	7.0E-07
	Aroclor-1260	54.6	mg/kg	54.6	mg/kg	M	1.8E-05	2.2E+00	(mg/kg-day) ⁻¹	3.9E-05
	Gasoline Range Organics	0.207	mg/kg	0.207	mg/kg	M	4.8E-09	NA	--	--
	Diesel Range Organics	470	mg/kg	470	mg/kg	M	1.1E-05	NA	--	--
	Antimony	1.22	mg/kg	1.22	mg/kg	M	2.8E-09	NA	--	--
	Arsenic	3.49	mg/kg	3.49	mg/kg	M	2.4E-07	3.7E+00	(mg/kg-day) ⁻¹	8.8E-07
	Iron	2,260	mg/kg	2,260	mg/kg	M	5.2E-06	NA	--	--
	Thallium	0.31	mg/kg	0.31	mg/kg	M	7.1E-10	NA	--	--
	(Total)									2.7E-04
Total Risk Across All Exposure Routes/Pathways										3.8E-04

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.

mg/kg - milligram per kilogram
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.7.1a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	1.96	mg/kg	1.48E-09	mg/m ³	R	3.4E-11	mg/kg-day	NA	--	--
	Benzo(a)anthracene	69.0	mg/kg	5.23E-08	mg/m ³	R	1.2E-09	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	3.8E-10
	Benzo(a)pyrene	30.5	mg/kg	2.31E-08	mg/m ³	R	5.4E-10	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	1.7E-09
	Benzo(b)fluoranthene	40.9	mg/kg	3.10E-08	mg/m ³	R	7.2E-10	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	2.2E-10
	Benzo(k)fluoranthene	18.7	mg/kg	1.41E-08	mg/m ³	R	3.3E-10	mg/kg-day	3.1E-02	(mg/kg-day) ⁻¹	1.0E-11
	Carbazole	3.16	mg/kg	2.39E-09	mg/m ³	R	5.5E-11	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	1.1E-12
	Chrysene	96.0	mg/kg	7.27E-08	mg/m ³	R	1.7E-09	mg/kg-day	3.1E-03	(mg/kg-day) ⁻¹	5.2E-12
	Dibenz(a,h)anthracene	1.41	mg/kg	1.07E-09	mg/m ³	R	2.5E-11	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	7.7E-11
	Fluoranthene	243	mg/kg	1.84E-07	mg/m ³	R	4.3E-09	mg/kg-day	NA	--	--
	Indeno(1,2,3-cd)pyrene	8.79	mg/kg	6.66E-09	mg/m ³	R	1.5E-10	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	4.8E-11
	Naphthalene	0.525	mg/kg	3.98E-10	mg/m ³	R	9.2E-12	mg/kg-day	NA	--	--
	Pyrene	250	mg/kg	1.89E-07	mg/m ³	R	4.4E-09	mg/kg-day	NA	--	--
	4,4'-DDD	3	mg/kg	2.27E-09	mg/m ³	R	5.3E-11	mg/kg-day	2.4E-01	(mg/kg-day) ⁻¹	1.3E-11
	Chlordane, alpha-	48	mg/kg	3.64E-08	mg/m ³	R	8.4E-10	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	3.0E-10
	Chlordane, gamma-	58	mg/kg	4.39E-08	mg/m ³	R	1.0E-09	mg/kg-day	3.5E-01	(mg/kg-day) ⁻¹	3.6E-10
	Dieldrin	0.32	mg/kg	2.42E-10	mg/m ³	R	5.6E-12	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	9.1E-11
	Heptachlor	22	mg/kg	1.67E-08	mg/m ³	R	3.9E-10	mg/kg-day	4.6E+00	(mg/kg-day) ⁻¹	1.8E-09
	Heptachlor Epoxide	4.5	mg/kg	3.41E-09	mg/m ³	R	7.9E-11	mg/kg-day	9.1E+00	(mg/kg-day) ⁻¹	7.2E-10
	Aroclor-1248	1.51	mg/kg	1.14E-09	mg/m ³	R	2.6E-11	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	5.3E-11
	Aroclor-1254	0.975	mg/kg	7.39E-10	mg/m ³	R	1.7E-11	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	3.4E-11
	Aroclor-1260	54.6	mg/kg	4.13E-08	mg/m ³	R	9.6E-10	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	1.9E-09
	Gasoline Range Organics	0.207	mg/kg	1.57E-10	mg/m ³	R	3.6E-12	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	--
	Diesel Range Organics	470	mg/kg	3.56E-07	mg/m ³	R	8.3E-09	mg/kg-day	NA	--	--
	Antimony	1.22	mg/kg	9.25E-10	mg/m ³	R	2.1E-11	mg/kg-day	NA	--	--
	Arsenic	3.49	mg/kg	2.65E-09	mg/m ³	R	6.1E-11	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	9.3E-10
	Iron	2,260	mg/kg	1.71E-06	mg/m ³	R	4.0E-08	mg/kg-day	NA	--	--
	Thallium	0.31	mg/kg	2.32E-10	mg/m ³	R	5.4E-12	mg/kg-day	NA	--	--
(Total)											8.6E-09
Total Risk Across All Exposure Routes/Pathways											8.6E-09

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.7.1aB RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Air
Exposure Point: Fugitive dust
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	2-Methylnaphthalene	57.9	mg/kg	4.39E-08	mg/m ³	R	1.0E-09	mg/kg-day	NA	--	--
	Benzo(a)anthracene	4.76	mg/kg	3.61E-09	mg/m ³	R	8.4E-11	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	2.6E-11
	Benzo(a)pyrene	2.48	mg/kg	1.88E-09	mg/m ³	R	4.4E-11	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	1.3E-10
	Benzo(b)fluoranthene	2.81	mg/kg	2.13E-09	mg/m ³	R	4.9E-11	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	1.5E-11
	Benzo(k)fluoranthene	1.78	mg/kg	1.35E-09	mg/m ³	R	3.1E-11	mg/kg-day	3.1E-02	(mg/kg-day) ⁻¹	9.7E-13
	Carbazole	0.95	mg/kg	7.20E-10	mg/m ³	R	1.7E-11	mg/kg-day	2.0E-02	(mg/kg-day) ⁻¹	3.3E-13
	Chrysene	6.7	mg/kg	5.08E-09	mg/m ³	R	1.2E-10	mg/kg-day	3.1E-03	(mg/kg-day) ⁻¹	3.7E-13
	Dibenz(a,h)anthracene	0.695	mg/kg	5.27E-10	mg/m ³	R	1.2E-11	mg/kg-day	3.1E+00	(mg/kg-day) ⁻¹	3.8E-11
	Indeno(1,2,3-cd)pyrene	1.72	mg/kg	1.30E-09	mg/m ³	R	3.0E-11	mg/kg-day	3.1E-01	(mg/kg-day) ⁻¹	9.4E-12
	Dieldrin	0.052	mg/kg	3.94E-11	mg/m ³	R	9.1E-13	mg/kg-day	1.6E+01	(mg/kg-day) ⁻¹	1.5E-11
	Aroclor-1260	95.6	mg/kg	7.24E-08	mg/m ³	R	1.7E-09	mg/kg-day	2.0E+00	(mg/kg-day) ⁻¹	3.4E-09
	Arsenic	5.26	mg/kg	3.98E-09	mg/m ³	R	9.2E-11	mg/kg-day	1.5E+01	(mg/kg-day) ⁻¹	1.4E-09
	Iron	2,347	mg/kg	1.78E-06	mg/m ³	R	4.1E-08	mg/kg-day	NA	--	--
	(Total)										5.0E-09
Total Risk Across All Exposure Routes/Pathways											

NOTES:

EPC - Exposure Point Concentration

NA - Toxicity criterion not available.

-- - Not applicable.

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

mg/kg - milligram per kilogram

mg/m³ - milligram per cubic meter

mg/kg-day - milligram per kilogram per day

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.7.2 RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater
Exposure Point: Groundwater
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Benzene	0.0034	mg/L	0.0034	mg/L	M	2.4E-05	5.5E-02	(mg/kg-day) ⁻¹	1.3E-06
	Chloroform	0.016	mg/L	0.016	mg/L	M	1.1E-04	6.1E-03	(mg/kg-day) ⁻¹	6.8E-07
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	7.3E-06	NA	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	1.5E-05	NA	--	--
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	1.2E-07	9.1E+00	(mg/kg-day) ⁻¹	1.1E-06
	MCPA	0.044	mg/L	0.044	mg/L	M	3.1E-04	NA	--	--
	Antimony	0.011	mg/L	0.011	mg/L	M	7.7E-05	NA	--	--
	Arsenic	0.03	mg/L	0.03	mg/L	M	2.1E-04	1.5E+00	(mg/kg-day) ⁻¹	3.1E-04
	Iron	67.7	mg/L	67.7	mg/L	M	4.7E-01	NA	--	--
	Manganese	0.45	mg/L	0.45	mg/L	M	3.1E-03	NA	--	--
Dermal	Thallium	0.0057	mg/L	0.0057	mg/L	M	4.0E-05	NA	--	--
	(total)									3.2E-04
	Benzene	0.0034	mg/L	0.0034	mg/L	M	1.1E-06	5.9E-02	(mg/kg-day) ⁻¹	6.6E-08
	Chloroform	0.016	mg/L	0.016	mg/L	M	2.2E-06	3.1E-02	(mg/kg-day) ⁻¹	6.8E-08
	2-Methylnaphthalene	0.00105	mg/L	0.00105	mg/L	M	2.3E-06	NA	--	--
	Naphthalene	0.0022	mg/L	0.0022	mg/L	M	2.4E-06	NA	--	--
	Heptachlor Epoxide	0.0000167	mg/L	0.0000167	mg/L	M	1.4E-08	1.3E+01	(mg/kg-day) ⁻¹	1.8E-07
	MCPA	0.044	mg/L	0.044	mg/L	M	3.4E-06	NA	--	--
	Antimony	0.011	mg/L	0.011	mg/L	M	1.7E-07	NA	--	--
	Arsenic	0.03	mg/L	0.03	mg/L	M	4.7E-07	3.7E+00	(mg/kg-day) ⁻¹	1.7E-06
(Total)	Iron	67.7	mg/L	67.7	mg/L	M	1.1E-03	NA	--	--
	Manganese	0.45	mg/L	0.45	mg/L	M	7.1E-06	NA	--	--
	Thallium	0.0057	mg/L	0.0057	mg/L	M	9.0E-08	NA	--	--
Total Risk Across All Exposure Routes/Pathways										3.2E-04

NOTES:
EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
mg/L - milligram per liter
mg/kg-day - milligram per kilogram per day
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 8.7.2a RME
CALCULATION OF CANCER RISKS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Air
Exposure Point: Shower
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Benzene	0.0034	mg/L	4.81E-03	mg/m ³	R	3.5E-06	2.7E-02	(mg/kg-day) ⁻¹	9.4E-08
	Chloroform	0.016	mg/L	1.80E-02	mg/m ³	R	1.3E-05	8.1E-02	(mg/kg-day) ⁻¹	1.1E-06
Total Risk Across All Exposure Routes/Pathways										1.1E-06

NOTES:

- EPC - Exposure Point Concentration
NA - Toxicity criterion not available.
-- - Not applicable.
(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 9.1A.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Receptor Population: Military Base Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	2.8E-06	6.0E-11	7.8E-06	1.1E-05	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	1.2E-05	2.7E-10	2.1E-05	3.4E-05	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	1.7E-06	3.6E-11	2.9E-06	4.5E-06	Benzo(b)fluoranthene	NA	--	--	--	--
			Benzo(k)fluoranthene	7.6E-08	1.6E-12	1.3E-07	2.1E-07	Benzo(k)fluoranthene	NA	--	--	--	--
			Carbazole	3.5E-09	1.8E-13	6.1E-09	9.6E-09	Carbazole	NA	--	--	--	--
			Chrysene	3.9E-08	8.4E-13	1.1E-07	1.5E-07	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	5.8E-07	1.2E-11	1.6E-06	2.2E-06	Dibenz(a,h)anthracene	NA	--	--	--	--
			Fluoranthene	--	--	--	--	Fluoranthene	(o) Liver / CVS	5.9E-03	3.0E-07	1.3E-03	7.2E-03
			Indeno(1,2,3-cd)pyrene	3.6E-07	7.7E-12	9.9E-07	1.4E-06	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
			Naphthalene	--	--	--	--	Naphthalene	(o) Whole Body, (i) Rss	2.6E-05	3.0E-08	2.1E-06	2.8E-05
			Pyrene	--	--	--	--	Pyrene	(o) Kidney	8.2E-03	4.1E-07	1.7E-03	9.9E-03
			4,4'-DDD	4.0E-08	2.0E-12	3.8E-09	4.4E-08	4,4'-DDD	NA	--	--	--	--
			Chlordane, alpha-	9.4E-07	4.7E-11	3.1E-07	1.2E-06	Chlordane, alpha-	Liver	9.4E-02	1.2E-05	3.1E-02	1.2E-01
			Chlordane, gamma-	1.1E-06	5.7E-11	3.7E-07	1.5E-06	Chlordane, gamma-	Liver	1.1E-01	1.4E-05	3.7E-02	1.5E-01
			Dieldrin	2.9E-07	1.4E-11	3.8E-08	3.2E-07	Dieldrin	(o) Liver	6.3E-03	3.2E-07	8.3E-04	7.1E-03
			Heptachlor	5.5E-06	2.8E-10	5.1E-07	6.0E-06	Heptachlor	(o) Liver	4.3E-02	2.2E-06	3.9E-03	4.7E-02
			Heptachlor Epoxide	2.3E-06	1.2E-10	2.1E-07	2.5E-06	Heptachlor Epoxide	(o) Liver	3.4E-01	1.7E-05	3.1E-02	3.7E-01
			Aroclor-1248	1.7E-07	8.5E-12	1.7E-07	3.4E-07	Aroclor-1248	NA	--	--	--	--
			Aroclor-1254	1.1E-07	5.5E-12	1.1E-07	2.2E-07	Aroclor-1254	(o) Whole Body / ImS	4.8E-02	2.4E-06	4.9E-02	9.7E-02
			Aroclor-1260	6.1E-06	3.1E-10	6.3E-06	1.2E-05	Aroclor-1260	NA	--	--	--	--
Surface Water	Surface Water	Surface Water	Gasoline Range Organics	--	--	--	--	Gasoline Range Organics	NA	--	--	--	--
			Diesel Range Organics	--	--	--	--	Diesel Range Organics	NA	--	--	--	--
			Antimony	--	--	--	--	Antimony	(o) Whole Body	3.0E-03	--	9.9E-04	4.0E-03
			Arsenic	2.9E-07	1.5E-10	1.4E-07	4.3E-07	Arsenic	(o) Skin / CVS	1.1E-02	--	5.5E-03	1.7E-02
			Iron	--	--	--	--	Iron	(o) Liver / CVS / GIS	7.4E-03	--	3.2E-04	7.7E-03
			Thallium	--	--	--	--	Thallium	(o) CVS	4.5E-03	--	2.0E-04	4.7E-03
			(Total)	3.5E-05	1.4E-09	4.3E-05	7.8E-05	(Total)		6.8E-01	4.9E-05	1.6E-01	8.5E-01
			Acetone	--	--	--	--	Acetone	(o) Liver / Kidney	1.4E-05	--	3.2E-06	1.7E-05
			Toluene	--	--	--	--	Toluene	(o) Liver / Kidney, (i) CNS / Rss	3.4E-06	--	6.4E-05	6.7E-05
			Xylenes, total	--	--	--	--	Xylenes, total	(o) Whole body	4.5E-07	--	1.5E-05	1.6E-05
Surface Water	Surface Water	Surface Water	(Total)	--	--	--	--	(Total)		1.8E-05	--	8.2E-05	1.0E-04

TABLE 9.1A.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Receptor Population: Military Base Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment	2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Aroclor-1248	3.1E-07	--	3.3E-07	6.4E-07	Aroclor-1248	NA	--	--	--	--
			Aroclor-1260	4.5E-06	--	4.6E-06	9.1E-06	Aroclor-1260	NA	--	--	--	--
			Diesel Range Organics (Total)	4.8E-06	--	4.9E-06	9.7E-06	Diesel Range Organics (Total)	NA	--	--	--	--

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
ImS = Immune System
RsS = Respiratory System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across Surface Soil	7.8E-05
Total Risk Across Surface Water	--
Total Risk Across Sediment	9.7E-06
Total Risk Across All Media and All Exposure Routes	8.8E-05

Total Hazard Index Across Surface Soil	0.85
Total Hazard Index Across Surface Water	0.00
Total Hazard Index Across Sediment	--
Total Hazard Index Across All Media and All Exposure Routes	0.85

All Exposure Routes:

Total Liver HI =	0.28

Inhalation Exposure Routes:

Inhalation Central Nervous System HI =	0.00E+00
Inhalation Respiratory System HI =	3.02E-08

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI =	0.10
Oral / Dermal Immune System HI =	0.10
Oral / Dermal Gastrointestinal System HI =	0.01
Oral / Dermal Cardiovascular System HI =	0.04
Oral / Dermal Skin HI =	0.02
Oral / Dermal Kidney HI =	0.01
Oral / Dermal Liver HI =	0.44

TABLE 9.1B.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Receptor Population: Military Base Personnel
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	1.9E-07	4.2E-12	5.4E-07	7.3E-07	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	1.0E-06	2.2E-11	1.7E-06	2.7E-06	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	1.1E-07	2.4E-12	2.0E-07	3.1E-07	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	7.3E-09	1.6E-13	1.2E-08	2.0E-08	Benzo(b)fluoranthene	NA	--	--	--	--
			Benzo(k)fluoranthene	1.1E-09	5.3E-14	1.8E-09	2.9E-09	Benzo(k)fluoranthene	NA	--	--	--	--
			Carbazole	2.7E-09	5.8E-14	7.6E-09	1.0E-08	Carbazole	NA	--	--	--	--
			Chrysene	2.8E-07	6.1E-12	7.9E-07	1.1E-06	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	7.0E-08	1.5E-12	1.9E-07	2.6E-07	Dibenz(a,h)anthracene	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	4.7E-08	2.4E-12	6.1E-09	5.3E-08	Indeno(1,2,3-cd)pyrene	(o) Liver	1.0E-03	5.1E-08	1.3E-04	1.2E-03
			Dieldrin	1.1E-05	5.4E-10	1.1E-05	2.2E-05	Dieldrin	NA	1.7E-02	--	8.3E-03	2.5E-02
			Aroclor-1260	4.4E-07	2.2E-10	2.1E-07	6.5E-07	Aroclor-1260	(o) Skin / CVS	7.7E-03	--	3.4E-04	8.0E-03
			Arsenic	--	--	--	--	Arsenic	(o) Liver / CVS / GIS	2.6E-02	5.1E-08	8.8E-03	3.5E-02
			Iron	1.3E-05	8.0E-10	1.5E-05	2.8E-05	Iron	(o) Liver / CVS / GIS	--	--	--	--
			(Total)	--	--	--	--	(Total)	--	--	--	--	--
Surface Water	Surface Water	Surface Water	Acetone	--	--	--	--	Acetone	(o) Liver / Kidney	1.4E-05	--	3.2E-06	1.7E-05
			Toluene	--	--	--	--	Toluene	(o) Liver / Kidney, (i) CNS / R&S	3.4E-06	--	6.4E-05	6.7E-05
			Xylenes, total	--	--	--	--	Xylenes, total	(o) Whole body	4.5E-07	--	1.5E-05	1.6E-05
Sediment	Sediment	Sediment	(Total)	--	--	--	--	(Total)	--	1.8E-05	--	8.2E-05	1.0E-04
			2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Aroclor-1248	3.1E-07	--	3.3E-07	6.4E-07	Aroclor-1248	NA	--	--	--	--
			Aroclor-1260	4.5E-06	--	4.6E-06	9.1E-06	Aroclor-1260	NA	--	--	--	--
			Diesel Range Organics	--	--	--	--	Diesel Range Organics	NA	--	--	--	--
			(Total)	4.8E-06	--	4.9E-06	9.7E-06	(Total)	--	--	--	--	--

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System

CVS = Cardiovascular System

GIS = Gastrointestinal System

ImS = Immune System

R&S = Respiratory System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across Surface Soil	2.8E-05
Total Risk Across Surface Water	--
Total Risk Across Sediment	9.7E-06
Total Risk Across All Media and All Exposure Routes	3.7E-05

Total Hazard Index Across Surface Soil	0.03
Total Hazard Index Across Surface Water	0.00
Total Hazard Index Across Sediment	--
Total Hazard Index Across All Media and All Exposure Routes	0.03

Inhalation Exposure Routes:

Inhalation Central Nervous System HI = 0.00E+00

Inhalation Respiratory System HI = 0.00E+00

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI = 0.00

Oral / Dermal Gastrointestinal System HI = 0.01

Oral / Dermal Cardiovascular System HI = 0.03

Oral / Dermal Skin HI = 0.03

Oral / Dermal Kidney HI = 0.00

Oral / Dermal Liver HI = 0.01

TABLE 9.2A.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	3.2E-06	6.9E-11	1.6E-05	1.9E-05	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	1.4E-05	3.1E-10	4.2E-05	5.7E-05	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	1.9E-06	4.1E-11	5.7E-06	7.6E-06	Benzo(b)fluoranthene	NA	--	--	--	--
			Benzo(k)fluoranthene	8.8E-08	1.9E-12	2.6E-07	3.5E-07	Benzo(k)fluoranthene	NA	--	--	--	--
			Carbazole	4.1E-09	2.0E-13	1.2E-08	1.6E-08	Carbazole	NA	--	--	--	--
			Chrysene	4.5E-08	9.6E-13	2.2E-07	2.6E-07	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	6.6E-07	1.4E-11	3.2E-06	3.8E-06	Dibenz(a,h)anthracene	NA	--	--	--	--
			Fluoranthene	--	--	--	--	Fluoranthene	(o) Liver / CVS	1.1E-03	5.7E-08	4.2E-04	1.6E-03
			Indeno(1,2,3-cd)pyrene	4.1E-07	8.8E-12	2.0E-06	2.4E-06	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
			Naphthalene	--	--	--	--	Naphthalene	(o) Whole Body, (i) R _{SS}	4.9E-06	5.8E-09	7.0E-07	5.6E-06
			Pyrene	--	--	--	--	Pyrene	(o) Kidney	1.6E-03	7.9E-08	5.8E-04	2.1E-03
			4,4'-DDD	4.6E-08	2.3E-12	7.6E-09	5.4E-08	4,4'-DDD	NA	--	--	--	--
			Chlordane, alpha-	1.1E-06	5.4E-11	6.2E-07	1.7E-06	Chlordane, alpha-	Liver	1.8E-02	2.3E-06	1.0E-02	2.8E-02
			Chlordane, gamma-	1.3E-06	6.6E-11	7.5E-07	2.1E-06	Chlordane, gamma-	Liver	2.2E-02	2.7E-06	1.2E-02	3.4E-02
			Dieldrin	3.3E-07	1.7E-11	7.5E-08	4.0E-07	Dieldrin	(o) Liver	1.2E-03	6.0E-08	2.7E-04	1.5E-03
			Heptachlor	6.4E-06	3.2E-10	1.0E-06	7.4E-06	Heptachlor	(o) Liver	8.3E-03	4.2E-07	1.3E-03	9.6E-03
			Heptachlor Epoxide	2.6E-06	1.3E-10	4.2E-07	3.1E-06	Heptachlor Epoxide	(o) Liver	6.5E-02	3.3E-06	1.0E-02	7.5E-02
			Aroclor-1248	1.9E-07	9.8E-12	3.5E-07	5.4E-07	Aroclor-1248	NA	--	--	--	--
			Aroclor-1254	1.3E-07	6.3E-12	2.2E-07	3.5E-07	Aroclor-1254	(o) Whole Body / ImS	9.2E-03	4.6E-07	1.6E-02	2.5E-02
			Aroclor-1260	7.0E-06	3.5E-10	1.2E-05	1.9E-05	Aroclor-1260	NA	--	--	--	--
			Gasoline Range Organics	--	--	--	--	Gasoline Range Organics	NA	--	--	--	--
			Diesel Range Organics	--	--	--	--	Diesel Range Organics	NA	--	--	--	--
			Antimony	--	--	--	--	Antimony	(o) Whole Body	5.7E-04	--	3.3E-04	9.0E-04
			Arsenic	3.4E-07	1.7E-10	2.8E-07	6.2E-07	Arsenic	(o) Skin / CVS	2.2E-03	--	1.8E-03	4.0E-03
			Iron	--	--	--	--	Iron	(o) Liver / CVS / GIS	1.4E-03	--	1.1E-04	1.5E-03
			Thallium	--	--	--	--	Thallium	(o) CVS	8.7E-04	--	6.6E-05	9.4E-04
			(Total)	4.0E-05	1.6E-09	8.5E-05	1.3E-04	(Total)	1.3E-01	9.4E-06	5.4E-02	1.9E-01	
Surface Water	Surface Water	Surface Water	Acetone	--	--	--	--	Acetone	(o) Liver / Kidney	2.7E-06	--	1.1E-06	3.8E-06
			Toluene	--	--	--	--	Toluene	(o) Liver / Kidney, (i) CNS / R _{SS}	6.6E-07	--	2.1E-05	2.2E-05
			Xylenes, total	--	--	--	--	Xylenes, total	(o) Whole body	8.5E-08	--	5.0E-06	5.1E-06
				--	--	--	--			3.5E-06	--	2.7E-05	3.1E-05

TABLE 9.2A.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment	2-Methylnaphthalene	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Aroclor-1248	3.6E-07	--	6.5E-07	Aroclor-1248	NA	--	--	--	--
			Aroclor-1260	5.2E-06	--	9.1E-06	Aroclor-1260	NA	--	--	--	--
			Diesel Range Organics	--	--	--	Diesel Range Organics	NA	--	--	--	--
			(Total)	5.5E-06	--	9.8E-06	(Total)		--	--	--	--

Notes:

Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
ImS = Immune System
RsS = Respiratory System

- (o) Oral exposure
(i) Inhalation exposure

Total Risk Across Surface Soil
Total Risk Across Surface Water
Total Risk Across Sediment
Total Risk Across All Media and All Exposure Routes

1.3E-04
--
1.5E-05
1.4E-04

All Exposure Routes:
Total Liver HI =

0.06

Inhalation Exposure Routes:
Inhalation Central Nervous System HI =
Inhalation Respiratory System HI =

0.00E+00
5.79E-09

Total Hazard Index Across Surface Soil
Total Hazard Index Across Surface Water
Total Hazard Index Across Sediment
Total Hazard Index Across All Media and All Exposure Routes

0.19
0.00
--
0.19

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI =
Oral / Dermal Immune System HI =
Oral / Dermal Gastrointestinal System HI =
Oral / Dermal Cardiovascular System HI =
Oral / Dermal Skin HI =
Oral / Dermal Kidney HI =
Oral / Dermal Liver HI =

0.03
0.03
0.00
0.01
0.00
0.00
0.09

TABLE 9.2B.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	2.2E-07	4.8E-12	1.1E-06	--	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	1.2E-06	2.5E-11	3.5E-06	1.3E-06	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	1.3E-07	2.8E-12	3.9E-07	4.6E-06	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	8.4E-09	1.8E-13	2.5E-08	5.2E-07	Benzo(b)fluoranthene	NA	--	--	--	--
			Benzo(k)fluoranthene	1.2E-09	6.2E-14	3.6E-09	3.3E-08	Benzo(k)fluoranthene	NA	--	--	--	--
			Chrysene	3.2E-09	6.7E-14	1.5E-08	4.9E-09	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	3.3E-07	7.0E-12	1.6E-06	1.8E-08	Dibenz(a,h)anthracene	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	8.1E-08	1.7E-12	3.9E-07	1.9E-06	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
			Dieldrin	5.4E-08	2.7E-12	1.2E-08	4.7E-07	Dieldrin	NA	2.0E-04	9.8E-09	4.5E-05	2.4E-04
			Aroclor-1260	1.2E-05	6.2E-10	2.2E-05	6.6E-08	Aroclor-1260	(o) Liver / CVS	3.3E-03	--	2.7E-03	6.0E-03
			Arsenic	5.1E-07	2.6E-10	4.2E-07	9.3E-07	Arsenic	NA	1.5E-03	--	1.1E-04	1.6E-03
			Iron	--	--	--	--	Iron	(o) Liver / CVS / GIS	5.0E-03	9.8E-09	2.9E-03	7.9E-03
			(Total)	1.5E-05	9.2E-10	2.9E-05	4.4E-05	(Total)					
			Acetone	--	--	--	--	Acetone	(o) Liver / Kidney	2.7E-06	--	1.1E-06	3.8E-06
Sediment	Sediment	Sediment	Toluene	--	--	--	--	Toluene	(o) Liver / Kidney, (i) CNS / R _{SS}	6.6E-07	--	2.1E-05	2.2E-05
			Xylenes, total	--	--	--	--	Xylenes, total	(o) Whole body	8.5E-08	--	5.0E-06	5.1E-06
			(Total)	--	--	--	--	(Total)		3.3E-06	--	2.7E-05	3.1E-05
			2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Aroclor-1248	3.6E-07	--	6.5E-07	1.0E-06	Aroclor-1248	NA	--	--	--	--
			Aroclor-1260	5.2E-06	--	9.1E-06	1.4E-05	Aroclor-1260	NA	--	--	--	--
			Diesel Range Organics	--	--	--	--	Diesel Range Organics	NA	--	--	--	--
			(Total)	5.5E-06	--	9.8E-06	1.5E-05	(Total)					
			(Total)	5.5E-06	--	9.8E-06	1.5E-05	(Total)					
			(Total)	5.5E-06	--	9.8E-06	1.5E-05	(Total)					
			(Total)	5.5E-06	--	9.8E-06	1.5E-05	(Total)					
			(Total)	5.5E-06	--	9.8E-06	1.5E-05	(Total)					
			(Total)	5.5E-06	--	9.8E-06	1.5E-05	(Total)					

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System

CVS = Cardiovascular System

GIS = Gastrointestinal System

ImS = Immune System

R_{SS} = Respiratory System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across Surface Soil

Total Risk Across Surface Water

Total Risk Across Sediment

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Total Risk Across All Media and All Exposure Routes

Inhalation Exposure Routes:

Inhalation Central Nervous System HI =

Inhalation Respiratory System HI =

Inhalation Gastrointestinal System HI =

Inhalation Cardiovascular System HI =

Inhalation Immune System HI =

Inhalation Respiratory System HI =

Inhalation Respiratory System HI =

Inhalation Respiratory System HI =

Inhalation Respiratory System HI =

Inhalation Respiratory System HI =

Inhalation Respiratory System HI =

Inhalation Respiratory System HI =

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI =

Oral / Dermal Gastrointestinal System HI =

Oral / Dermal Cardiovascular System HI =

Oral / Dermal Skin HI =

Oral / Dermal Kidney HI =

Oral / Dermal Liver HI =

Oral / Dermal Liver HI =

Oral / Dermal Liver HI =

Oral / Dermal Liver HI =

Oral / Dermal Liver HI =

Oral / Dermal Liver HI =

Oral / Dermal Liver HI =

TABLE 9.3A.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CORCS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	1.9E-06	4.0E-11	8.4E-06	--	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	8.4E-06	1.8E-10	2.3E-05	1.0E-05	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	1.1E-06	2.4E-11	3.1E-06	3.1E-05	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	5.1E-08	1.1E-12	1.4E-07	4.2E-06	Benzo(b)fluoranthene	NA	--	--	--	--
			Carbazole	2.4E-09	1.2E-13	6.5E-09	1.9E-07	Carbazole	NA	--	--	--	--
			Chrysene	2.6E-08	5.6E-13	1.2E-07	8.9E-09	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	3.9E-07	8.3E-12	1.7E-06	1.4E-07	Dibenz(a,h)anthracene	NA	--	--	--	--
			Fluoranthene	2.4E-07	5.2E-12	1.1E-06	2.1E-06	Fluoranthene	(o) Liver / CVS	1.8E-03	8.9E-08	6.1E-04	2.4E-03
			Indeno(1,2,3-cd)pyrene	--	--	--	1.3E-06	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
			Naphthalene	2.7E-08	1.4E-12	4.1E-09	--	Naphthalene	(o) Whole Body, (i) R&S	7.7E-06	9.0E-09	1.0E-06	8.7E-06
			Pyrene	6.3E-07	3.2E-11	3.3E-07	--	Pyrene	(o) Kidney	2.4E-03	1.2E-07	8.3E-04	3.3E-03
			4,4'-DDD	7.6E-07	3.8E-11	4.0E-07	3.1E-08	4,4'-DDD	NA	--	--	--	--
			Chlordane, alpha-	1.9E-07	9.7E-12	4.1E-08	9.7E-07	Chlordane, alpha-	Liver	2.8E-02	3.5E-06	1.5E-02	4.3E-02
			Chlordane, gamma-	3.7E-06	1.9E-10	5.5E-07	1.2E-06	Chlordane, gamma-	Liver	3.4E-02	4.3E-06	1.8E-02	5.2E-02
			Dieldrin	1.5E-06	7.7E-11	2.3E-07	2.3E-07	Dieldrin	(o) Liver	1.9E-03	9.4E-08	4.0E-04	2.3E-03
			Hepachlor	1.1E-07	5.7E-12	1.9E-07	4.3E-06	Hepachlor	(o) Liver	1.3E-02	6.5E-07	1.9E-03	1.5E-02
			Hepachlor Epoxide	7.3E-08	3.7E-12	1.2E-07	1.8E-06	Hepachlor Epoxide	(o) Liver	1.0E-01	5.1E-06	1.5E-02	1.2E-01
			Aroclor-1248	4.1E-06	2.1E-10	6.8E-06	3.0E-07	Aroclor-1248	NA	--	--	--	--
			Aroclor-1254	--	--	--	1.9E-07	Aroclor-1254	(o) Whole Body / ImS	1.4E-02	7.2E-07	2.3E-02	3.8E-02
			Aroclor-1260	--	--	--	1.1E-05	Aroclor-1260	NA	--	--	--	--
			Gasoline Range Organics	--	--	--	--	Gasoline Range Organics	NA	--	--	--	--
			Diesel Range Organics	--	--	--	--	Diesel Range Organics	NA	--	--	--	--
			Antimony	2.0E-07	1.0E-10	1.5E-07	3.5E-07	Antimony	(o) Whole Body	8.9E-04	--	4.7E-04	1.4E-03
			Arsenic	--	--	--	--	Arsenic	(o) Skin / CVS	3.4E-03	--	2.6E-03	6.0E-03
			Iron	--	--	--	--	Iron	(o) Liver / CVS / GIS	2.2E-03	--	1.6E-04	2.4E-03
			Thallium	2.3E-05	9.2E-10	4.6E-05	--	Thallium	(o) CVS	1.4E-03	--	9.6E-05	1.5E-03
			(Total)	--	--	--	7.0E-05	(Total)	--	2.0E-01	1.5E-05	7.8E-02	2.8E-01
Surface Water	Surface Water	Surface Water	Acetone	--	--	--	--	Acetone	(o) Liver / Kidney	4.3E-06	--	1.5E-06	5.8E-06
			Toluene	--	--	--	--	Toluene	(o) Liver / Kidney, (i) CNS / R&S	1.0E-06	--	3.1E-05	3.2E-05
			Xylenes, total	--	--	--	--	Xylenes, total	(o) Whole body	1.3E-07	--	7.3E-06	7.4E-06
			(Total)	--	--	--	--	(Total)	--	5.4E-06	--	3.9E-05	4.5E-05

Scenario Timeframe: Current
Receptor Population: Recreational Users
Receptor Age: Adolescent

TABLE 9.3A RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Receptor Population: Recreational Users
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment	2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	
			Aroclor-1248	2.1E-07	--	3.5E-07	5.6E-07	Aroclor-1248	NA	--	--	--	
			Aroclor-1260	3.0E-06	--	5.0E-06	8.0E-06	Aroclor-1260	NA	--	--	--	
			Diesel Range Organics	--	--	--	--	Diesel Range Organics	NA	--	--	--	
			(Total)	3.2E-06	--	5.3E-06	8.5E-06	(Total)	--	--	--	--	

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
InS = Immune System
RS = Respiratory System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across Surface Soil
Total Risk Across Surface Water
Total Risk Across Sediment
Total Risk Across All Media and All Exposure Routes

7.0E-05
--
8.5E-06
7.8E-05

All Exposure Routes:

Total Liver HI =

0.09

Inhalation Exposure Routes:

Inhalation Central Nervous System HI =
Inhalation Respiratory System HI =

0.00E+00
9.01E-09

Total Hazard Index Across Surface Soil
Total Hazard Index Across Surface Water
Total Hazard Index Across Sediment
Total Hazard Index Across All Media and All Exposure Routes

0.28
0.00
--
0.28

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI =
Oral / Dermal Immune System HI =
Oral / Dermal Gastrointestinal System HI =
Oral / Dermal Cardiovascular System HI =
Oral / Dermal Skin HI =
Oral / Dermal Kidney HI =
Oral / Dermal Liver HI =

0.04
0.04
0.00
0.01
0.01
0.00
0.14

TABLE 9.3.B.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Receptor Population: Recreational Users
Receptor Age: Adolescent

[illegible]

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System

CVS = Cardiovascular System

GIS = Gastrointestinal System

ImS = Immune System

RsS = Respiratory System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across Surface Soil	2.4E-05
Total Risk Across Surface Water	--
Total Risk Across Sediment	8.5E-06
Total Risk Across All Media and All Exposure Routes	3.3E-05

Total Risk Across All Media and All Exposure Routes

Inhalation Exposure Routes:

Inhalation Central Nervous System HI =

Inhalation Respiratory System HI =

0.00E+00	0.00E+00

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI =

Oral / Dermal Gastrointestinal System HI =

Oral / Dermal Cardiovascular System HI =

Oral / Dermal Skin HI =

Oral / Dermal Kidney HI =

Oral / Dermal Liver HI =

Total Hazard Index Across Surface Soil	0.01
Total Hazard Index Across Surface Water	0.00
Total Hazard Index Across Sediment	--
Total Hazard Index Across All Media and All Exposure Routes	0.01

Total Hazard Index Across Surface Soil

Total Hazard Index Across Surface Water

Total Hazard Index Across Sediment

Across All Media and All Exposure Routes

0.00
00.0
10.0
10.0
00.0
00.0

TABLE 9.4A.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEIUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future Receptor Population: Residents Receptor Age: Adult				Carcinogenic Risk				Chemical		Non-Carcinogenic Hazard Quotient				
Medium	Exposure Medium	Exposure Point	Chemical	Ingestion	Inhalation	Dermal	Exposure Routes Total	Chemical		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Carbazole Chrysene Dibenz(a,h)anthracene Fluoranthene Indeno(1,2,3-cd)pyrene Naphthalene Pyrene 4,4'-DDD Chlordane, alpha- Chlordane, gamma- Dieldrin Heptachlor Heptachlor Epoxide Aroclor-1254 Aroclor-1260 Gasoline Range Organics Diesel Range Organics Antimony Arsenic Iron Thallium	2.4E-05 1.0E-04 1.4E-07 6.4E-07 3.0E-08 3.3E-07 4.8E-06 3.0E-06 3.4E-07 7.9E-06 2.4E-06 4.6E-05 1.9E-05 1.4E-06 9.2E-07 5.1E-05	1.5E-09 6.7E-09 9.0E-10 4.1E-11 4.5E-12 2.1E-11 3.1E-10 1.9E-10 5.1E-11 1.2E-09 1.4E-09 3.7E-10 7.1E-09 2.9E-09 2.1E-10 1.4E-10 7.7E-09	4.0E-05 1.1E-04 1.5E-05 6.6E-07 3.1E-08 5.5E-07 8.8E-07 5.0E-06 1.9E-08 1.6E-06 1.9E-07 2.6E-06 1.1E-06 8.9E-07 5.7E-07 3.2E-05	6.3E-05 2.1E-04 2.9E-05 1.3E-06 6.0E-08 8.8E-07 1.3E-05 8.1E-06 3.6E-07 9.5E-06 1.1E-05 2.6E-06 4.9E-05 2.0E-05 2.3E-06 1.5E-06 8.3E-05	2-Methylnaphthalene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Carbazole Chrysene Dibenz(a,h)anthracene Fluoranthene Indeno(1,2,3-cd)pyrene Naphthalene Pyrene 4,4'-DDD Chlordane, alpha- Chlordane, gamma- Dieldrin Heptachlor Heptachlor Epoxide Aroclor-1254 Aroclor-1260 Gasoline Range Organics Diesel Range Organics Antimony Arsenic Iron Thallium		NA NA NA NA NA NA NA (o) Liver / CVS NA (o) Whole Body, (i) R&S (o) Kidney NA Liver Liver (o) Liver (o) Liver (o) Liver NA NA NA NA (o) Whole Body (o) Skin / CVS (o) Liver / CVS / GIS (o) CVS	-- -- -- -- -- -- -- 8.3E-03 -- 3.6E-05 1.1E-02 -- 1.3E-01 1.6E-01 8.8E-03 6.0E-02 4.7E-01 -- 6.7E-02 -- -- -- 4.2E-03 1.6E-02 1.0E-02 6.4E-03 9.6E-01	-- -- -- -- -- -- -- 1.3E-06 -- 1.3E-07 1.7E-06 -- 5.0E-05 6.0E-05 7.0E-04 9.1E-06 7.2E-05 1.0E-05 -- -- -- -- -- -- -- -- -- -- -- 2.0E-04	-- -- -- -- -- -- -- 1.1E-03 -- 1.8E-06 1.5E-03 -- 2.6E-02 3.2E-02 7.0E-04 3.3E-03 2.6E-02 4.1E-02 -- -- 8.3E-04 4.7E-03 2.7E-04 1.7E-04 1.4E-01	-- -- -- -- -- -- -- 9.4E-03 -- 3.8E-05 1.3E-02 -- 1.6E-01 1.9E-01 9.5E-03 6.4E-02 5.0E-01 -- 1.1E-01 -- -- -- 5.0E-03 2.1E-02 1.1E-02 6.5E-03 1.1E+00
Groundwater	Groundwater	Tap	Benzenes Chloroform 2-Methylnaphthalene Naphthalene Heptachlor Epoxide MCPA Antimony Arsenic Iron Manganese Thallium	1.8E-06 9.2E-07 -- 1.4E-06 -- 4.2E-04 -- -- -- -- -- 4.3E-04	1.3E-07 1.4E-06 -- -- -- -- -- 1.5E-06	8.9E-08 9.2E-08 -- 2.5E-07 -- 2.3E-06 -- 2.7E-06	2.0E-06 2.4E-06 -- 1.7E-06 -- 4.3E-04 -- 4.3E-04	Benzenes Chloroform 2-Methylnaphthalene Naphthalene Heptachlor Epoxide MCPA Antimony Arsenic Iron Manganese Thallium		CVS (o) Liver NA (o) Whole Body, (i) R&S (o) Liver (o) Kidney / Liver (o) Whole Body (o) Skin / CVS (o) Liver / CVS / GIS CNS (o) CVS	3.1E-02 4.4E-02 -- 3.0E-03 3.5E-02 2.4E-00 7.5E-01 2.7E-00 6.2E-00 5.1E-01 2.4E-00 1.5E+01	8.0E-03 6.0E-01 -- -- -- -- -- 6.0E-01	1.6E-03 4.4E-03 -- 5.8E-04 6.0E-03 5.3E-02 8.5E-02 1.5E-02 6.3E-02 2.9E-02 3.5E-02 3.2E-01	4.1E-02 6.4E-01 -- 3.6E-03 4.1E-02 2.5E+00 8.4E-01 2.8E+00 6.3E+00 5.4E-01 2.4E+00 1.6E+01

TABLE 9.4A.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Surface Water	Acetone	--	--	--	--	(Total) Acetone Toluene Xylenes, total	(o) Liver / Kidney	2.7E-06	--	1.1E-06	3.8E-06
			Toluene	--	--	--	--		(i) Liver / Kidney, (i) CNS / R&S	6.6E-07	--	2.1E-05	2.2E-05
			Xylenes, total	--	--	--	--		(o) Whole body	8.5E-08	--	5.0E-06	5.1E-06
Sediment	Sediment	Sediment	(Total)	--	--	--	--			3.5E-06	--	2.7E-05	3.1E-05
			2-Methylnaphthalene	--	--	--	--	(Total) 2-Methylnaphthalene Aroclor-1248 Aroclor-1260 Diesel Range Organics	NA	--	--	--	--
			Aroclor-1248	3.6E-07	--	2.3E-07	5.9E-07		NA	--	--	--	--
			Aroclor-1260	5.2E-06	--	3.2E-06	8.4E-06		NA	--	--	--	--
			(Total)	5.5E-06	--	3.4E-06	8.9E-06		NA	--	--	--	--

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System

CVS = Cardiovascular System

GIS = Gastrointestinal System

ImS = Immune System

R&S = Respiratory System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across All Media and All Exposure Routes
Total Risk Across Surface Soil
Total Risk Across Groundwater
Total Risk Across Surface Water
Total Risk Across Sediment
Total Risk Across All Media and All Exposure Routes

5.1E-04
4.3E-04
--
8.9E-06
9.5E-04

Total Hazard Index Across Surface Soil
Total Hazard Index Across Groundwater
Total Hazard Index Across Surface Water
Total Hazard Index Across Sediment
Total Hazard Index Across All Media and All Exposure Routes

1.10
6.01
0.00
--
17.10

All Exposure Routes:

Total Central Nervous System HI = 0.54
Total Cardiovascular System HI = 0.04
Total Liver HI = 0.35

0.54
0.04
0.35

Inhalation Exposure Routes:

Inhalation Central Nervous System HI = 0.00E+00
Inhalation Respiratory System HI = 1.27E-07

0.00E+00
1.27E-07

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI = 0.96
Oral / Dermal Immune System HI = 0.11
Oral / Dermal Gastrointestinal System HI = 6.29
Oral / Dermal Cardiovascular System HI = 1.43
Oral / Dermal Skin HI = 2.78
Oral / Dermal Kidney HI = 2.48
Oral / Dermal Liver HI = 9.42

0.96
0.11
6.29
1.43
2.78
2.48
9.42

TABLE 9.4B.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	1.6E-06	1.0E-10	2.7E-06	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	8.5E-06	5.4E-10	8.8E-06	Benzo(a)anthracene	NA	--	--	--	--
Groundwater	Groundwater	Top	Benzo(a)pyrene	9.6E-07	6.2E-11	1.0E-06	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	6.1E-08	3.9E-12	6.3E-08	Benzo(b)fluoranthene	NA	--	--	--	--
Surface Water	Surface Water	Surface Water	Benzo(k)fluoranthene	8.9E-09	1.3E-12	9.3E-09	Benzo(k)fluoranthene	NA	--	--	--	--
			Chrysene	2.3E-08	1.5E-12	3.8E-08	Chrysene	NA	--	--	--	--
Sediment	Sediment	Sediment	Dibenz(a,h)anthracene	2.4E-06	1.5E-10	4.0E-06	Dibenz(a,h)anthracene	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	5.9E-07	3.8E-11	9.9E-07	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
Groundwater	Groundwater	Top	Dieldrin	3.9E-07	5.9E-11	3.1E-08	Dieldrin	(o) Liver	1.4E-03	2.1E-07	1.1E-04	1.5E-03
			Aroclor-1260	9.0E-05	1.4E-08	5.6E-05	Aroclor-1260	NA	2.4E-02	--	7.0E-03	3.1E-02
Surface Water	Surface Water	Surface Water	Arsenic	3.7E-06	5.6E-09	1.1E-06	Arsenic	(o) Skin / CVS	1.1E-02	--	2.9E-04	1.1E-02
			Iron	1.1E-04	2.0E-08	7.4E-05	Iron	(o) Liver / CVS / GIS	3.6E-02	2.1E-07	7.4E-03	4.4E-02
Groundwater	Groundwater	Top	Benzo(a)anthracene	1.8E-06	1.3E-10	8.9E-06	Benzo(a)anthracene	CVS	3.1E-02	8.0E-03	1.6E-03	4.1E-02
			Chloroform	9.2E-07	1.4E-06	9.2E-08	Chloroform	(o) Liver	4.4E-02	6.0E-01	4.4E-03	6.4E-01
Surface Water	Surface Water	Surface Water	2-Methylnaphthalene	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Naphthalene	--	--	--	Naphthalene	(o) Whole Body, (i) R/S	3.0E-03	--	5.8E-04	3.6E-03
Sediment	Sediment	Sediment	Heptachlor Epoxide	1.4E-06	--	2.5E-07	Heptachlor Epoxide	(o) Liver	3.5E-02	--	6.0E-03	4.1E-02
			MCPA	--	--	--	MCPA	(o) Kidney / Liver	2.4E+00	--	5.3E-02	2.5E+00
Groundwater	Groundwater	Top	Antimony	4.2E-04	--	--	Antimony	(o) Whole Body	7.5E-01	--	8.3E-02	8.4E-01
			Arsenic	--	--	--	Arsenic	(o) Skin / CVS	2.7E+00	--	1.5E-02	2.8E+00
Surface Water	Surface Water	Surface Water	Iron	--	--	--	Iron	(o) Liver / CVS / GIS	6.2E+00	--	9.3E-02	6.3E+00
			Manganese	--	--	--	Manganese	CNS	5.1E-01	--	2.9E-02	5.4E-01
Sediment	Sediment	Sediment	Thallium	--	--	--	Thallium	(o) CVS	2.4E+00	--	3.5E-02	2.4E+00
			Acetone	4.3E-04	1.5E-06	2.7E-06	Acetone	(o) Liver / Kidney	1.5E+01	6.0E-01	3.2E-01	1.6E+01
Groundwater	Groundwater	Top	Toluene	--	--	--	Toluene	(o) Liver / Kidney, (i) CNS / R/S	2.7E-06	--	1.1E-06	3.8E-06
			Xylenes, total	--	--	--	Xylenes, total	(o) Liver / Kidney, (i) CNS / R/S	6.6E-07	--	2.1E-05	2.2E-05
Surface Water	Surface Water	Surface Water	2-Methylnaphthalene	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Aroclor-1248	3.6E-07	--	2.3E-07	Aroclor-1248	NA	--	--	--	--
Sediment	Sediment	Sediment	Aroclor-1260	5.2E-06	--	3.2E-06	Aroclor-1260	NA	--	--	--	--
			Diesel Range Organics	5.5E-06	--	3.4E-06	Diesel Range Organics	NA	--	--	--	--

Notes:
Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
ImmS = Immune System
RtS = Respiratory System
(o) Oral exposure
(i) Inhalation exposure

Oral and Dermal Exposure Routes:
Oral / Dermal Whole Body HI = 0.84
Oral / Dermal Gastrointestinal System HI = 6.29
Oral / Dermal Cardiovascular System HI = 11.47
Oral / Dermal Skin HI = 2.79
Oral / Dermal Kidney HI = 2.46
Oral / Dermal Liver HI = 8.34

All Exposure Routes:
Total Central Nervous System HI = 0.54
Total Cardiovascular System HI = 0.04

Inhalation Exposure Routes:
Inhalation Central Nervous System HI = 0.00E+00
Inhalation Respiratory System HI = 0.00E+00

Total Risk Across All Media and All Exposure Routes:
Total Risk Across Surface Soil = 1.8E-04
Total Risk Across Groundwater = 4.3E-04
Total Risk Across Surface Water = 8.9E-06
Total Risk Across Sediment = 6.2E-04

Total Hazard Index Across All Media and All Exposure Routes:
Total Hazard Index Across Surface Soil = 0.04
Total Hazard Index Across Groundwater = 16.01
Total Hazard Index Across Surface Water = 0.00
Total Hazard Index Across Sediment = 16.05

TABLE 9.5A.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	5.5E-05	1.3E-09	6.5E-05	1.2E-04	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	2.4E-04	5.9E-09	1.8E-04	4.2E-04	Benzo(a)anthracene	NA	--	--	--	--
Groundwater	Groundwater	Tap	Benzo(a)pyrene	3.3E-05	7.9E-10	2.4E-05	5.6E-05	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	1.5E-06	3.6E-11	1.1E-06	2.6E-06	Benzo(b)fluoranthene	NA	--	--	--	--
			Benzo(k)fluoranthene	6.9E-08	3.9E-12	5.0E-08	1.2E-07	Benzo(k)fluoranthene	NA	--	--	--	--
			Carbazole	7.7E-07	1.9E-11	9.0E-07	1.7E-06	Carbazole	NA	--	--	--	--
			Chrysene	1.1E-05	2.7E-10	1.3E-05	2.5E-05	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	7.0E-06	1.7E-10	8.3E-06	1.5E-05	Dibenz(a,h)anthracene	(o) Liver / CVS	7.8E-02	4.4E-06	7.0E-03	8.5E-02
			Fluoranthene	--	--	--	--	Fluoranthene	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	--	Indeno(1,2,3-cd)pyrene	(o) Whole Body, (i) R&S	3.4E-04	4.5E-07	1.2E-05	3.5E-04
			Naphthalene	--	--	--	--	Naphthalene	(o) Kidney	1.1E-01	6.1E-06	9.6E-03	1.2E-01
			Pyrene	7.9E-07	4.5E-11	3.2E-08	8.2E-07	Pyrene	NA	--	--	--	--
			4,4'-DDD	1.8E-05	1.0E-09	2.6E-06	2.1E-05	4,4'-DDD	Liver	1.2E+00	1.7E-04	1.7E-01	1.4E+00
			Chlordane, alpha-	2.2E-05	1.3E-09	3.1E-06	2.5E-05	Chlordane, alpha-	Liver	1.5E+00	2.1E-04	2.1E-01	1.7E+00
			gamma-Dieldrin	5.6E-06	3.2E-10	3.1E-07	5.9E-06	gamma-Dieldrin	(o) Liver	8.2E-02	4.6E-06	4.6E-03	8.6E-02
			Heptachlor	1.1E-04	6.2E-09	4.2E-06	1.1E-04	Heptachlor	(o) Liver	5.6E-01	3.2E-05	2.2E-02	5.8E-01
			Heptachlor Epoxide	4.5E-05	2.5E-09	1.7E-06	4.7E-05	Heptachlor Epoxide	(o) Liver	4.4E+00	2.5E-04	1.7E-01	4.6E+00
Groundwater	Groundwater	Tap	Aroclor-1248	3.3E-06	1.9E-10	1.5E-06	4.8E-06	Aroclor-1248	NA	--	--	--	--
			Aroclor-1254	2.1E-06	1.2E-10	9.3E-07	3.1E-06	Aroclor-1254	(o) Whole Body / ImS	6.2E-01	3.5E-05	2.7E-01	8.9E-01
			Aroclor-1260	1.2E-04	6.8E-09	5.2E-05	1.7E-04	Aroclor-1260	NA	--	--	--	--
			Gasoline Range Organics	--	--	--	--	Gasoline Range Organics	NA	--	--	--	--
			Diesel Range Organics	--	--	--	--	Diesel Range Organics	NA	--	--	--	--
			Antimony	--	--	--	--	Antimony	(o) Whole Body	3.9E-02	--	5.5E-03	4.5E-02
			Arsenic	5.7E-06	3.3E-09	1.2E-06	6.9E-06	Arsenic	(o) Skin / CVS	1.5E-01	--	3.0E-02	1.8E-01
			Iron	--	--	--	--	Iron	(o) Liver / CVS / GIS	9.6E-02	--	1.8E-03	9.8E-02
			Thallium	--	--	--	--	Thallium	(o) CVS	5.9E-02	--	1.1E-03	6.1E-02
			(Total)	6.8E-04	3.0E-08	3.6E-04	1.0E-03	(Total)		8.9E+00	7.2E-04	9.1E-01	9.8E+00
			Benzene	1.0E-06	1.1E-07	3.8E-08	1.2E-06	Benzene	CVS	7.2E-02	2.8E-02	2.7E-03	1.0E-01
			Chloroform	5.3E-07	1.2E-06	3.9E-08	1.8E-06	Chloroform	(o) Liver	1.0E-01	2.1E+00	7.5E-03	2.2E+00
			2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Naphthalene	--	--	--	--	Naphthalene	(o) Whole Body, (i) R&S	7.0E-03	--	1.0E-03	8.0E-03
			Heptachlor Epoxide	8.3E-07	--	1.0E-07	9.4E-07	Heptachlor Epoxide	(o) Liver	8.2E-02	--	1.0E-02	9.2E-02
			MCPA	--	--	--	--	MCPA	(o) Kidney / Liver	5.6E+00	--	9.1E-02	5.7E+00
			Antimony	--	--	--	--	Antimony	(o) Whole Body	1.8E+00	--	1.5E-01	1.9E+00
			Arsenic	2.5E-04	--	9.9E-07	2.5E-04	Arsenic	(o) Skin / CVS	6.4E+00	--	2.6E-02	6.4E+00
			Iron	--	--	--	--	Iron	(o) Liver / CVS / GIS	1.4E+01	--	1.6E-01	1.5E+01
			Manganese	--	--	--	--	Manganese	CNS	1.2E+00	--	4.9E-02	1.2E+00
			Thallium	--	--	--	--	Thallium	(o) CVS	5.5E+00	--	6.1E-02	5.6E+00
			(Total)	2.5E-04	1.4E-06	1.2E-06	2.5E-04	(Total)		3.5E+01	2.1E+00	5.5E-01	3.8E+01

TABLE 9.5A.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Surface Water	Acetone Toluene Xylenes, total (Total)	-- -- -- --	-- -- -- --	-- -- -- --	-- -- -- --	Acetone Toluene Xylenes, total (Total)	(o) Liver / Kidney (o) Liver / Kidney, (i) CNS / R _{SS} (o) Whole body	6.4E-05 1.5E-05 2.0E-06 8.1E-05	-- -- -- --	2.5E-06 4.8E-05 1.2E-05 6.2E-05	6.6E-05 6.4E-05 1.4E-05 1.4E-04
Sediment	Sediment	Sediment	2-Methylnaphthalene Aroclor-1248 Aroclor-1260 Diesel Range Organics (Total)	-- 8.4E-07 1.2E-05 1.3E-05	-- -- -- --	-- 3.7E-07 5.2E-06 5.6E-06	-- 1.2E-06 1.7E-05 1.8E-05	2-Methylnaphthalene Aroclor-1248 Aroclor-1260 Diesel Range Organics (Total)	NA NA NA NA	-- -- -- --	-- -- -- --	-- -- -- --	-- -- -- --

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System

CVS = Cardiovascular System

GIS = Gastrointestinal System

ImS = Immune System

R_{SS} = Respiratory System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across Surface Soil
Total Risk Across Groundwater
Total Risk Across Surface Water
Total Risk Across Sediment
Total Risk Across All Media and All Exposure Routes

1.0E-03
2.5E-04
--
1.8E-05
1.3E-03

All Exposure Routes:

Total Central Nervous System HI =

Total Cardiovascular System HI =

Total Liver HI =

1.25
0.10
3.09

Inhalation Exposure Routes:

Inhalation Central Nervous System HI =

Inhalation Respiratory System HI =

0.00E+00
4.45E-07

Total Hazard Index Across Surface Soil
Total Hazard Index Across Groundwater
Total Hazard Index Across Surface Water
Total Hazard Index Across Sediment
Total Hazard Index Across All Media and All Exposure Routes

9.84
37.86
0.00
47.70

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI =

Oral / Dermal Immune System HI =

Oral / Dermal Gastrointestinal System HI =

Oral / Dermal Cardiovascular System HI =

Oral / Dermal Skin HI =

Oral / Dermal Kidney HI =

Oral / Dermal Liver HI =

2.85
0.89
14.68
27.01
6.60
5.83
25.96

TABLE 9.5B.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEIBELINE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	3.8E-06	9.2E-11	4.5E-06	8.3E-06	2-Methylnaphthalene	NA	--	--	--	
			Benzo(a)anthracene	2.0E-05	4.8E-10	1.4E-05	3.4E-05	Benzo(a)anthracene	NA	--	--	--	
			Benzo(a)pyrene	2.2E-06	5.4E-11	1.6E-06	3.9E-06	Benzo(a)pyrene	NA	--	--	--	
			Benzo(b)fluoranthene	1.4E-07	3.4E-12	1.0E-07	2.5E-07	Benzo(b)fluoranthene	NA	--	--	--	
			Benzo(k)fluoranthene	2.1E-08	1.2E-12	1.5E-08	3.6E-08	Benzo(k)fluoranthene	NA	--	--	--	
			Carbazole	5.4E-08	1.3E-12	6.3E-08	1.2E-07	Carbazole	NA	--	--	--	
			Chrysene	5.4E-06	1.3E-10	6.5E-06	1.2E-05	Chrysene	NA	--	--	--	
			Dibenz(a,h)anthracene	1.4E-06	3.3E-11	1.6E-06	3.0E-06	Dibenz(a,h)anthracene	NA	--	--	--	
			Indeno(1,2,3-cd)pyrene	9.1E-07	5.2E-11	5.1E-08	9.6E-07	Indeno(1,2,3-cd)pyrene	NA	--	--	--	
			Dieldrin	2.1E-04	1.2E-08	9.1E-05	3.0E-04	Dieldrin	(o) Liver	1.3E-02	7.6E-07	7.4E-04	
			Aroclor-1260	8.6E-06	4.9E-09	1.8E-06	1.0E-05	Aroclor-1260	NA	2.2E-01	--	4.6E-02	
			Arsenic	--	--	--	1.0E-05	Arsenic	(o) Skin / CVS	1.0E-01	--	1.9E-03	
			Iron	--	--	--	1.0E-05	Iron	(o) Liver / CVS / GIS	3.4E-01	7.6E-07	4.9E-02	
			(Total)	2.5E-04	1.8E-08	1.2E-04	3.7E-04	(Total)		7.2E-02	2.8E-02	2.7E-03	
Groundwater	Groundwater	Tap	Benzene	1.0E-06	1.1E-07	3.8E-08	1.2E-06	Benzene	CVS	1.0E-01	2.1E+00	7.5E-03	
			Chloroform	5.3E-07	1.2E-06	3.9E-08	1.8E-06	Chloroform	(o) Liver	1.0E-01	2.1E+00	7.5E-03	
			2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	
			Naphthalene	8.3E-07	--	1.0E-07	--	Naphthalene	(o) Whole Body, (i) R/S	7.0E-03	--	1.0E-03	
			Hepachlor Epoxide	--	--	--	9.4E-07	Hepachlor Epoxide	(o) Liver	8.2E-02	--	1.0E-02	
			MCPA	--	--	--	--	MCPA	(o) Kidney / Liver	5.6E+00	--	9.1E-02	
			Antimony	--	--	--	--	Antimony	(o) Whole Body	1.8E+00	--	1.5E-01	
			Arsenic	2.5E-04	--	9.9E-07	2.5E-04	Arsenic	(o) Skin / CVS	6.4E+00	--	2.6E-02	
			Iron	--	--	--	--	Iron	(o) Liver / CVS / GIS	1.4E+01	--	1.6E-01	
			Manganese	--	--	--	--	Manganese	CNS	1.2E+00	--	4.9E-02	
			Thallium	--	--	--	--	Thallium	(o) CVS	5.5E+00	--	6.1E-02	
			(Total)	2.5E-04	1.4E-06	1.2E-06	2.5E-04	(Total)		3.5E+01	2.1E+00	5.5E-01	
			Acetone	--	--	--	--	Acetone	(o) Liver / Kidney	6.4E-05	--	2.5E-06	
			Toluene	--	--	--	--	Toluene	(o) Liver / Kidney, (i) CNS / R/S	1.5E-05	--	4.8E-05	
Xylenes, total	--	--	--	--	Xylenes, total	(o) Whole body	2.0E-06	--	1.2E-05				
Sediment	Sediment	Sediment	(Total)	--	--	--	--	(Total)		--	6.2E-05	1.4E-04	
			2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	
			Aroclor-1248	8.4E-07	--	3.7E-07	1.2E-06	Aroclor-1248	NA	--	--	--	
			Aroclor-1260	1.2E-05	--	5.2E-06	1.7E-05	Aroclor-1260	NA	--	--	--	
			Diesel Range Organics	--	--	--	--	Diesel Range Organics	NA	--	--	--	

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System

CVS = Cardiovascular System

GIS = Gastrointestinal System

ImmS = Immune System

R/S = Respiratory System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across Surface Soil

Total Risk Across Groundwater

Total Risk Across Surface Water

Total Risk Across Sediment

Total Risk Across All Media and All Exposure Routes

All Exposure Routes:

Total General Nervous System HI =

Total Cardiovascular System HI =

Inhalation Exposure Routes:

Inhalation General Nervous System HI =

Inhalation Respiratory System HI =

Total Risk Across Surface Soil

Total Risk Across Groundwater

Total Risk Across Surface Water

Total Risk Across Sediment

Total Risk Across All Media and All Exposure Routes

All Exposure Routes:

Total General Nervous System HI =

Total Cardiovascular System HI =

Inhalation Exposure Routes:

Inhalation General Nervous System HI =

Inhalation Respiratory System HI =

Total Hazard Index Across Surface Soil

Total Hazard Index Across Groundwater

Total Hazard Index Across Surface Water

Total Hazard Index Across Sediment

Total Hazard Index Across All Media and All Exposure Routes

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI =

Oral / Dermal Gastrointestinal System HI =

Oral / Dermal Cardiovascular System HI =

Oral / Dermal Skin HI =

Oral / Dermal Kidney HI =

Oral / Dermal Liver HI =

TABLE 9.4A.CT
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEIUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	3.0E-06	3.7E-10	8.7E-06	1.2E-05	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	1.3E-05	1.6E-09	2.4E-05	3.7E-05	Benzo(a)anthracene	NA	--	--	--	--
Surface Soil	Surface Soil	Surface Soil	Benzo(a)pyrene	1.8E-06	2.2E-10	3.2E-06	5.0E-06	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	8.0E-08	9.9E-12	1.5E-07	2.3E-07	Benzo(b)fluoranthene	NA	--	--	--	--
Surface Soil	Surface Soil	Surface Soil	Benzo(k)fluoranthene	3.7E-09	1.1E-12	6.8E-09	1.0E-08	Benzo(k)fluoranthene	NA	--	--	--	--
			Carbazole	4.1E-08	5.1E-12	1.2E-07	1.6E-07	Carbazole	NA	--	--	--	--
Surface Soil	Surface Soil	Surface Soil	Chrysene	6.1E-07	7.5E-11	1.8E-06	2.4E-06	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	3.8E-07	4.7E-11	1.1E-06	1.5E-06	Dibenz(a,h)anthracene	NA	2.8E-03	8.1E-07	6.3E-04	3.4E-03
Surface Soil	Surface Soil	Surface Soil	Fluoranthene	--	--	--	--	Fluoranthene	(o) Liver / CVS	1.2E-05	8.2E-08	1.1E-06	1.3E-05
			Indeno(1,2,3-cd)pyrene	--	--	--	--	Indeno(1,2,3-cd)pyrene	(o) Whole Body, (i) R&S	3.8E-03	1.1E-06	8.6E-04	4.7E-03
Surface Soil	Surface Soil	Surface Soil	Naphthalene	4.2E-08	1.2E-11	4.2E-09	4.7E-08	Naphthalene	(o) Kidney	4.4E-02	3.2E-05	1.5E-02	5.9E-02
			Pyrene	9.9E-07	2.9E-10	3.5E-07	1.3E-06	Pyrene	Liver	5.3E-02	3.9E-05	1.9E-02	7.2E-02
Surface Soil	Surface Soil	Surface Soil	4,4'-DDD	1.2E-06	3.5E-10	4.2E-07	1.6E-06	4,4'-DDD	Liver	2.9E-03	8.5E-07	4.1E-04	3.3E-03
			Chlordane, alpha-	3.0E-07	8.8E-11	4.2E-08	3.4E-07	Chlordane, alpha-	(o) Liver	2.0E-02	5.9E-06	2.0E-03	2.2E-02
Surface Soil	Surface Soil	Surface Soil	Chlordane, gamma-	5.8E-06	1.7E-09	5.7E-07	6.4E-06	Chlordane, gamma-	(o) Liver	1.6E-01	4.6E-05	1.5E-02	1.7E-01
			Dieldrin	2.4E-06	7.0E-10	2.3E-07	2.6E-06	Dieldrin	NA	2.2E-02	6.5E-06	2.4E-02	4.7E-02
Surface Soil	Surface Soil	Surface Soil	Hepachlor Epoxide	1.8E-07	5.2E-11	2.0E-07	3.7E-07	Hepachlor Epoxide	(o) Whole Body / ImmS	--	--	--	--
			Aroclor-1248	1.1E-07	3.3E-11	1.3E-07	2.4E-07	Aroclor-1248	NA	--	--	--	--
Surface Soil	Surface Soil	Surface Soil	Aroclor-1254	6.4E-06	1.9E-09	7.0E-06	1.3E-05	Aroclor-1254	NA	--	--	--	--
			Gasoline Range Organics	--	--	--	--	Gasoline Range Organics	NA	--	--	--	--
Surface Soil	Surface Soil	Surface Soil	Diesel Range Organics	--	--	--	--	Diesel Range Organics	NA	--	--	--	--
			Antimony	3.1E-07	9.0E-10	1.6E-07	4.7E-07	Antimony	(o) Whole Body	1.4E-03	--	4.9E-04	1.9E-03
Surface Soil	Surface Soil	Surface Soil	Arsenic	--	--	--	--	Arsenic	(o) Skin / CVS	5.3E-03	--	2.7E-03	8.1E-03
			Iron	--	--	--	--	Iron	(o) Liver / CVS / GIS	3.4E-03	--	1.6E-04	3.6E-03
Surface Soil	Surface Soil	Surface Soil	Thallium	--	--	--	--	Thallium	(o) CVS	2.1E-03	--	9.9E-05	2.2E-03
			(Total)	3.7E-05	8.3E-09	4.8E-05	8.5E-05	(Total)	--	3.2E-01	1.3E-04	8.1E-02	4.0E-01
Groundwater	Groundwater	Tap	Benzo(a)anthracene	3.1E-07	3.2E-08	2.5E-08	3.6E-07	Benzo(a)anthracene	CVS	1.5E-02	5.3E-03	1.2E-03	2.1E-02
			Benzo(a)pyrene	1.6E-07	3.5E-07	2.6E-08	5.4E-07	Benzo(a)pyrene	(o) Liver	2.1E-02	4.0E-01	3.3E-03	4.2E-01
Groundwater	Groundwater	Tap	2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Naphthalene	--	--	--	--	Naphthalene	(o) Whole Body, (i) R&S	1.4E-03	--	4.3E-04	1.8E-03
Groundwater	Groundwater	Tap	Hepachlor Epoxide	2.5E-07	--	6.8E-08	3.2E-07	Hepachlor Epoxide	(o) Liver	1.6E-02	--	4.5E-03	2.1E-02
			MCPA	--	--	--	--	MCPA	(o) Kidney / Liver	1.1E+00	--	3.9E-02	1.2E+00
Groundwater	Groundwater	Tap	Antimony	--	--	--	--	Antimony	(o) Whole Body	3.3E-01	--	6.3E-02	4.2E-01
			Arsenic	7.4E-05	--	6.5E-07	7.5E-05	Arsenic	(o) Skin / CVS	1.3E+00	--	1.1E-02	1.3E+00
Groundwater	Groundwater	Tap	Iron	--	--	--	--	Iron	(o) Liver / CVS / GIS	2.9E+00	--	6.9E-02	3.0E+00
			Manganese	--	--	--	--	Manganese	CNS	2.4E-01	--	2.1E-02	2.6E-01
Groundwater	Groundwater	Tap	Thallium	--	--	--	--	Thallium	(o) CVS	1.1E+00	--	2.6E-02	1.1E+00
			(Total)	7.5E-05	3.9E-07	7.6E-07	7.6E-05	(Total)	--	7.1E+00	4.0E-01	2.4E-01	7.7E+00

TABLE 9.4A.CT
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Surface Water	Acetone	--	--	--	--	(Total) Acetone Toluene Xylenes, total	(o) Liver / Kidney	2.7E-06	--	9.4E-07	3.7E-06
			Toluene	--	--	--	--		(o) Liver / Kidney, (i) CNS / R&S	6.6E-07	--	1.9E-05	1.9E-05
			Xylenes, total	--	--	--	--		(o) Whole body	8.5E-08	--	4.4E-06	4.5E-06
Sediment	Sediment	Sediment	(Total)	--	--	--	--	(Total)		3.5E-06	--	2.4E-05	2.7E-05
			2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene Aroclor-1248 Aroclor-1260 Diesel Range Organics	NA	--	--	--	--
			Aroclor-1248	6.8E-08	--	7.4E-08	1.4E-07		NA	--	--	--	--
			Aroclor-1260	9.7E-07	--	1.1E-06	2.0E-06		NA	--	--	--	--
			(Total)	1.0E-06	--	1.1E-06	2.2E-06	(Total)	NA	--	--	--	--

Notes:

Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
ImS = Immune System
RsS = Respiratory System

(o) Oral exposure
(i) Inhalation exposure

Total Risk Across Surface Soil = 8.3E-05
Total Risk Across Groundwater = 7.6E-05
Total Risk Across Surface Water = --
Total Risk Across Sediment = 2.2E-06
Total Risk Across All Media and All Exposure Routes = 1.0E-04

All Exposure Routes:

Total Central Nervous System HI = 0.26
Total Cardiovascular System HI = 0.02
Total Liver HI = 0.13

Inhalation Exposure Routes:

Inhalation Central Nervous System HI = 0.00E+00
Inhalation Respiratory System HI = 8.17E-08

Total Hazard Index Across Surface Soil = 7.7E-05
Total Hazard Index Across Groundwater = 0.00
Total Hazard Index Across Surface Water = --
Total Hazard Index Across Sediment = 8.1E-05
Total Hazard Index Across All Media and All Exposure Routes = 8.1E-05

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI = 0.47
Oral / Dermal Immune System HI = 0.05
Oral / Dermal Gastrointestinal System HI = 2.97E-05
Oral / Dermal Cardiovascular System HI = 5.41E-05
Oral / Dermal Skin HI = 1.50E-05
Oral / Dermal Kidney HI = 1.17E-05
Oral / Dermal Liver HI = 4.38E-05

TABLE 9.4B.CT
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	2.0E-07	2.5E-11	6.0E-07	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	1.1E-06	1.3E-10	1.9E-06	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	1.2E-07	1.5E-11	2.2E-07	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	7.7E-09	9.5E-13	1.4E-08	Benzo(b)fluoranthene	NA	--	--	--	--
			Benzo(k)fluoranthene	1.1E-09	3.3E-13	2.0E-09	Benzo(k)fluoranthene	NA	--	--	--	--
			Carbazole	2.9E-09	3.6E-13	8.5E-09	Carbazole	NA	--	--	--	--
			Chrysene	3.0E-07	3.7E-11	8.8E-07	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	7.4E-08	9.1E-12	2.2E-07	Dibenz(a,h)anthracene	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	4.9E-08	1.4E-11	6.9E-09	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
			Dieldrin	1.1E-05	3.3E-09	1.2E-05	Dieldrin	(o) Liver	4.8E-04	1.4E-07	6.7E-05	5.4E-04
			Aroclor-1260	4.6E-07	1.4E-09	2.4E-07	Aroclor-1260	NA	--	--	--	--
			Arsenic	1.4E-05	4.9E-09	1.6E-05	Arsenic	(o) Skin / CVS	8.0E-03	--	4.1E-03	1.2E-02
			Iron	1.4E-05	4.9E-09	1.6E-05	Iron	(o) Liver / CVS / GIS	3.6E-03	--	1.7E-04	3.8E-03
			(Total)				(Total)		1.2E-02	1.4E-07	4.3E-03	1.6E-02
Groundwater	Groundwater	Tap	Benzo(a)anthracene	3.1E-07	3.2E-08	2.5E-08	Benzo(a)anthracene	CVS	1.3E-02	5.3E-03	1.2E-03	2.1E-02
			Benzo(a)pyrene	1.6E-07	3.5E-07	2.6E-08	Benzo(a)pyrene	(o) Liver	2.1E-02	4.0E-01	3.3E-03	4.2E-01
			Benzo(b)fluoranthene	--	--	--	Benzo(b)fluoranthene	NA	--	--	--	--
			Benzo(k)fluoranthene	--	--	--	Benzo(k)fluoranthene	(o) Whole Body, (i) R/S	1.4E-03	--	4.3E-04	1.8E-03
			Carbazole	2.5E-07	--	6.8E-08	Carbazole	(o) Liver	1.6E-02	--	4.5E-03	2.1E-02
			Chrysene	--	--	--	Chrysene	(o) Kidney / Liver	1.1E-00	--	3.9E-02	1.2E-00
			Dibenz(a,h)anthracene	--	--	--	Dibenz(a,h)anthracene	(o) Whole Body	3.5E-01	--	6.3E-02	4.2E-01
			Indeno(1,2,3-cd)pyrene	7.4E-05	--	6.5E-07	Indeno(1,2,3-cd)pyrene	(o) Skin / CVS	1.3E-00	--	1.1E-02	1.3E-00
			Dieldrin	--	--	--	Dieldrin	(o) Liver / CVS / GIS	2.9E-00	--	6.9E-02	3.0E-00
			Aroclor-1260	--	--	--	Aroclor-1260	CNS	2.4E-01	--	2.1E-02	2.6E-01
			Arsenic	--	--	--	Arsenic	(o) CVS	1.1E-00	--	2.6E-02	1.1E-00
			Iron	7.5E-05	3.9E-07	7.6E-07	Iron	(o) CVS	7.1E-00	4.0E-01	2.4E-01	7.7E-00
			(Total)				(Total)		2.7E-06	--	9.4E-07	3.7E-06
				--	--	--		(o) Liver / Kidney	6.6E-07	--	1.9E-05	1.9E-05
Surface Water	Surface Water	Surface Water	Benzo(a)anthracene	--	--	--	Benzo(a)anthracene	(o) Liver / Kidney, (i) CNS / R/S	8.3E-08	--	4.4E-06	4.3E-06
			Benzo(a)pyrene	--	--	--	Benzo(a)pyrene	(o) Whole body	3.5E-06	--	2.4E-05	2.7E-05
			Benzo(b)fluoranthene	--	--	--	Benzo(b)fluoranthene	NA	--	--	--	--
			Benzo(k)fluoranthene	--	--	--	Benzo(k)fluoranthene	NA	--	--	--	--
			Carbazole	6.8E-08	--	7.4E-08	Carbazole	NA	--	--	--	--
			Chrysene	9.7E-07	--	1.1E-06	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	--	--	--	Dibenz(a,h)anthracene	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
			Dieldrin	--	--	--	Dieldrin	NA	--	--	--	--
			Aroclor-1260	--	--	--	Aroclor-1260	NA	--	--	--	--
			Arsenic	1.0E-06	--	1.1E-06	Arsenic	NA	--	--	--	--
			Iron	1.0E-06	--	1.1E-06	Iron	NA	--	--	--	--
			(Total)				(Total)		--	--	--	--
				3.0E-05	--	7.6E-05			7.1E-00	4.0E-01	2.4E-01	7.7E-00
Sediment	Sediment	Sediment	Benzo(a)anthracene	--	--	--	Benzo(a)anthracene	(o) Liver / Kidney, (i) CNS / R/S	2.7E-06	--	9.4E-07	3.7E-06
			Benzo(a)pyrene	--	--	--	Benzo(a)pyrene	(o) Liver / Kidney, (i) CNS / R/S	6.6E-07	--	1.9E-05	1.9E-05
			Benzo(b)fluoranthene	--	--	--	Benzo(b)fluoranthene	(o) Whole body	8.3E-08	--	4.4E-06	4.3E-06
			Benzo(k)fluoranthene	--	--	--	Benzo(k)fluoranthene	(o) Whole body	3.5E-06	--	2.4E-05	2.7E-05
			Carbazole	6.8E-08	--	7.4E-08	Carbazole	NA	--	--	--	--
			Chrysene	9.7E-07	--	1.1E-06	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	--	--	--	Dibenz(a,h)anthracene	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	--	--	--	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
			Dieldrin	--	--	--	Dieldrin	NA	--	--	--	--
			Aroclor-1260	--	--	--	Aroclor-1260	NA	--	--	--	--
			Arsenic	1.0E-06	--	1.1E-06	Arsenic	NA	--	--	--	--
			Iron	1.0E-06	--	1.1E-06	Iron	NA	--	--	--	--
			(Total)				(Total)		--	--	--	--
				3.0E-05	--	7.6E-05			7.1E-00	4.0E-01	2.4E-01	7.7E-00

Note:

Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
ImS = Immune System
R/S = Respiratory System

(o) Oral exposure
(i) Inhalation exposure

Total Risk Across Surface Soil
Total Risk Across Groundwater
Total Risk Across Surface Water
Total Risk Across Sediment
Total Risk Across All Media and All Exposure Routes

All Exposure Routes:
Total Central Nervous System HI =
Total Cardiovascular System HI =

Inhalation Exposure Routes:
Inhalation Central Nervous System HI =
Inhalation Respiratory System HI =

Total Hazard Index Across Surface Soil
Total Hazard Index Across Groundwater
Total Hazard Index Across Surface Water
Total Hazard Index Across Sediment
Total Hazard Index Across All Media and All Exposure Routes

Oral and Dermal Exposure Routes:
Oral / Dermal Whole Body HI =
Oral / Dermal Gastrointestinal System HI =
Oral / Dermal Cardiovascular System HI =
Oral / Dermal Skin HI =
Oral / Dermal Kidney HI =
Oral / Dermal Liver HI =

TABLE 9.5A.CT
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	1.8E-05	8.9E-10	3.1E-05	4.9E-05	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	8.1E-05	3.9E-09	8.5E-05	1.7E-04	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	1.1E-05	5.3E-10	1.1E-05	2.2E-05	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	5.0E-07	2.4E-11	5.2E-07	1.0E-06	Benzo(b)fluoranthene	NA	--	--	--	--
			Carbazole	2.3E-08	2.6E-12	2.4E-08	4.7E-08	Carbazole	NA	--	--	--	--
			Chrysene	2.6E-07	1.2E-11	4.3E-07	6.9E-07	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	3.8E-06	1.8E-10	6.3E-06	1.0E-05	Dibenz(a,h)anthracene	NA	--	--	--	--
			Fluoranthene	--	--	--	--	Fluoranthene	(o) Liver / CVS	2.6E-02	3.0E-06	3.4E-03	2.9E-02
			Indeno(1,2,3-cd)pyrene	2.4E-06	1.1E-10	3.9E-06	6.3E-06	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
			Naphthalene	--	--	--	--	Naphthalene	(o) Whole Body, (i) R&S	1.1E-04	3.0E-07	5.6E-06	1.2E-04
			Pyrene	--	--	--	--	Pyrene	(o) Kidney	3.6E-02	4.0E-06	4.6E-03	4.0E-02
			4,4'-DDD	2.6E-07	3.0E-11	1.5E-08	2.8E-07	4,4'-DDD	NA	--	--	--	--
			Chlordane, alpha-	6.2E-06	7.0E-10	1.2E-06	7.4E-06	Chlordane, alpha-	Liver	4.1E-01	1.2E-04	8.2E-02	4.9E-01
			Chlordane, gamma-	7.4E-06	8.5E-10	1.5E-06	8.9E-06	Chlordane, gamma-	Liver	5.0E-01	1.4E-04	9.9E-02	6.0E-01
			Dieldrin	1.9E-06	2.1E-10	1.5E-07	2.0E-06	Dieldrin	(o) Liver	2.7E-02	3.1E-06	2.2E-03	3.0E-02
			Heptachlor	3.6E-05	4.2E-09	2.0E-06	3.8E-05	Heptachlor	(o) Liver	1.9E-01	2.1E-05	1.0E-02	2.0E-01
			Heptachlor Epoxide	1.5E-05	1.7E-09	8.3E-07	1.6E-05	Heptachlor Epoxide	(o) Liver	1.5E-00	1.7E-04	8.2E-02	1.6E-00
			Aroclor-1248	1.1E-06	1.3E-10	6.9E-07	1.8E-06	Aroclor-1248	NA	--	--	--	--
			Aroclor-1254	7.1E-07	8.1E-11	4.4E-07	1.2E-06	Aroclor-1254	(o) Whole Body / ImS	2.1E-01	2.4E-05	1.3E-01	3.4E-01
			Aroclor-1260	4.0E-05	4.5E-09	2.5E-05	6.5E-05	Aroclor-1260	NA	--	--	--	--
Groundwater	Groundwater	Tap	Gasoline Range Organics	--	--	--	--	Gasoline Range Organics	NA	--	--	--	--
			Diesel Range Organics	--	--	--	--	Diesel Range Organics	NA	--	--	--	--
			Antimony	--	--	--	--	Antimony	(o) Whole Body	1.3E-02	--	2.6E-03	1.6E-02
			Arsenic	1.9E-06	2.2E-09	5.6E-07	2.5E-06	Arsenic	(o) Skin / CVS	5.0E-02	--	1.5E-02	6.4E-02
			Iron	--	--	--	--	Iron	(o) Liver / CVS / GIS	3.2E-02	--	8.6E-04	3.3E-02
			Thallium	--	--	--	--	Thallium	(o) CVS	2.0E-02	--	5.3E-04	2.0E-02
			(Total)	2.3E-04	2.0E-08	1.7E-04	4.0E-04	(Total)		3.0E-00	4.8E-04	4.3E-01	3.4E-00
			Benzene	6.9E-07	1.1E-07	3.1E-08	8.3E-07	Benzene	CVS	4.8E-02	2.8E-02	2.2E-03	7.9E-02
			Chloroform	3.6E-07	1.2E-06	3.2E-08	1.6E-06	Chloroform	(o) Liver	6.8E-02	2.1E-00	6.0E-03	2.2E-00
			2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Naphthalene	--	--	--	--	Naphthalene	(o) Whole Body, (i) R&S	4.7E-03	--	8.0E-04	5.5E-03
			Heptachlor Epoxide	5.6E-07	--	8.4E-08	6.4E-07	Heptachlor Epoxide	(o) Liver	5.5E-02	--	8.3E-03	6.3E-02
			MCPA	--	--	--	--	MCPA	(o) Kidney / Liver	3.8E-00	--	7.3E-02	3.8E-00
			Antimony	--	--	--	--	Antimony	(o) Whole Body	1.2E-00	--	1.2E-01	1.3E-00
			Arsenic	1.6E-04	--	8.0E-07	1.7E-04	Arsenic	(o) Skin / CVS	4.3E-00	--	2.1E-02	4.3E-00
			Iron	--	--	--	--	Iron	(o) Liver / CVS / GIS	9.6E-00	--	1.3E-01	9.8E-00
			Manganese	--	--	--	--	Manganese	CNS	8.0E-01	--	4.0E-02	8.4E-01
			Thallium	--	--	--	--	Thallium	(o) CVS	3.7E-00	--	4.9E-02	3.7E-00
			(Total)	1.7E-04	1.4E-06	9.4E-07	1.7E-04	(Total)		2.4E-01	2.1E-00	4.4E-01	2.6E-01

TABLE 9.5A.CT
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Water	Surface Water	Surface Water	Acetone Toluene Xylenes, total (Total)	-- -- -- --	-- -- -- --	-- -- -- --	-- -- -- --	Acetone Toluene Xylenes, total (Total)	(o) Liver / Kidney (o) Liver / Kidney, (i) CNS / R ₅ S (o) Whole body	6.4E-05 1.5E-05 2.0E-06 8.1E-05	-- -- -- --	1.8E-06 3.5E-05 8.2E-06 4.5E-05	6.6E-05 5.0E-05 1.0E-05 1.3E-04
Sediment	Sediment	Sediment	2-Methylnaphthalene Aroclor-1248 Aroclor-1260 Diesel Range Organics (Total)	-- 4.2E-07 6.0E-06 6.4E-06	-- -- -- --	-- 2.3E-07 3.3E-06 3.5E-06	-- 6.5E-07 9.3E-06 9.9E-06	2-Methylnaphthalene Aroclor-1248 Aroclor-1260 Diesel Range Organics (Total)	NA NA NA NA	-- -- -- --	-- -- -- --	-- -- -- --	-- -- -- --

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System

CVS = Cardiovascular System

GIS = Gastrointestinal System

InS = Immune System

R₅S = Respiratory System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across All Media and All Exposure Routes
Total Risk Across Surface Soil = 4.0E-04
Total Risk Across Groundwater = 1.7E-04
Total Risk Across Surface Water = --
Total Risk Across Sediment = 9.9E-06
Total Risk Across All Media and All Exposure Routes = 5.8E-04

All Exposure Routes:
Total Central Nervous System HI = 0.84
Total Cardiovascular System HI = 0.08
Total Liver HI = 1.09

Inhalation Exposure Routes:
Inhalation Central Nervous System HI = 0.00E+00
Inhalation Respiratory System HI = 2.98E-07

Total Hazard Index Across Surface Soil = 3.42
Total Hazard Index Across Groundwater = 26.09
Total Hazard Index Across Surface Water = 0.00
Total Hazard Index Across Sediment = 29.51
Total Hazard Index Across All Media and All Exposure Routes

Oral and Dermal Exposure Routes:
Oral / Dermal Whole Body HI = 1.65
Oral / Dermal Immune System HI = 0.34
Oral / Dermal Gastrointestinal System HI = 9.81
Oral / Dermal Cardiovascular System HI = 17.95
Oral / Dermal Skin HI = 4.36
Oral / Dermal Kidney HI = 3.87
Oral / Dermal Liver HI = 15.60

TABLE 9.5B CT
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEIBUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	1.3E-06	6.1E-11	2.1E-06	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	6.6E-06	3.2E-10	6.9E-06	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	7.5E-07	3.6E-11	7.8E-07	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	4.8E-08	2.3E-12	5.0E-08	Benzo(b)fluoranthene	NA	--	--	--	--
			Chrysene	7.0E-09	7.9E-13	7.2E-09	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	1.9E-06	8.6E-13	3.0E-08	Dibenz(a,h)anthracene	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	4.6E-07	9.0E-11	3.1E-06	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
			Dieldrin	3.0E-07	2.2E-11	7.7E-07	Dieldrin	(o) Liver	4.4E-03	5.1E-07	3.6E-04	4.8E-03
			Aroclor-1260	7.0E-05	8.0E-09	4.4E-05	Aroclor-1260	(o) Skin / CVS	--	--	2.2E-02	9.7E-02
			Arsenic	2.9E-06	3.3E-09	8.5E-07	Arsenic	(o) Liver / CVS / GIS	3.3E-02	--	8.9E-04	3.4E-02
			Iron	8.4E-05	1.2E-08	5.8E-05	Iron	(o) Liver / CVS / GIS	1.1E-01	5.1E-07	2.3E-02	1.4E-01
			(Total)				(Total)					
			Benzene	6.9E-07	1.1E-07	3.1E-08	Benzene	CVS	4.8E-02	2.8E-02	2.2E-03	7.9E-02
			Chloroform	3.6E-07	1.2E-06	3.2E-08	Chloroform	(o) Liver	6.8E-02	2.1E-00	6.0E-03	2.2E+00
Surface Water	Surface Water	Surface Water	2-Methylnaphthalene	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Naphthalene	--	--	--	Naphthalene	(o) Whole Body, (i) R ₅ S	4.7E-03	--	8.0E-04	5.3E-03
			Hepachlor Epoxide	5.6E-07	--	8.4E-08	Hepachlor Epoxide	(o) Liver	5.5E-02	--	8.3E-03	6.3E-02
			MCPA	--	--	--	MCPA	(o) Kidney / Liver	3.8E-00	--	7.3E-02	3.8E+00
			Autimony	--	--	--	Autimony	(o) Whole Body	1.2E-01	--	1.2E-01	1.3E+00
			Arsenic	1.6E-04	--	8.0E-07	Arsenic	(o) Skin / CVS	4.3E+00	--	2.1E-02	4.3E+00
			Iron	--	--	--	Iron	(o) Liver / CVS / GIS	9.6E+00	--	1.3E-01	9.6E+00
			Manganese	--	--	--	Manganese	CNS	8.0E-01	--	4.0E-02	8.4E-01
			Thallium	--	--	--	Thallium	(o) CVS	3.7E+00	--	4.9E-02	3.7E+00
			(Total)				(Total)					
			Acetone	1.7E-04	1.4E-06	9.4E-07	Acetone	(o) Liver / Kidney	2.4E+01	2.1E+00	4.4E-01	2.6E+01
			Toluene	--	--	--	Toluene	(o) Liver / Kidney, (i) CNS / R ₅ S	6.4E-05	--	1.8E-06	6.6E-05
			Xylenes, total	--	--	--	Xylenes, total	(o) Whole body	1.5E-05	--	3.5E-05	5.0E-05
			(Total)				(Total)					
Sediment	Sediment	Sediment	2-Methylnaphthalene	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Aroclor-1248	4.2E-07	--	2.3E-07	Aroclor-1248	NA	--	--	--	--
			Aroclor-1260	6.0E-06	--	3.3E-06	Aroclor-1260	NA	--	--	--	--
			Diesel Range Organics	--	--	--	Diesel Range Organics	NA	--	--	--	--
			(Total)				(Total)					

Notes:

Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
ImS = Immune System
R₅S = Respiratory System

(o) Oral exposure
(i) Inhalation exposure

All Exposure Routes:
Total Central Nervous System HI = 0.84
Total Cardiovascular System HI = 0.08

Inhalation Exposure Routes:
Inhalation Central Nervous System HI = 0.00E+00
Inhalation Respiratory System HI = 0.00E+00

Total Risk Across Surface Soil
Total Risk Across Groundwater
Total Risk Across Surface Water
Total Risk Across Sediment
Total Risk Across All Media and All Exposure Routes

1.4E-04
2.7E-04
9.9E-06
3.2E-04

Total Hazard Index Across Surface Soil
Total Hazard Index Across Groundwater
Total Hazard Index Across Surface Water
Total Hazard Index Across Sediment
Total Hazard Index Across All Media and All Exposure Routes

0.14
26.09
0.00
26.23

Oral and Dermal Exposure Routes:
Oral / Dermal Whole Body HI = 1.30
Oral / Dermal Gastrointestinal System HI = 9.81
Oral / Dermal Cardiovascular System HI = 3.754
Oral / Dermal Skin HI = 4.39
Oral / Dermal Kidney HI = 3.83
Oral / Dermal Liver HI = 13.78

TABLE 9.6A.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCKA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future Receptor Population: Construction Workers Receptor Age: Adult				Jacksonville, North Carolina									
Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	3.4E-06	1.5E-11	1.9E-06	5.3E-06	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	1.5E-05	6.6E-11	5.3E-06	2.0E-05	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	2.0E-06	8.9E-12	7.2E-07	2.7E-06	Benzo(b)fluoranthene	NA	--	--	--	--
			Benzo(k)fluoranthene	9.1E-08	4.1E-13	3.3E-08	1.2E-07	Benzo(k)fluoranthene	NA	--	--	--	--
			Carbazole	4.2E-09	4.4E-14	1.5E-09	5.8E-09	Carbazole	NA	--	--	--	--
			Chrysene	4.7E-08	2.1E-13	2.7E-08	7.4E-08	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	6.9E-07	3.1E-12	4.0E-07	1.1E-06	Dibenz(a,h)anthracene	NA	--	--	--	--
			Fluoranthene	4.3E-07	1.9E-12	2.5E-07	6.8E-07	Fluoranthene	(o) Liver / CVS	2.9E-02	3.0E-07	1.3E-03	3.0E-02
			Indeno(1,2,3-cd)pyrene	--	--	--	--	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
			Naphthalene	--	--	--	--	Naphthalene	(o) Whole Body, (i) R ₅ S	1.2E-04	3.0E-08	2.1E-06	1.3E-04
			Pyrene	4.8E-08	5.1E-13	9.5E-10	4.9E-08	Pyrene	(o) Kidney	3.9E-02	4.1E-07	1.7E-03	4.1E-02
			4,4'-DDD	1.1E-06	1.2E-11	7.7E-08	1.2E-06	4,4'-DDD	NA	--	--	--	--
			Chlordane, alpha-	1.4E-06	1.4E-11	9.4E-08	1.5E-06	Chlordane, alpha-	Liver	4.5E-01	1.2E-05	3.1E-02	4.8E-01
			Chlordane, gamma-	3.4E-07	3.6E-12	9.4E-09	3.5E-07	Chlordane, gamma-	Liver	5.4E-01	1.4E-05	3.7E-02	5.8E-01
			Dieldrin	6.6E-06	7.0E-11	1.3E-07	6.8E-06	Dieldrin	(o) Liver	3.0E-02	3.2E-07	8.3E-04	3.1E-02
			Hepachlor	2.7E-06	2.9E-11	5.2E-08	2.8E-06	Hepachlor	(o) Liver	2.1E-01	2.2E-06	3.9E-03	2.1E-01
			Hepachlor Epoxide	2.0E-07	2.1E-12	4.4E-08	2.5E-07	Hepachlor Epoxide	(o) Liver	1.6E+00	1.7E-05	3.1E-02	1.7E+00
			Aroclor-1248	1.3E-07	1.4E-12	2.8E-08	1.6E-07	Aroclor-1248	NA	--	--	--	--
			Aroclor-1260	7.3E-06	7.7E-11	1.6E-06	8.9E-06	Aroclor-1260	(o) Whole Body / ImS	2.3E-01	2.4E-06	4.9E-02	2.8E-01
Subsurface Soil	Subsurface Soil	Subsurface Soil	Gasoline Range Organics	--	--	--	--	Gasoline Range Organics	NA	--	--	--	--
			Diesel Range Organics	--	--	--	--	Diesel Range Organics	NA	--	--	--	--
			Antimony	--	--	--	--	Antimony	NA	--	--	--	--
			Arsenic	3.5E-07	3.7E-11	3.5E-08	3.9E-07	Arsenic	(o) Whole Body	1.4E-02	--	9.9E-04	1.5E-02
			Iron	--	--	--	--	Iron	(o) Skin / CVS	5.5E-02	--	5.5E-03	6.0E-02
			Thallium	--	--	--	--	Thallium	(o) Liver / CVS / GIS	3.5E-02	--	3.2E-04	3.2E-02
			(Total)	4.2E-05	3.4E-10	1.1E-05	5.3E-05	(Total)	(o) CVS	2.2E-02	--	2.0E-04	2.2E-02
			2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
Benzo(a)anthracene	9.7E-09	4.3E-14	5.6E-09	1.5E-08	Benzo(a)anthracene	NA	--	--	--	--			
Benzo(a)pyrene	9.5E-08	4.2E-13	3.4E-08	1.3E-07	Benzo(a)pyrene	NA	--	--	--	--			
Benzo(b)fluoranthene	1.1E-08	4.7E-14	3.8E-09	1.4E-08	Benzo(b)fluoranthene	NA	--	--	--	--			
Benzo(k)fluoranthene	6.7E-10	3.0E-15	2.4E-10	9.1E-10	Benzo(k)fluoranthene	NA	--	--	--	--			
Bis(2-chloroethoxy)methane	--	--	--	--	Bis(2-chloroethoxy)methane	NA	--	--	--	--			
Carbazole	1.1E-10	1.2E-15	4.1E-11	1.5E-10	Carbazole	NA	--	--	--	--			
Chrysene	1.0E-10	4.6E-16	5.9E-11	1.6E-10	Chrysene	NA	--	--	--	--			
Dibenz(a,h)anthracene	3.7E-08	1.7E-13	2.1E-08	5.9E-08	Dibenz(a,h)anthracene	NA	--	--	--	--			
Indeno(1,2,3-cd)pyrene	7.1E-09	3.2E-14	4.1E-09	1.1E-08	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--			
Naphthalene	--	--	--	--	Naphthalene	NA	--	--	--	--			
Chlordane, alpha-	2.9E-08	3.0E-13	2.0E-09	3.0E-08	Chlordane, alpha-	(o) Whole Body, (i) R ₅ S	5.3E-05	1.3E-08	9.1E-07	5.4E-05			
Chlordane, gamma-	3.9E-08	4.1E-13	2.7E-09	4.1E-08	Chlordane, gamma-	Liver	1.1E-02	3.0E-07	7.8E-04	1.2E-02			
Hepachlor	4.7E-08	5.0E-13	8.9E-10	4.8E-08	Hepachlor	Liver	1.5E-02	4.1E-07	1.1E-03	1.7E-02			
Hepachlor Epoxide	9.8E-09	1.0E-13	1.9E-10	1.0E-08	Hepachlor Epoxide	(o) Liver	1.5E-03	1.5E-08	2.8E-05	1.5E-03			
Aroclor-1248	4.3E-08	4.5E-13	9.2E-09	5.2E-08	Aroclor-1248	(o) Liver	5.8E-03	6.1E-08	1.1E-04	5.9E-03			
Aroclor-1254	4.5E-08	4.7E-13	9.6E-09	5.4E-08	Aroclor-1254	NA	--	--	--	--			
Aroclor-1260	7.5E-07	7.9E-12	1.6E-07	9.1E-07	Aroclor-1260	(o) Whole Body / ImS	7.8E-02	8.2E-07	1.7E-02	9.5E-02			

TABLE 9.6A.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future Receptor Population: Construction Workers Receptor Age: Adult				Carcinogenic Risk			Chemical	Non-Carcinogenic Hazard Quotient				
Medium	Exposure Medium	Exposure Point	Chemical	Ingestion	Inhalation	Dermal		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Subsurface Soil (Cont)	Subsurface Soil (Cont)	Subsurface Soil (Cont)	Gasoline Range Organics Diesel Range Organics Arsenic Iron Thallium	1.1E-07 1.1E-08 1.2E-07 1.2E-06	1.2E-11 1.1E-08 1.2E-07 2.3E-11	1.1E-08 1.1E-08 1.1E-08 1.1E-08	(Total)	NA NA (o) Skin / CVS (o) Liver / CVS / GIS (o) CVS	1.7E-02 4.3E-02 2.9E-02 2.0E-01	1.6E-06 2.1E-02	1.7E-03 4.0E-04 2.6E-04 2.2E-01	1.9E-02 4.4E-02 2.9E-02 2.2E-01
Groundwater	Groundwater	Groundwater	Benzene Chloroform 2-Methylnaphthalene Naphthalene Heptachlor Epoxide MCPA Antimony Arsenic Iron Manganese Thallium	1.1E-07 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08	1.1E-07 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08	1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08 1.1E-08	(Total)	CVS (o) Liver NA (o) Whole Body, (i) R _S (o) Liver (o) Kidney / Liver (o) Whole Body (o) Skin / CVS (o) Liver / CVS / GIS CNS (o) CVS	1.7E-02 4.3E-02 2.9E-02 2.0E-01 1.7E-02 4.3E-02 2.9E-02 2.0E-01 1.7E-02 4.3E-02 2.9E-02 2.0E-01	1.6E-06 2.1E-02 1.6E-03 1.8E-02 2.5E-03 2.5E-02 2.2E-01 3.6E-01 6.3E-02 3.9E-01 1.2E-01 1.5E-01	6.6E-03 1.8E-02 2.5E-03 2.5E-02 2.2E-01 3.6E-01 6.3E-02 3.9E-01 1.2E-01 1.5E-01	6.6E-03 1.8E-02 2.5E-03 2.5E-02 2.2E-01 3.6E-01 6.3E-02 3.9E-01 1.2E-01 1.5E-01
Surface Water	Surface Water	Surface Water	Acetone Toluene Xylenes, total	1.1E-07 1.1E-08 1.1E-08	1.1E-07 1.1E-08 1.1E-08	1.1E-08 1.1E-08 1.1E-08	(Total)	(o) Liver / Kidney (o) Liver / Kidney, (i) CNS / R _S (o) Whole body	1.7E-02 4.3E-02 2.9E-02 2.0E-01	1.6E-06 2.1E-02	1.7E-03 4.0E-04 2.6E-04 2.2E-01	1.9E-02 4.4E-02 2.9E-02 2.2E-01
Sediment	Sediment	Sediment	2-Methylnaphthalene Aroclor-1248 Aroclor-1260 Diesel Range Organics	1.1E-07 1.1E-08 1.1E-08 1.1E-08	1.1E-07 1.1E-08 1.1E-08 1.1E-08	1.1E-08 1.1E-08 1.1E-08 1.1E-08	(Total)	NA NA NA NA	1.7E-02 4.3E-02 2.9E-02 2.0E-01	1.6E-06 2.1E-02	1.7E-03 4.0E-04 2.6E-04 2.2E-01	1.9E-02 4.4E-02 2.9E-02 2.2E-01

Notes:	Total Risk Across Surface Soil	5.3E-05	Total Hazard Index Across Surface Soil	3.44
Target Organ Abbreviations:	Total Risk Across Subsurface Soil	1.5E-06	Total Hazard Index Across Subsurface Soil	0.22
CNS = Central Nervous System	Total Risk Across Groundwater	4.8E-07	Total Hazard Index Across Groundwater	1.35
CVS = Cardiovascular System	Total Risk Across Surface Water	1.7E-06	Total Hazard Index Across Surface Water	0.00
GIS = Gastrointestinal System	Total Risk Across Sediment	1.2E-06	Total Hazard Index Across Sediment	0.00
InS = Immune System	Total Risk Across All Media and All Exposure Routes	5.7E-05	Total Hazard Index Across All Media and All Exposure Routes	5.02
R _S = Respiratory System				
(o) Oral exposure	All Exposure Routes:		Oral and Dermal Exposure Routes:	
(i) Inhalation exposure	Total Central Nervous System HI =	0.12	Oral / Dermal Whole Body HI =	0.75
	Total Cardiovascular System HI =	0.01	Oral / Dermal Immune System HI =	0.37
	Total Liver HI =	1.09	Oral / Dermal Gastrointestinal System HI =	0.47
	Inhalation Exposure Routes:		Oral / Dermal Cardiovascular System HI =	0.84
	Inhalation Central Nervous System HI =	0.00E+00	Oral / Dermal Skin HI =	0.14
	Inhalation Respiratory System HI =	4.31E-08	Oral / Dermal Kidney HI =	0.26
			Oral / Dermal Liver HI =	2.67

TABLE 9.6B.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Carbazole Chrysene Dibenz(a,h)anthracene Indeno(1,2,3-cd)pyrene Dieldrin Aroclor-1260 Arsenic Iron (Total)	-- 2.3E-07 1.2E-06 1.4E-07 8.7E-09 1.3E-09 3.3E-09 3.4E-07 8.4E-08 5.6E-08 1.3E-05 5.3E-07 -- 1.5E-05 (Total)	-- 1.0E-12 5.4E-12 6.1E-13 3.9E-14 1.3E-14 1.5E-14 1.5E-12 3.7E-13 5.9E-13 1.3E-10 5.6E-11 -- 2.0E-10 (Total)	-- 1.3E-07 4.3E-07 4.9E-08 3.1E-09 4.6E-10 1.9E-09 5.2E-09 2.0E-07 4.9E-08 1.5E-09 2.7E-06 5.3E-08 -- 3.7E-06 (Total)	-- 3.7E-07 1.6E-06 1.9E-07 1.2E-08 1.7E-09 5.4E-07 1.3E-07 5.7E-08 1.6E-05 5.8E-07 -- 1.9E-05 (Total)	NA NA NA NA NA NA NA NA NA NA NA NA NA (o) Liver NA (o) Skin / CVS (o) Liver / CVS / GIS (Total)	-- -- -- -- -- -- -- -- -- -- -- -- -- 4.9E-03 -- 8.2E-02 3.7E-02 1.2E-01 5.1E-08 --				

TABLE 9.6B.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Sediment	2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Aroclor-1248	--	--	8.1E-08	8.1E-08	Aroclor-1248	NA	--	--	--	--
			Aroclor-1260	--	--	1.1E-06	1.1E-06	Aroclor-1260	NA	--	--	--	--
			Diesel Range Organics (Total)	--	--	1.2E-06	1.2E-06	Diesel Range Organics (Total)	NA	--	--	--	--

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
ImS = Immune System
RsS = Respiratory System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across Surface Soil	1.9E-05
Total Risk Across Subsurface Soil	4.6E-06
Total Risk Across Groundwater	4.8E-07
Total Risk Across Surface Water	1.7E-06
Total Risk Across Sediment	1.2E-06
Total Risk Across All Media and All Exposure Routes	2.7E-05

Total Risk Across All Media and All Exposure Routes

All Exposure Routes:

Total Central Nervous System HI = 0.12
Total Cardiovascular System HI = 0.01

Inhalation Exposure Routes:

Inhalation Central Nervous System HI = 0.00E+00
Inhalation Respiratory System HI = 4.95E-08

Total Hazard Index Across Surface Soil	0.13
Total Hazard Index Across Subsurface Soil	0.11
Total Hazard Index Across Groundwater	0.135
Total Hazard Index Across Surface Water	0.00
Total Hazard Index Across Sediment	--
Total Hazard Index Across All Media and All Exposure Routes	0.159

Total Hazard Index Across All Media and All Exposure Routes

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI = 0.36
Oral / Dermal Gastrointestinal System HI = 0.47
Oral / Dermal Cardiovascular System HI = 0.84
Oral / Dermal Skin HI = 0.18
Oral / Dermal Kidney HI = 0.22
Oral / Dermal Liver HI = 0.74

TABLE 9.7A.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	8.8E-06	3.8E-10	4.9E-05	5.8E-05	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	3.9E-05	1.7E-09	1.3E-04	1.7E-04	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	5.2E-06	2.2E-10	1.8E-05	2.3E-05	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	2.4E-07	1.0E-11	8.2E-07	1.1E-06	Benzo(b)fluoranthene	NA	--	--	--	--
			Carbazole	1.1E-08	1.1E-12	3.8E-08	4.9E-08	Benzo(k)fluoranthene	NA	--	--	--	--
			Chrysene	1.2E-07	5.2E-12	6.8E-07	8.0E-07	Carbazole	NA	--	--	--	--
			Dibenz(a,h)anthracene	1.8E-06	7.7E-11	1.0E-05	1.2E-05	Chrysene	NA	--	--	--	--
			Fluoranthene	--	--	--	--	Dibenz(a,h)anthracene	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1.1E-06	4.8E-11	6.2E-06	7.3E-06	Fluoranthene	(o) Liver / CVS	3.0E-03	3.0E-07	1.3E-03	4.2E-03
			Naphthalene	--	--	--	--	Indeno(1,2,3-cd)pyrene	NA	--	--	--	--
			Pyrene	1.3E-07	1.3E-11	2.4E-08	1.5E-07	Naphthalene	(o) Whole Body, (i) Rss	1.3E-05	3.0E-08	2.1E-06	1.5E-05
			4,4'-DDD	2.9E-06	3.0E-10	1.9E-06	4.9E-06	Pyrene	(o) Kidney	4.1E-03	4.1E-07	1.7E-03	5.8E-03
			Chlordane, alpha-	3.5E-06	9.1E-11	2.4E-07	1.1E-06	4,4'-DDD	NA	--	--	--	--
			Chlordane, gamma-	8.9E-07	1.8E-09	3.2E-06	2.0E-05	Chlordane, alpha-	Liver	4.7E-02	1.2E-05	3.1E-02	7.8E-02
			Heptachlor	7.2E-06	7.2E-10	1.3E-06	8.5E-06	Dieldrin	Liver	5.7E-02	1.4E-05	3.7E-02	9.4E-02
			Heptachlor Epoxide	5.3E-07	5.3E-11	1.1E-06	1.6E-06	Heptachlor	(o) Liver	3.1E-03	3.2E-07	8.3E-04	4.0E-03
			Aroclor-1254	3.4E-07	3.4E-11	7.0E-07	1.0E-06	Heptachlor Epoxide	(o) Liver	2.2E-02	2.2E-06	3.9E-03	2.5E-02
			Aroclor-1260	1.9E-05	1.9E-09	3.9E-05	5.8E-05	Aroclor-1248	(o) Liver	1.7E-01	1.7E-05	3.1E-02	2.0E-01
			Gasoline Range Organics	--	--	--	--	Aroclor-1254	NA	--	--	--	--
			Diesel Range Organics	--	--	--	--	Aroclor-1260	(o) Whole Body / ImS	2.4E-02	2.4E-06	4.9E-02	7.3E-02
			Antimony	9.2E-07	9.3E-10	8.8E-07	1.8E-06	Gasoline Range Organics	NA	--	--	--	--
			Arsenic	--	--	--	--	Diesel Range Organics	NA	--	--	--	--
			Iron	--	--	--	--	Antimony	(o) Whole Body	1.5E-03	--	--	2.5E-03
			Thallium	--	--	--	--	Arsenic	(o) Skin / CVS	5.7E-03	--	5.5E-03	1.1E-02
			(Total)	1.1E-04	8.6E-09	2.7E-04	3.8E-04	Iron	(o) Liver / CVS / GIS	3.7E-03	--	3.2E-04	4.0E-03
				--	--	--	--	Thallium	(o) CVS	2.3E-03	--	2.0E-04	2.5E-03
Groundwater	Groundwater	Groundwater	Benzene	1.3E-06	9.4E-08	6.6E-08	1.5E-06	Benzene	CVS	3.4E-01	4.9E-05	1.6E-01	5.1E-01
			Chloroform	6.8E-07	1.1E-06	6.8E-08	1.8E-06	Chloroform	(o) Liver	2.2E-02	5.7E-03	1.1E-03	2.9E-02
			2-Methylnaphthalene	--	--	--	--	2-Methylnaphthalene	NA	3.1E-02	4.3E-01	3.1E-03	4.6E-01
			Naphthalene	--	--	--	--	Naphthalene	(o) Whole Body, (i) Rss	--	--	--	--
			Heptachlor Epoxide	1.1E-06	--	1.8E-07	1.2E-06	Heptachlor Epoxide	(o) Liver	2.2E-03	--	4.2E-04	2.6E-03
			MCPA	--	--	--	--	MCPA	(o) Liver	2.5E-02	--	4.3E-03	2.9E-02
			(Total)	--	--	--	--	(Total)	(o) Kidney / Liver	1.7E+00	--	3.8E-02	1.8E+00

TABLE 9.7A.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCs
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater (Cont)	Groundwater (Cont)	Groundwater (Cont)	Antimony	--	--	--	--	(Total)	(o) Whole Body	5.4E-01	--	6.1E-02	6.0E-01
			Arsenic	3.1E-04	--	1.7E-06	3.2E-04		(o) Skin / CVS	2.0E+00	--	1.1E-02	2.0E+00
			Iron	--	--	--	--		(o) Liver / CVS / GIS	4.4E+00	--	6.6E-02	4.5E+00
			Manganese	--	--	--	--		CNS	3.7E-01	--	2.1E-02	3.9E-01
			Thallium	--	--	--	--		(o) CVS	1.7E+00	--	2.5E-02	1.7E+00
			(Total)	3.2E-04	1.1E-06	2.0E-06	3.2E-04			1.1E+01	4.3E-01	2.3E-01	1.1E+01

Notes:

Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
ImS = Immune System
RsS = Respiratory System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across All Media and All Exposure Routes
Total Risk Across Surface Soil
Total Risk Across Groundwater

3.8E-04
3.2E-04
7.0E-04

All Exposure Routes:

Total Central Nervous System HI = 0.39
Total Cardiovascular System HI = 0.03
Total Liver HI = 0.17

Inhalation Exposure Routes:

Inhalation Respiratory System HI = 3.02E-08

Total Hazard Index Across Surface Soil
Total Hazard Index Across Groundwater
Total Hazard Index Across All Media and All Exposure Routes

0.51
11.43
11.94

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI = 0.68
Oral / Dermal Immune System HI = 0.07
Oral / Dermal Gastrointestinal System HI = 4.49
Oral / Dermal Cardiovascular System HI = 8.19
Oral / Dermal Skin HI = 1.98
Oral / Dermal Kidney HI = 1.77
Oral / Dermal Liver HI = 6.54

TABLE 9.7B.RME
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR COPCS
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	2-Methylnaphthalene	6.1E-07	2.6E-11	3.4E-06	2-Methylnaphthalene	NA	--	--	--	--
			Benzo(a)anthracene	3.2E-06	1.3E-10	1.1E-05	Benzo(a)anthracene	NA	--	--	--	--
			Benzo(a)pyrene	3.6E-07	1.5E-11	1.2E-06	Benzo(a)pyrene	NA	--	--	--	--
			Benzo(b)fluoranthene	2.3E-08	9.7E-13	7.8E-08	Benzo(b)fluoranthene	NA	--	--	--	--
			Benzo(k)fluoranthene	3.3E-09	3.3E-13	1.1E-08	Benzo(k)fluoranthene	NA	--	--	--	--
			Carbazole	8.5E-09	3.7E-13	4.7E-08	Carbazole	NA	--	--	--	--
			Chrysene	8.9E-07	3.8E-11	4.9E-06	Chrysene	NA	--	--	--	--
			Dibenz(a,h)anthracene	2.2E-07	9.4E-12	1.2E-06	Dibenz(a,h)anthracene	NA	--	--	--	--
			Indeno(1,2,3-cd)pyrene	1.5E-07	1.5E-11	3.8E-08	Indeno(1,2,3-cd)pyrene	NA	5.1E-04	5.1E-08	1.3E-04	6.4E-04
			Dieldrin	3.3E-05	3.4E-09	6.9E-05	Dieldrin	(o) Liver	--	--	--	--
			Aroclor-1260	1.4E-06	1.4E-09	1.3E-06	Aroclor-1260	NA	8.6E-03	--	8.3E-03	1.7E-02
			Arsenic	--	--	--	Arsenic	(o) Skin / CVS	3.8E-03	--	3.4E-04	4.2E-03
			Iron	4.0E-05	5.0E-09	9.2E-05	Iron	(o) Liver / CVS / GIS	1.3E-02	5.1E-08	8.8E-03	2.2E-02
			(Total)	3.2E-04	1.1E-06	2.0E-06	(Total)		1.1E+01	4.3E-01	2.3E-01	1.1E+01
Groundwater	Groundwater	Groundwater	Benzene	1.3E-06	9.4E-08	6.6E-08	Benzene	CVS	2.2E-02	5.7E-03	1.1E-03	2.9E-02
			Chloroform	6.8E-07	1.1E-06	6.8E-08	Chloroform	(o) Liver	3.1E-02	4.3E-01	3.1E-03	4.6E-01
			2-Methylnaphthalene	--	--	--	2-Methylnaphthalene	NA	--	--	--	--
			Naphthalene	1.1E-06	--	1.8E-07	Naphthalene	(o) Whole Body, (i) R&S	2.2E-03	--	4.2E-04	2.6E-03
			Heptachlor Epoxide	--	--	--	Heptachlor Epoxide	(o) Liver	2.3E-02	--	4.3E-03	2.9E-02
			MCPA	--	--	--	MCPA	(o) Kidney / Liver	1.7E+00	--	3.8E-02	1.8E+00
			Antimony	--	--	--	Antimony	(o) Whole Body	5.4E-01	--	6.1E-02	6.0E-01
			Arsenic	3.1E-04	--	1.7E-06	Arsenic	(o) Skin / CVS	2.0E+00	--	1.1E-02	2.0E+00
			Iron	--	--	--	Iron	(o) Liver / CVS / GIS	4.4E+00	--	6.6E-02	4.5E+00
			Manganese	--	--	--	Manganese	CNS	3.7E-01	--	2.1E-02	3.9E-01
			Thallium	--	--	--	Thallium	(o) CVS	1.7E+00	--	2.5E-02	1.7E+00
			(Total)	3.2E-04	1.1E-06	2.0E-06	(Total)		1.1E+01	4.3E-01	2.3E-01	1.1E+01

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System

CVS = Cardiovascular System

GIS = Gastrointestinal System

ImS = Immune System

R&S = Respiratory System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across Surface Soil

Total Risk Across Groundwater

Total Risk Across All Media and All Exposure Routes

0.02

0.02

0.02

Total Hazard Index Across Surface Soil

Total Hazard Index Across Groundwater

Total Hazard Index Across All Media and All Exposure Routes

0.02

0.02

0.02

All Exposure Routes:

Total Central Nervous System HI =

Total Cardiovascular System HI =

Inhalation Exposure Routes:

Inhalation Respiratory System HI =

0.39

0.03

0.00E+00

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI =

Oral / Dermal Gastrointestinal System HI =

Oral / Dermal Cardiovascular System HI =

Oral / Dermal Skin HI =

Oral / Dermal Kidney HI =

Oral / Dermal Liver HI =

0.60

4.49

6.19

1.98

1.76

6.31

TABLE 10.1A.RME
RISK ASSESSMENT SUMMARY
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Current
Receptor Population: Recreational Users
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient			
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal
Surface Soil	Surface Soil	Surface Soil	Benzo(a)anthracene	3.2E-06	6.9E-11	1.6E-05	1.9E-05					
			Benzo(a)pyrene	1.4E-05	3.1E-10	4.2E-05	5.7E-05					
			Benzo(b)fluoranthene	1.9E-06	4.1E-11	5.7E-06	7.6E-06					
			Dibenz(a,h)anthracene	6.6E-07	1.4E-11	3.2E-06	3.8E-06					
			Indeno(1,2,3-cd)pyrene	4.1E-07	8.8E-12	2.0E-06	2.4E-06					
			Heptachlor	6.4E-06	3.2E-10	1.0E-06	7.4E-06					
			Aroclor-1260	7.0E-06	3.5E-10	1.2E-05	1.9E-05					
			(Total)	3.4E-05	1.1E-09	8.2E-05	1.2E-04					

Total Risk Across Surface Soil
Total Risk Across All Media and All Exposure Routes

1.2E-04
1.2E-04

Total Hazard Index Across Surface Soil
Total Hazard Index Across All Media and All Exposure Routes

TABLE 10.2A RME
RISK ASSESSMENT SUMMARY
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	Benzo(a)anthracene	2.4E-05	1.5E-09	4.0E-05	6.3E-05	Chlordane, alpha-Chlordane, gamma-Heptachlor Epoxide Aroclor-1254	Liver Liver (o) Liver (o) Whole Body / InS	1.3E-01	5.0E-05	2.6E-02	1.6E-01
			Benzo(a)pyrene	1.0E-04	6.7E-09	1.1E-04	2.1E-04			1.6E-01	6.0E-05	3.2E-02	1.9E-01
			Benzo(b)fluoranthene	1.4E-05	9.0E-10	1.5E-05	2.9E-05			4.7E-01	7.2E-05	2.6E-02	5.0E-01
			Dibenz(a,h)anthracene	4.8E-06	3.1E-10	8.1E-06	1.3E-05			6.7E-02	1.0E-05	4.1E-02	1.1E-01
			Chlordane, gamma-Heptachlor Epoxide	9.5E-06	1.4E-09	1.9E-06	1.1E-05			8.9E-01	2.0E-04	1.3E-01	1.0E+00
			Heptachlor Epoxide	4.6E-05	7.1E-09	2.6E-06	4.9E-05						
			Aroclor-1260	1.9E-05	2.9E-09	1.1E-06	2.0E-05						
			(Total)	5.1E-05	7.7E-09	3.2E-05	8.3E-05						
				2.9E-04	3.4E-08	2.2E-04	5.1E-04						
Groundwater	Groundwater	Tap	Chloroform					Chloroform MCPA Antimony Arsenic Iron Manganese Thallium	(o) Liver (o) Kidney / Liver (o) Whole Body (o) Skin / CVS (o) Liver / CVS / GIS CNS (o) CVS	4.4E-02	6.0E-01	4.4E-03	6.4E-01
			MCPA							2.4E+00	--	5.3E-02	2.5E+00
			Antimony							7.5E-01	--	8.5E-02	8.4E-01
			Arsenic							2.7E+00	--	1.5E-02	2.8E+00
			Iron							6.2E+00	--	9.3E-02	6.3E+00
			Manganese							5.1E-01	--	2.9E-02	5.4E-01
			Thallium							2.4E+00	--	3.5E-02	2.4E+00
			(Total)							1.5E+01	6.0E-01	3.1E-01	1.6E+01

Notes:

Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
InS = Immune System

(o) Oral exposure
(i) Inhalation exposure

Total Risk Across Surface Soil
5.1E-04
Total Risk Across All Media and All Exposure Routes
5.1E-04

Total Hazard Index Across Surface Soil
1.02
Total Hazard Index Across Groundwater
15.92
Total Hazard Index Across All Media and All Exposure Routes
16.94

All Exposure Routes:
Total Central Nervous System HI = 0.54
Total Liver HI = 0.35

Oral and Dermal Exposure Routes:
Oral / Dermal Whole Body HI = 0.95
Oral / Dermal Immune System HI = 0.11
Oral / Dermal Gastrointestinal System HI = 6.28
Oral / Dermal Cardiovascular System HI = 1.43
Oral / Dermal Skin HI = 2.75
Oral / Dermal Kidney HI = 2.46
Oral / Dermal Liver HI = 9.35

TABLE 10.2B.RME
RISK ASSESSMENT SUMMARY
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	Benzo(a)pyrene Aroclor-1260	8.5E-06 9.0E-05	5.4E-10 1.4E-08	8.8E-06 5.6E-05						
			(Total)	9.8E-05	1.4E-08	6.5E-05						
Groundwater	Groundwater	Tap					Chloroform MCPA Antimony Arsenic Iron Manganese Thallium	(o) Liver (o) Kidney / Liver (o) Whole Body (o) Skin / CVS (o) Liver / CVS / GIS CNS (o) CVS	4.4E-02 2.4E+00 7.5E-01 2.7E+00 6.2E+00 5.1E-01 2.4E+00	6.0E-01 -- -- -- -- -- --	4.4E-03 5.3E-02 8.5E-02 1.5E-02 9.3E-02 2.9E-02 3.5E-02	6.4E-01 2.5E+00 8.4E-01 2.8E+00 6.3E+00 5.4E-01 2.4E+00
			(Total)						1.5E+01	6.0E-01	3.1E-01	1.6E+01

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System

CVS = Cardiovascular System

GIS = Gastrointestinal System

ImS = Immune System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across Surface Soil

1.6E-04
1.6E-04

Total Risk Across All Media and All Exposure Routes

Total Hazard Index Across Groundwater

15.92
15.92

Total Hazard Index Across All Media and All Exposure Routes

All Exposure Routes:

Total Central Nervous System HI = 0.54

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI = 0.84

Oral / Dermal Gastrointestinal System HI = 6.28

Oral / Dermal Cardiovascular System HI = 11.43

Oral / Dermal Skin HI = 2.75

Oral / Dermal Kidney HI = 2.46

Oral / Dermal Liver HI = 8.79

TABLE 10.3A.RME
RISK ASSESSMENT SUMMARY
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	Benzo(a)anthracene	5.5E-05	1.3E-09	6.5E-05	Pyrene Chlordane, alpha- Chlordane, gamma- Heptachlor Heptachlor Epoxide Aroclor-1254	(o) Kidney Liver Liver (o) Liver (o) Liver (o) Whole Body / InS	1.1E-01	6.1E-06	9.6E-03	1.2E-01
			Benzo(a)pyrene	2.4E-04	5.9E-09	1.8E-04			1.2E+00	1.7E-04	1.7E-01	1.4E+00
			Benzo(b)fluoranthene	3.3E-05	7.9E-10	2.4E-05			1.5E+00	2.1E-04	2.1E-01	1.7E+00
			Dibenz(a,h)anthracene	1.1E-05	2.7E-10	1.3E-05			5.6E-01	3.2E-05	2.2E-02	5.8E-01
			Indeno(1,2,3-cd)pyrene	7.0E-06	1.7E-10	8.3E-06			4.4E+00	2.5E-04	1.7E-01	4.6E+00
			Chlordane, alpha-	1.8E-05	1.0E-09	2.6E-06			6.2E-01	3.5E-05	2.7E-01	8.9E-01
			Chlordane, gamma-	2.2E-05	1.3E-09	3.1E-06			1.5E-01	--	3.0E-02	1.8E-01
			Heptachlor	1.1E-04	6.2E-09	4.2E-06			8.8E+00	7.1E-04	8.9E-01	9.6E+00
			Heptachlor Epoxide	4.5E-05	2.5E-09	1.7E-06			7.2E-02	2.8E-02	2.7E-03	1.0E-01
			Aroclor-1260	1.2E-04	6.8E-09	5.2E-05			1.0E-01	2.1E+00	7.5E-03	2.2E+00
Groundwater	Groundwater	Tap	(Total)	6.6E-04	2.6E-08	3.5E-04	(Total)	CVS	5.6E+00	--	9.1E-02	5.7E+00
			Benzene				Benzene Chloroform MCPA Antimony Arsenic Iron Manganese Thallium	(o) Liver	1.8E+00	--	1.5E-01	1.9E+00
			Chloroform					(o) Kidney / Liver	6.4E+00	--	2.6E-02	6.4E+00
			MCPA					(o) Whole Body	1.4E+01	--	1.6E-01	1.5E+01
			Antimony					(o) Skin / CVS	1.2E+00	--	4.9E-02	1.2E+00
			Arsenic					(o) Liver / CVS / GIS	5.5E+00	--	6.1E-02	5.6E+00
			Iron					CNS	3.5E+01	2.1E+00	5.4E-01	3.8E+01
			Manganese					(o) CVS				
			Thallium									
			(Total)									

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System

CVS = Cardiovascular System

GIS = Gastrointestinal System

InS = Immune System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across Surface Soil

1.0E-03

Total Risk Across All Media and All Exposure Routes

1.0E-03

Total Hazard Index Across Surface Soil

9.65

Total Hazard Index Across Groundwater

37.76

Total Hazard Index Across All Media and All Exposure Routes

47.40

All Exposure Routes:

Total Central Nervous System HI =

1.25

Total Cardiovascular System HI =

0.10

Total Liver HI =

3.09

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI =

2.80

Oral / Dermal Immune System HI =

0.89

Oral / Dermal Gastrointestinal System HI =

14.68

Oral / Dermal Cardiovascular System HI =

26.95

Oral / Dermal Skin HI =

6.60

Oral / Dermal Kidney HI =

5.83

Oral / Dermal Liver HI =

25.78

TABLE 10.3B.RME
RISK ASSESSMENT SUMMARY
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	Benzo(a)pyrene Dibenz(a,h)anthracene Aroclor-1260 (Total)	2.0E-05 5.6E-06 2.1E-04 2.4E-04	4.8E-10 1.3E-10 1.2E-08 1.3E-08	1.4E-05 6.5E-06 9.1E-05 1.2E-04	3.4E-05 1.2E-05 3.0E-04 3.6E-04						
Groundwater	Groundwater	Tap						Benzenes Chloroform MCPA Antimony Arsenic Iron Manganese Thallium (Total)	CVS (o) Liver (o) Kidney / Liver (o) Whole Body (o) Skin / CVS (o) Liver / CVS / GIS CNS (o) CVS	7.2E-02 1.0E-01 5.6E+00 1.8E+00 6.4E+00 1.4E+01 1.2E+00 5.5E+00 3.5E+01	2.8E-02 2.1E+00 -- -- -- -- -- -- 2.1E+00	2.7E-03 7.5E-03 9.1E-02 1.5E-01 2.6E-02 1.6E-01 4.9E-02 6.1E-02 5.4E-01	1.0E-01 2.2E+00 5.7E+00 1.9E+00 6.4E+00 1.5E+01 1.2E+00 5.6E+00 3.8E+01

Notes:

Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
Ins = Immune System

(o) Oral exposure
(i) Inhalation exposure

Total Risk Across Surface Soil
Total Risk Across All Media and All Exposure Routes

3.6E-04
3.6E-04

Total Hazard Index Across Groundwater
Total Hazard Index Across All Media and All Exposure Routes

3776
3776

All Exposure Routes:
Total Central Nervous System HI =
Total Cardiovascular System HI =

1.25
0.10

Oral and Dermal Exposure Routes:
Oral / Dermal Whole Body HI =
Oral / Dermal Gastrointestinal System HI =
Oral / Dermal Cardiovascular System HI =
Oral / Dermal Skin HI =
Oral / Dermal Kidney HI =
Oral / Dermal Liver HI =

190
1453
7653
642
572
2041

TABLE 10.2A.CT
RISK ASSESSMENT SUMMARY
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient					
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total	
Groundwater	Groundwater	Tap	Chloroform MCPA Antimony Arsenic Iron Manganese Thallium (Total)					(o) Liver	2.1E-02	4.0E-01	3.3E-03	4.2E-01		
								(o) Kidney / Liver	1.1E+00	--	3.9E-02	1.2E+00		
								(o) Whole Body	3.5E-01	--	6.3E-02	4.2E-01		
								(o) Skin / CVS	1.3E+00	--	1.1E-02	1.3E+00		
								(o) Liver / CVS / GIS	2.9E+00	--	6.9E-02	3.0E+00		
								CNS	2.4E-01	--	2.1E-02	2.6E-01		
								(o) CVS	1.1E+00	--	2.6E-02	1.1E+00		
								7.0E+00	4.0E-01	2.3E-01	7.7E+00			
Notes:												Total Hazard Index Across Groundwater		7.66
Target Organ Abbreviations:												Total Hazard Index Across All Media and All Exposure Routes		7.66

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System

CVS = Cardiovascular System

GIS = Gastrointestinal System

(o) Oral exposure

(i) Inhalation exposure

All Exposure Routes:

Total Central Nervous System HI = 0.26

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI = 0.42

Oral / Dermal Gastrointestinal System HI = 2.96

Oral / Dermal Cardiovascular System HI = 5.39

Oral / Dermal Skin HI = 1.29

Oral / Dermal Kidney HI = 1.17

Oral / Dermal Liver HI = 4.15

TABLE 10.2B.CT
RISK ASSESSMENT SUMMARY
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Tap	Chloroform MCFA Antimony Arsenic Iron Manganese Thallium (Total)					(o) Liver	2.1E-02	4.0E-01	3.3E-03	4.2E-01
								(o) Kidney / Liver	1.1E+00	--	3.9E-02	1.2E+00
								(o) Whole Body	3.5E-01	--	6.3E-02	4.2E-01
								(o) Skin / CVS	1.3E+00	--	1.1E-02	1.3E+00
								(o) Liver / CVS / GIS	2.9E+00	--	6.9E-02	3.0E+00
								CNS	2.4E-01	--	2.1E-02	2.6E-01
								(o) CVS	1.1E+00	--	2.6E-02	1.1E+00
									7.0E+00	4.0E-01	2.3E-01	7.7E+00

Notes:

Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
InS = Immune System

(o) Oral exposure

Total Risk Across Groundwater
Total Risk Across All Media and All Exposure Routes

0.26

All Exposure Routes:
Total Central Nervous System HI =

0.26

Total Hazard Index Across Groundwater
Total Hazard Index Across All Media and All Exposure Routes

7.66

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI =
Oral / Dermal Gastrointestinal System HI =
Oral / Dermal Cardiovascular System HI =
Oral / Dermal Skin HI =
Oral / Dermal Kidney HI =
Oral / Dermal Liver HI =

0.42
2.96
3.39
1.29
1.17
4.15

TABLE 10.3A.CT
RISK ASSESSMENT SUMMARY
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient					
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total	
Surface Soil	Surface Soil	Surface Soil	Benzo(a)anthracene	1.8E-05	8.9E-10	3.1E-05	4.9E-05	Chlordane, alpha-Chlordane, gamma-Heptachlor Epoxide Aroclor-1254	Liver	4.1E-01	1.2E-04	8.2E-02	4.9E-01	
			Benzo(a)pyrene	8.1E-05	3.9E-09	8.5E-05	1.7E-04			5.0E-01	1.4E-04	9.9E-02	6.0E-01	
			Benzo(b)fluoranthene	1.1E-05	5.3E-10	1.1E-05	2.2E-05			1.9E-01	2.1E-05	1.0E-02	2.0E-01	
			Dibenz(a,h)anthracene	3.8E-06	1.8E-10	6.3E-06	1.0E-05			1.5E+00	1.7E-04	8.2E-02	1.6E+00	
			Heptachlor Epoxide	3.6E-05	4.2E-09	2.0E-06	3.8E-05			2.1E-01	2.4E-05	1.3E-01	3.4E-01	
Groundwater	Groundwater	Tap	Aroclor-1260	4.0E-05	4.5E-09	2.5E-05	6.5E-05	(Total)	(o) Whole Body / lms	2.8E+00	4.7E-04	4.0E-01	3.2E+00	
			(Total)	2.1E-04	1.6E-08	1.6E-04	3.7E-04							
			Chloroform							(o) Liver (o) Kidney / Liver (o) Whole Body (o) Skin / CVS (o) Liver / CVS / GIS CNS (o) CVS	6.8E-02	2.1E+00	6.0E-03	2.2E+00
			MCPA				3.8E+00				--	7.3E-02	3.8E+00	
			Antimony				1.2E+00				--	1.2E-01	1.3E+00	
Arsenic				4.3E+00	--	2.1E-02	4.3E+00							
Iron				9.6E+00	--	1.3E-01	9.8E+00							
			Manganese					(Total)		8.0E-01	--	4.0E-02	8.4E-01	
			Thallium				3.7E+00			--	4.9E-02	3.7E+00		
				Total Risk Across Surface Soil				Total Hazard Index Across Surface Soil						
				Total Risk Across Groundwater				Total Hazard Index Across Groundwater						
				Total Risk Across All Media and All Exposure Routes				Total Hazard Index Across All Media and All Exposure Routes						
				3.7E-04				3.19				3.19		
				0.0E+00				25.94				25.94		
				3.7E-04				29.13				29.13		

Notes:
Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
ImS = Immune System

(o) Oral exposure

All Exposure Routes:
Total Central Nervous System HI = 0.84
Total Liver HI = 1.09

Oral and Dermal Exposure Routes:
Oral / Dermal Whole Body HI = 1.63
Oral / Dermal Immune System HI = 0.34
Oral / Dermal Gastrointestinal System HI = 9.77
Oral / Dermal Cardiovascular System HI = 17.81
Oral / Dermal Skin HI = 4.29
Oral / Dermal Kidney HI = 3.83
Oral / Dermal Liver HI = 15.44

TABLE 10.3B.CT
RISK ASSESSMENT SUMMARY
CENTRAL TENDENCY
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Residents
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	Benzo(a)pyrene Aroclor-1260	6.6E-06 7.0E-05 7.7E-05	3.2E-10 8.0E-09 8.3E-09	6.9E-06 4.4E-05 5.0E-05	1.4E-05 1.1E-04 1.3E-04						
Groundwater	Groundwater	Tap							(o) Liver (o) Kidney / Liver (o) Whole Body (o) Skin / CVS (o) Liver / CVS / GIS CNS (o) CVS	6.8E-02 3.8E+00 1.2E+00 4.3E+00 9.6E+00 8.0E-01 3.7E+00	2.1E+00 -- -- -- -- -- --	6.0E-03 7.3E-02 1.2E-01 2.1E-02 1.3E-01 4.0E-02 4.9E-02	2.2E+00 3.8E+00 1.3E+00 4.3E+00 9.8E+00 8.4E-01 3.7E+00
			(Total)					(Total)		2.3E+01	2.1E+00	4.3E-01	2.6E+01

Notes:
Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
IntS = Immune System

(o) Oral exposure

Total Risk Across Surface Soil

1.3E-04
1.3E-04

Total Risk Across All Media and All Exposure Routes

All Exposure Routes:
Total Central Nervous System HI = 0.84

Total Hazard Index Across Groundwater
Total Hazard Index Across All Media and All Exposure Routes

25.94
25.94

Oral and Dermal Exposure Routes:
Oral / Dermal Whole Body HI = 1.29
Oral / Dermal Gastrointestinal System HI = 19.77
Oral / Dermal Cardiovascular System HI = 17.81
Oral / Dermal Skin HI = 4.29
Oral / Dermal Kidney HI = 3.83
Oral / Dermal Liver HI = 13.68

TABLE 10.4A.RME
RISK ASSESSMENT SUMMARY
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil						Liver Liver (o) Liver (o) Liver (o) Whole Body / ImS	4.5E-01 5.4E-01 2.1E-01 1.6E+00 2.3E-01	1.2E-05 1.4E-05 2.2E-06 1.7E-05 2.4E-06	3.1E-02 3.7E-02 3.9E-03 3.1E-02 4.9E-02	4.8E-01 5.8E-01 2.1E-01 1.7E+00 2.8E-01
							(Total)		3.1E+00	4.8E-05	1.6E-01	3.3E+00
Groundwater	Groundwater	Groundwater						(o) Kidney / Liver (o) Whole Body (o) Liver / CVS / GIS CNS (o) CVS	-- -- -- -- --	-- -- -- -- --	2.2E-01 3.6E-01 3.9E-01 1.2E-01 1.5E-01	2.2E-01 3.6E-01 3.9E-01 1.2E-01 1.5E-01
							(Total)		--	--	1.3E+00	1.3E+00

Notes:
Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
ImS = Immune System
RsS = Respiratory System
(o) Oral exposure
(i) Inhalation exposure

Total Risk Across Surface Soil
3.4E-05
Total Risk Across All Media and All Exposure Routes
3.4E-05

Total Hazard Index Across Surface Soil
3.27
Total Hazard Index Across Groundwater
3.40
Total Hazard Index Across All Media and All Exposure Routes
3.57

All Exposure Routes:
Total Central Nervous System HI = 0.12
Total Liver HI = 1.06

Oral and Dermal Exposure Routes:
Oral / Dermal Whole Body HI = 0.63
Oral / Dermal Immune System HI = 0.28
Oral / Dermal Gastrointestinal System HI = 0.39
Oral / Dermal Cardiovascular System HI = 0.66
Oral / Dermal Skin HI = 0.12
Oral / Dermal Kidney HI = 0.22
Oral / Dermal Liver HI = 2.48

TABLE 10.4B.RME
RISK ASSESSMENT SUMMARY
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Construction Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	Groundwater						MCPA Antimony Iron Manganese Thallium (Total)	(o) Kidney / Liver (o) Whole Body (o) Liver / CVS / GIS CNS (o) CVS	--	--	2.2E-01 3.6E-01 3.9E-01 1.2E-01 1.5E-01 1.3E+00	2.2E-01 3.6E-01 3.9E-01 1.2E-01 1.5E-01 1.3E+00
										--	--	--	--
										--	--	--	--
										--	--	--	--

Notes:

Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
InS = Immune System

(o) Oral exposure

All Exposure Routes:
Total Central Nervous System HI =

0.12

Total Hazard Index Across Groundwater
Total Hazard Index Across All Media and All Exposure Routes

1.50
1.50

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI =	0.36
Oral / Dermal Gastrointestinal System HI =	0.39
Oral / Dermal Cardiovascular System HI =	0.60
Oral / Dermal Skin HI =	0.06
Oral / Dermal Kidney HI =	0.22
Oral / Dermal Liver HI =	0.61

TABLE 10.5A.RME
RISK ASSESSMENT SUMMARY
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - BEFORE NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk			Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Dibenz(a,h)anthracene Heptachlor Aroclor-1260	8.8E-06 3.9E-05 5.2E-06 1.8E-06 1.7E-05 1.9E-05	3.8E-10 1.7E-09 2.2E-10 7.7E-11 1.8E-09 1.9E-09	4.9E-05 1.3E-04 1.8E-05 1.0E-05 3.2E-06 3.9E-05	(Total)					
Groundwater	Groundwater	Groundwater		9.2E-05	6.1E-09	2.6E-04	(Total)	(o) Liver (o) Kidney / Liver (o) Whole Body (o) Skin / CVS (o) Liver / CVS / GIS CNS (o) CVS	3.1E-02 1.7E+00 5.4E-01 2.0E+00 4.4E+00 3.7E-01 1.7E+00	4.3E-01 -- -- -- -- -- --	3.1E-03 3.8E-02 6.1E-02 1.1E-02 6.6E-02 2.1E-02 2.2E-01	4.6E-01 1.8E+00 6.0E-01 2.0E+00 4.5E+00 3.9E-01 1.7E+00
									1.1E+01	4.3E-01	2.2E-01	1.1E+01

Notes:

Target Organ Abbreviations:

CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
ImS = Immune System
RsS = Respiratory System

(o) Oral exposure

(i) Inhalation exposure

Total Risk Across Surface Soil

3.5E-04
3.5E-04

Total Risk Across All Media and All Exposure Routes

All Exposure Routes:

Total Central Nervous System HI = 0.39

Total Hazard Index Across Groundwater

11.37
11.37

Total Hazard Index Across All Media and All Exposure Routes

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI = 0.60
Oral / Dermal Gastrointestinal System HI = 4.48
Oral / Dermal Cardiovascular System HI = 8.17
Oral / Dermal Skin HI = 1.97
Oral / Dermal Kidney HI = 1.76
Oral / Dermal Liver HI = 6.28

TABLE 10.5B.RME
RISK ASSESSMENT SUMMARY
REASONABLE MAXIMUM EXPOSURE
SITE 84 (BUILDING 45 AREA) - AFTER NON-TCRA
MCB CAMP LEJEUNE
JACKSONVILLE, NORTH CAROLINA

Scenario Timeframe: Future
Receptor Population: Industrial / Commercial Workers
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total		Primary Target Organ	Ingestion	Inhalation	Dermal	Exposure Routes Total
Surface Soil	Surface Soil	Surface Soil	Benzo(a)pyrene Aroclor-1260	3.2E-06 3.3E-05 3.7E-05	1.3E-10 3.4E-09 3.5E-09	1.1E-05 6.9E-05 7.9E-05	1.4E-05 1.0E-04 1.2E-04						
Groundwater	Groundwater	Groundwater	(Total)										
								Chloroform MCPA Antimony Arsenic Iron Manganese Thallium	(o) Liver (o) Kidney / Liver (o) Whole Body (o) Skin / CVS (o) Liver / CVS / GIS CNS (o) CVS	3.1E-02 1.7E+00 5.4E-01 2.0E+00 4.4E+00 3.7E-01 1.7E+00	4.3E-01 -- -- -- -- -- --	3.1E-03 3.8E-02 6.1E-02 1.1E-02 6.6E-02 2.1E-02 2.5E-02	4.6E-01 1.8E+00 6.0E-01 2.0E+00 4.5E+00 3.9E-01 1.7E+00
								(Total)		1.1E+01 1.7E+00	4.3E-01 2.2E-01	2.2E-01 1.1E+01	1.1E+01 1.1E+01

Notes:

Target Organ Abbreviations:
CNS = Central Nervous System
CVS = Cardiovascular System
GIS = Gastrointestinal System
ImS = Immune System

(o) Oral exposure

Total Risk Across Surface Soil

Total Risk Across All Media and All Exposure Routes

All Exposure Routes:

Total Central Nervous System HI = 0.39

Total Hazard Index Across Groundwater

Total Hazard Index Across All Media and All Exposure Routes

Oral and Dermal Exposure Routes:

Oral / Dermal Whole Body HI = 0.60
Oral / Dermal Gastrointestinal System HI = 4.48
Oral / Dermal Cardiovascular System HI = 8.17
Oral / Dermal Skin HI = 1.97
Oral / Dermal Kidney HI = 1.76
Oral / Dermal Liver HI = 6.28



APPENDIX K
ENDPOINTS, EXPOSURE ESTIMATE, AND
RISK CALCULATION FOR UPPER TROPHIC
LEVEL RECEPTORS

APPENDIX K

ENDPOINTS, EXPOSURE ESTIMATE, AND RISK CALCULATION FOR UPPER TROPHIC LEVEL RECEPTORS

The sections that follow present the methodology used to conduct the conservative and more realistic exposure estimate for upper trophic level receptors. Assessment and measurement endpoints, as well as the specific receptors selected to represent the endpoints are also presented and discussed.

K.1 Endpoints and Hypotheses

Two types of endpoints, assessment endpoints and measurement endpoints, are defined as part of the ERA process as are risk hypotheses or risk questions (USEPA 1997). An assessment endpoint is an explicit expression of the environmental component or value that is to be protected. A measurement endpoint is a measurable ecological characteristic that is related to the component or value chosen as the assessment endpoint. The considerations for selecting assessment and measurement endpoints are summarized in USEPA (1997) and discussed in detail in Suter II (1989, 1990, and 1993). Risk hypotheses are testable hypotheses about the relationship among the assessment endpoints and their predicted responses when exposed to contaminants.

Endpoints in the risk assessment process define ecological attributes that are to be protected (assessment endpoints) and a measurable characteristic of those attributes (measurement endpoints) that can be used to gauge the degree of impact that has or may occur. Assessment endpoints most often relate to attributes of biological populations or communities, and are intended to focus the risk assessment on particular components of the ecosystem that could be adversely affected by chemicals attributable to the site (USEPA 1997). Assessment endpoints contain an entity (e.g., great blue heron population) and an attribute of that entity (e.g., survival rate). Individual assessment endpoints usually encompass a group of species or populations (the receptor) with some common characteristic, such as specific exposure route or chemical sensitivity, with the receptor then used to represent the assessment endpoint in the risk evaluation.

Assessment and measurement endpoints may involve ecological components from any level of biological organization, from individual organisms to the ecosystem itself (USEPA 1992). Effects on individuals are important for some receptors, such as rare and endangered species.

Population- and community-level effects are typically more relevant to ecosystems. Population- and community-level effects are usually difficult to evaluate directly without long-term and extensive study. However, measurement endpoint evaluations at the individual level, such as an evaluation of the effects of chemical exposure on reproduction, can be used to predict effects on an assessment endpoint at the population or community level.

Assessment endpoints, risk hypotheses, and measurement endpoints selected for the evaluation of upper trophic level receptors are summarized in Table K-1. It is noted that these endpoints are selected as part of Step 3a to evaluate potential upper trophic level risks contributed by site contaminants. These endpoints are distinct from those that would be selected in Steps 3b and 4. As evidenced by Table K-1, the assessment endpoints selected were based on survival, growth, and reproduction. These population traits of interest for each of the assessment endpoints represent components of a healthy population. Failure or impairment of survival, growth, or reproduction will adversely affect the ability of the population to be healthy and viable and fill its appropriate role in an ecosystem.

K.2 Selection of Upper Trophic Level Ecological Receptors

Because of the complexity of natural systems, it is generally not possible to directly assess the potential impacts to all upper trophic level ecological receptors present within an area. Therefore, specific receptor species (e.g., great blue heron) are often selected as surrogates to evaluate potential risks to larger components of the ecological community (e.g., piscivorous birds) that were selected to represent the assessment endpoints (e.g., survival, growth, and reproduction of piscivorous birds). Selection criteria typically include those species that:

- Are known to occur, or are likely to occur, at the site;
- Have a particular ecological, economic, or aesthetic value;
- Are representative of taxonomic groups, life history traits, and/or trophic levels in the habitats present at the site for which complete exposure pathways are likely to exist;
- Can, because of toxicological sensitivity or potential exposure magnitude, be expected to represent potentially sensitive populations at the site; and

- Have sufficient ecotoxicological information available on which to base an evaluation.

The upper trophic level receptor species listed below have been chosen for dietary exposure modeling based on the criteria listed above, the general guidelines presented in USEPA (1991), and the assessment endpoints presented in Table K-1.

Terrestrial species:

- American robin (*Turdus migratorius*) (avian omnivore)
- Eastern screech owl (*Otus asio*) (avian carnivore)
- Red-tailed hawk (*Buteo jamaicensis*) (avian carnivore)
- Meadow vole (*Microtus pennsylvanicus*) (mammalian herbivore)
- Short-tailed shrew (*Blarina carolinensis carolinensis*) (mammalian insectivore)
- White-footed mouse (*Peromyscus maniculatus nubiterrae*) (mammalian omnivore)
- Red fox (*Vulpes vulpes*) (mammalian carnivore)

Aquatic species:

- Great blue heron (*Ardea herodias*) (avian piscivore)
- Marsh wren (*Cistothorus palustris*) (avian insectivore)
- Raccoon (*Procyon lotor*) (semi-aquatic mammalian omnivore)
- Mink (*Mustela vison*) (semi-aquatic mammalian carnivore [piscivore])

With the exception of the red-tailed hawk, the upper trophic level receptors listed above were identified in the RI Work Plan. The red-tailed hawk was added to the list of upper trophic level receptors because this avian carnivore was observed during a site visit conducted in July 2001.

K.3 Conservative Evaluation

Upper trophic level receptor exposures to chemicals in surface soil, surface water, and/or sediment were determined by estimating the concentration of each chemical in each relevant dietary component using uptake and food web models. Ingestion of surface soil, surface water, and/or sediment was included when calculating the total exposure.

Not all surface soil, surface water, and sediment ECOCs were evaluated for food web exposures. The specific chemicals evaluated were limited to those ECOCs identified as important bioaccumulative chemicals by the USEPA (2000). Bioaccumulative chemicals are identified in Section 7, Tables 7-9 through 7-14.

Dietary items for which tissue concentrations were modeled included terrestrial plants, soil invertebrates (earthworms are the standard surrogate), small mammals (meadow vole, short-tailed shrew, and white-footed mouse), aquatic plants, aquatic invertebrates, and fish. The methodologies used for estimation of tissue concentrations are outlined in the following section. The uptake of chemicals from the abiotic media into these food items is based (where available) on conservative (e.g., maximum or 90th percentile) Bioconcentration Factors (BCFs) or Bioaccumulation Factors (BAFs) from the literature. A default BCF/BAF value of 1.0 was used for those bioaccumulative ECOCs lacking literature-based values.

K.3.1 Exposure Point Concentrations

Exposure point concentrations for upper trophic level terrestrial and aquatic dietary items were estimated using BAF/BCF models and maximum measured media concentrations. The methodology and models used to derive these estimates are described below. A BCF indicates the degree to which a chemical may accumulate in organisms coincident with the concentration of the chemical in the surrounding media. They are calculated by dividing the concentration of a chemical in the tissue of organisms by the concentration in the surrounding media. In the absence

of tissue data for aquatic life, BCF values for organic chemicals can be estimated from their log K_{ow} value. BCF values do not account for the uptake of chemicals from dietary exposures. BAF values consider both direct exposures to the surrounding media, as well as uptake from dietary exposures.

Terrestrial Plants. Tissue concentrations in the aboveground vegetative portion of terrestrial plants were estimated by multiplying the maximum measured surface soil concentration for each Bioaccumulative ECOPC by chemical-specific conservative (e.g., maximum or 90th percentile) soil-to-plant BCFs obtained from the literature. The BCF values used were based on root uptake from soil and on the ratio between dry-weight soil and-dry-weight plant tissue. Literature values based on the ratio between dry-weight soil and wet-weight plant tissue were converted to a dry-weight basis by dividing the wet-weight BCF by the estimated solids content for terrestrial plants (15 percent [0.15]; Sample et al. 1997).

The BCFs for terrestrial plants were those reported in Baes et al. (1984) or Bechtel Jacobs (1998a). For organic chemicals without literature based BCFs, soil-to-plant BCFs were estimated using the algorithm provided in Travis and Arms (1988):

$$\log B_v = 1.588 - (0.578) (\log K_{ow}) \quad (\text{Equation K-1})$$

where:

B_v = Soil-to-plant BCF (unitless; dry weight basis)
 K_{ow} = Octanol-water partitioning coefficient (unitless)

The log K_{ow} values used in the calculations were obtained primarily from USEPA (1995) and are listed in Table K-2. The soil-to-plant BCFs used in the conservative evaluation are summarized in Table K-3.

Earthworms. Tissue concentrations in soil invertebrates (earthworms) were estimated by multiplying the maximum measured surface soil concentration for each bioaccumulative ECOC by chemical-specific conservative (e.g., maximum or 90th percentile) BCFs or BAFs obtained from the literature. BCFs are calculated by dividing the concentration of a chemical in the tissues of an organism by the concentration of that same chemical in the surrounding environmental medium (in this case, soil) without accounting for uptake via the diet. BAFs consider both direct

exposure to soil and exposure via the diet. Since earthworms consume soil, BAFs are more appropriate values and were used in the food web models when available. BAFs based on depurated analyses (soil was purged from the gut of the earthworm prior to analysis) were given preference over undepurated analyses when selecting BAF values since direct ingestion of soil is accounted for separately in the food web model. The specific BAFs used were those reported by the references cited on Table K-3.

The BCF/BAF values are based on the ratio between dry-weight soil and dry-weight earthworm tissue. Literature values based on the ratio between dry-weight soil and wet-weight earthworm tissue were converted to a dry-weight basis by dividing the wet-weight BCF/BAF by the estimated solids content for earthworms (16 percent [0.16]; USEPA 1993). For bioaccumulative EOCs without available measured BAFs or BCFs, an earthworm BAF of 1.0 was assumed. The soil-to-invertebrate BCFs/BAFs used in the conservative evaluation are summarized on Table K-3.

Small Mammals. Whole-body tissue concentrations in small mammals (omnivores) were estimated using one of two methodologies. For chemicals with literature-based soil-to-small mammal BAFs, the small mammal tissue concentration was obtained by multiplying the maximum measured surface soil concentration for each chemical by a chemical-specific conservative (e.g., maximum or 90th percentile) soil-to-small mammal BAF. The BAF values used were based on the ratio between dry-weight soil and whole-body dry-weight tissue. Literature values based on the ratio between dry-weight soil and wet-weight tissue were converted to a dry-weight basis by dividing the wet-weight BAF by the estimated solids content for small mammals (32 percent [0.32]; USEPA 1993). BAFs for shrews were those reported in Sample et al. (1998b) for insectivores (or for general small mammals if insectivore values were unavailable), for voles were those reported for herbivores, and for mice were those reported for omnivores. The soil-to-small mammal BAFs used in the conservative evaluation are summarized in Table K-4.

For those chemicals without soil-to-small mammal BAF values, an alternate approach is used to estimate whole-body tissue concentrations. Because most chemical exposure for these small mammal species is via the diet, it is assumed that the concentration of each chemical in the small mammal's tissues is equal to the chemical concentration in its diet, that is, a diet to whole-body

BAF (wet-weight basis) of one is assumed. Resulting tissue concentrations (wet-weight) are then converted to dry weight using an estimated solids content of 32 percent (see above).

The use of a diet to whole-body BAF of one is likely to result in a conservative estimate of chemical concentrations for chemicals that are not known to biomagnify in terrestrial food chains (e.g., aluminum). For chemicals that are known to biomagnify (e.g., PCBs), a diet to whole-body BAF value of one will likely result in a realistic estimate of tissue concentrations based on reported literature values. For example, a maximum BAF (wet weight) value of 1.0 was reported by Simmons and McKee (1992) for PCBs based on laboratory studies with white-footed mice. Menzie et al. (1992) reported BAF values (wet-weight) for dichlorodiphenyltrichloroethane (DDT) of 0.3 for voles and 0.2 for short-tailed shrews. Reported BAF (wet-weight) values for dioxin are only slightly above one (1.4) for the deer mouse (USEPA 1990).

Aquatic Plants. Tissue concentrations in the vegetative portion of aquatic plants were estimated using the same methodologies as described above for terrestrial plants except that maximum sediment (not soil) concentrations were used in the calculation.

Aquatic Invertebrates. Tissue concentrations in aquatic invertebrates were estimated by multiplying the maximum sediment concentration for each bioaccumulative ECOC by chemical-specific conservative (e.g., maximum or 90th percentile) sediment-to-invertebrate BAFs obtained from the literature. The BAF values were based on the ratio between dry-weight sediment and dry-weight invertebrate tissue. BAFs based on depurated analyses (sediment was purged from the gut of the organism prior to analysis) were given preference over undepurated analyses when selecting BAF values since direct ingestion of sediment was accounted for separately in the food web model.

Literature values based on the ratio between dry-weight sediment and wet-weight invertebrate tissue were converted to a dry-weight basis by dividing the wet-weight BAF by the estimated solids content for aquatic invertebrates (21 percent [0.21]; USEPA 1993). For chemicals without literature based sediment-to-invertebrate BAFs, a BAF of 1.0 is assumed. The sediment-to-invertebrate BAFs used in the conservative evaluation are summarized in Table K-5.

Fish. Tissue concentrations in whole-body fish were estimated by multiplying the maximum measured sediment concentration for each bioaccumulative ECOC by chemical-specific

conservative (e.g., maximum or 90th percentile) sediment-to-fish BAFs obtained from the literature. The BAF values used were based on the ratio between dry-weight sediment and dry-weight fish tissue. Literature values based on the ratio between dry-weight sediment and wet-weight fish tissue were converted to a dry-weight basis by dividing the wet-weight BAF by the estimated solids content for aquatic invertebrates (25 percent [0.25]; USEPA 1993). For chemicals without literature based sediment-to-fish BAFs, a BAF of 1.0 was assumed. The sediment-to-fish BAFs used in the conservative evaluation are summarized in Table K-5.

K.3.2 Dietary Intakes

Dietary intakes for each upper trophic level receptor species was calculated using the following formula (Equation K-2) modified from USEPA (1993).

$$DI_x = \frac{[(\sum_i [(FIR)(FC_{xi})(PDF_i)] + [(FIR)(SC_x)(PDS)] + [(WIR)(WC_x)])][AUF]}{BW}$$

where:

DI _x	=	Dietary intake for chemical x (mg chemical/kg body weight/day)
FIR	=	Food ingestion rate (kg/day, dry-weight)
FC _{xi}	=	Maximum concentration of chemical x in food item i (mg/kg, dry weight)
PDF _i	=	Proportion of diet composed of food item i (mg/kg, dry weight basis)
SC _x	=	Maximum concentration of chemical x in soil/sediment (mg/kg, dry weight)
PDS	=	Proportion of diet composed of soil/sediment (dry weight basis)
WIR	=	Water ingestion rate (L/day)
WC _x	=	Maximum concentration of chemical x in surface water (mg/L)
BW	=	Body weight (kg, wet weight)
AUF	=	Area Use Factor (unitless)

Conservative life history information and receptor-specific exposure parameters (maximum food ingestion rates, maximum water ingestion rates, and minimum body weights) and dietary compositions are provided in Table K-6. It is noted that many of the values in this table were provided by the EPA's Wildlife Exposure Factor Handbook (USEPA 1993). In some cases (e.g., eastern screech owl) receptors were not listed specifically in the handbook; however, allometric

equations for food and water ingestion provided in the handbook (e.g., for birds) were used to estimate exposure parameters presented on the table.

Often, food and water ingestion rates are reported in the literature in units of gram of water per gram of organism per day or kilogram of food per kilogram of organism per day. Water ingestion rates are converted to units of liters of water per day by dividing the reported value by 1000 (1 liter of water equals 1000 grams of water) and multiplying by a maximum estimate of body weight for that species (Equation K-3):

$$\text{WIR (g H}_2\text{O/g animal/day)} * (1 \text{ L H}_2\text{O/1000 g H}_2\text{O}) * \text{BW (g animal [maximum])} = \text{WIR (L/day)}$$

Likewise, food ingestion rates are converted to units of kilograms of food per day by multiplying the reported value by a maximum estimate of body weight for the species in question (Equation K-4):

$$\text{FIR (kg food/ kg animal/ day)} * \text{BW (kg animal [maximum])} = \text{FIR (kg food/day)}$$

It is noted that maximum body weights are used in these unit conversion so as to provide the most conservative estimates (i.e., maximum values) of food and water ingestion for a given species. Conversely, minimum body weights are used in the conservative dose estimate in the denominator of equation K-2.

To estimate maximum food and water ingestion rates, For each upper trophic level receptor, an AUF of 1.0 was assumed (i.e., each receptor is assumed to spend 100 percent of its time within the site). As such, receptor-specific home ranges were not considered in the estimation of dietary intakes.

K.3.3 Ingestion-Based Screening Values

Ingestion-based screening values for dietary exposures were derived for each receptor species and bioaccumulative ECOC. Toxicological information from the literature for wildlife species most closely related to the receptor species was used, where available, but was also supplemented by laboratory studies of non-wildlife species (e.g., laboratory mice) when necessary. The ingestion-

based screening values are expressed as milligrams of the chemical per kilogram body weight of the receptor per day (mg/kg-BW/day).

Growth and reproduction are emphasized as assessment endpoints since they are the most relevant, ecologically, to maintaining viable populations and because they are generally the most studied chronic toxicological endpoints for ecological receptors. If several chronic toxicity studies were available from the literature, the most appropriate study is selected for each receptor species based on study design, study methodology, study duration, study endpoint, and test species. No Observed Adverse Effect Levels (NOAELs) based on growth and reproduction were utilized, where available, as the screening values. When chronic NOAEL values were unavailable, estimates were derived or extrapolated from chronic Lowest Observed Adverse Effect Levels (LOAELs) or acute values as follows:

- When values for chronic toxicity were not available, the median lethal dose (LD₅₀) was used. An uncertainty factor of 100 was used to convert the acute LD₅₀ to a chronic NOAEL (i.e., the LD₅₀ was multiplied by 0.01 to obtain the chronic NOAEL).
- An uncertainty factor of 10 was used to convert a reported LOAEL to a NOAEL (USEPA 1997).

Ingestion screening values for birds and mammals are summarized in Tables K-7 and K-8, respectively. It is noted that the ingestion-based screening values summarized in Tables K-7 and K-8 are based on toxicological studies with avian or mammalian species other than those selected as receptor species for this investigation. For the conservative evaluation, NOAEL and LOAEL values were not adjusted to reflect differences in body weights between test species and receptor species.

K.3.4 Risk Calculation

For a given bioaccumulative chemical, an HQ value was calculated by dividing the maximum exposure dose by the corresponding ingestion-based screening value. HQs greater than or equal to 1.0 indicate the potential for risk since the dose (exposure) exceeds the screening value (effect). It is noted that exposure doses are derived using intentionally conservative assumptions

(maximum media concentrations, maximum ingestion rates, and minimum body weights) such that HQs greater than or equal to 1.0 do not necessarily indicate that risks are present or impacts are occurring. Rather, they identify chemical-pathway-receptor combinations requiring further evaluation. Following the same reasoning, HQs less than one indicate that risks are very unlikely, enabling a conclusion of no unacceptable risk to be reached with high confidence.

K.4 More Realistic Evaluation

The preceding sections presented a conservative approach that was used to conduct the exposure estimate and risk calculation for upper trophic level receptors. A less conservative, more realistic evaluation, designed to be more representative of actual risks that may exist at the site, was also conducted using refined exposure assumptions. The specific assumptions and methods that were modified for use in the more realistic evaluation are identified below, along with justification for each modification.

- Maximum chemical concentrations were replaced by average (arithmetic mean) chemical concentrations. Arithmetic means were calculated assuming concentrations of one-half the detection limit for non-detected chemicals. If the mean concentration was greater than the maximum detected concentration for a given detected chemical, the maximum detected concentration was used. For individual upper trophic level receptor species, average chemical concentrations provide a better estimate of the likely level of chemical exposure because each receptor would be expected to forage in several different areas of the site, and, in many cases, off-site.
- Literature-based BCFs and BAFs based on, or modeled from, central tendency estimates (e.g., mean, median, midpoint) were used in place of maximum or high-end (e.g., maximum or 90th percentile) estimates for many chemicals. The statistical distribution of the data set from which the literature value was estimated was considered when selecting appropriate BCFs and BAFs. For example, if the data were normally distributed an arithmetic mean may be selected for use in the more realistic evaluation, whereas if the data were lognormally distributed a geometric mean may be selected. An assumed BCF/BAF of 1.0 was still used for those chemicals lacking a literature-based BAF/BCF. A summary of the surface soil-to-terrestrial plant BCFs and surface soil-to-terrestrial invertebrate BAFs, surface soil-

to-small mammal BAFs, and sediment-to-invertebrate and sediment-to-fish BAFs used in the more realistic evaluation are summarized in Tables K-9, K-10, and K-11, respectively.

- Central tendency estimates (e.g., mean, median, midpoint) for body weight, surface water ingestion rate, and food ingestion rate (see Table K-12) were used to develop exposure estimates for upper trophic level receptors rather than the minimum body weights and maximum ingestion rates used in the conservative evaluation. Conversion of food ingestion rates and water ingestion rates, as described in the conservative evaluation, were calculated using central tendency (e.g., mean) estimates of receptor body weights. The use of central tendency exposure parameter estimates is more realistic because they represent the characteristics of a greater proportion of the individuals in the population. The evaluation of food web exposures still assumed an AUF of 1.0.
- Although body-weight scaling factors are typically used for interspecies extrapolation among mammals to account for differences between receptor and test organism body weights (Travis and White 1988 and Travis et al. 1990), the ingestion-based screening values summarized in Table K-8 were not adjusted in the conservative evaluation. Differences in body weights between the mammalian test species and mammalian receptor species was accounted for in the more realistic evaluation by converting the test species NOAEL and LOAEL to receptor-based values. Using the NOAEL as an example, this was accomplished by the following scaling equation (Sample et al. 1996):

$$\text{NOAEL}_w = \text{NOAEL}_t (\text{BW}_t / \text{BW}_w)^{1/4} \quad (\text{Equation K-5})$$

where:

NOAEL _w	=	NOAEL of wildlife species (mg/kg/day)
NOAEL _t	=	NOAEL of test species (mg/kg/day)
BW _w	=	Body weight of wildlife species (kg)
BW _t	=	Body weight of test species (kg)

Sample et al. (1996) consider a scaling factor of 1.0 most appropriate for interspecies extrapolation between birds. Therefore, the literature-derived

NOAEL and LOAEL values summarized in Table K-7 were not adjusted to reflect differences in body weight between avian test species and receptor species.

K.5 UNCERTAINTIES

The procedures used in this evaluation to assess risks to upper trophic level ecological receptors, as in all such assessments, are subject to uncertainties because of the limitations of the available data and the need to make certain assumptions and extrapolations based on incomplete information. The major sources uncertainties associated with food web modeling are presented and discussed below.

Field sampling. The analytical data used in the ERA were derived from abiotic media that were collected in manner such that likely areas of contamination were preferentially sampled. This directed sampling effort would tend to provide a relatively accurate estimation of maximum exposure point concentrations, but an overestimation of exposure point concentrations at the population level. This uncertainty was reduced through the use of mean media concentrations in the refined risk evaluation. Conversely, the field sampling program may not have adequately characterized the extent and nature of contamination at a given site. This scenario would result in an underestimation of potential risks.

Exposure Point Concentrations. The maximum measured contaminant concentration provides a conservative estimate for immobile biota or those with a limited home range. The most realistic exposure estimates for mobile species with relatively large home ranges and for species populations (even those that are immobile or have limited home ranges) are those based on the mean chemical concentrations in each medium to which these receptors are exposed. This is reflected in the wildlife dietary exposure models contained in the Wildlife Exposure Factors Handbook (USEPA 1993), which specify the use of average media concentrations. Given the mobility of the upper trophic level receptor species used in the ERA, the use of maximum chemical concentrations (rather than mean concentrations) to estimate the exposure via food webs is very conservative. The use of mean media concentrations in the refined risk evaluation eliminated this uncertainty associated with use of maximum concentrations.

Ingestion-Based Screening Values. Data on the toxicity of many chemicals to the receptor species were sparse or lacking, requiring the extrapolation of data from other wildlife species or from laboratory studies with non-wildlife species. This is a typical limitation for ecological risk assessments because so few wildlife species have been tested directly for most chemicals. The uncertainties associated with toxicity extrapolation were minimized through the selection of the most appropriate test species for which suitable toxicity data were available. The factors considered in selecting a test species to represent a receptor species included taxonomic relatedness, trophic level, foraging method, and similarity of diet.

A second uncertainty related to the derivation of ingestion screening values applies to metals. Most of the toxicological studies on which the ingestion screening values for metals were based used forms of the metal (such as salts) that have high water solubility and high bioavailability to receptors. Since the analytical samples on which site-specific exposure estimates were based measured total metal, regardless of form, and these highly bioavailable forms are expected to compose only a fraction of the total metal concentration, this is likely to result in an overestimation of potential risks for these chemicals.

A third source of uncertainty associated with the derivation of ingestion screening values concerns the use of uncertainty factors. For example, LOAELs were extrapolated to NOAELs using an uncertainty factor of ten. This approach is likely to be conservative since Dourson and Stara (1983) determined that 96 percent of the chemicals included in a data review had LOAEL/NOAEL ratios of five or less. The use of an uncertainty factor of 10, although potentially conservative, also serves to counter some of the uncertainty associated with interspecies extrapolations, for which a specific uncertainty factor was not used.

A fourth uncertainty associated with ingestion-based screening values applied to chromium. The mammalian ingestion-based screening value used for chromium was derived from a study that used hexavalent chromium as the test material. This is likely to result in an overestimation of risks because hexavalent chromium is more toxic than trivalent chromium, and analyses at the site measured total chromium (a mixture of hexavalent and trivalent forms). For birds, the only ingestion-based screening value available from the literature was based on a study that used trivalent chromium as the test material. The use of this screening value for birds may result in an underestimation of potential risks if hexavalent chromium is present at the site.

Use of NOAEL-Based Screening Values. The use of NOAEL-based screening values in risk calculations for upper trophic level receptors is extremely conservative since they give no indication as to how much higher a concentration must be before adverse effects are observed. For this reason, HQs calculated based on LOAELs are also provided in the risk summary tables.

Chemical Interactions. The conclusions of the risk evaluation to upper trophic level receptors are based on independent effects of chemicals. The potential does exist for multiple chemicals in environmental media to interact. Much uncertainty is involved with the interpretation of chemical interactions due to the complexity of potential effects and due to varying toxicities of compounds in different species. For these reasons, cumulative effects are not addressed in this ERA. This could result in an underestimation of risk if there are additive or synergistic effects among chemicals or an overestimation of risks if there are antagonistic effects among chemicals.

Food Web Exposure Modeling. In the screening-level ERA, chemical concentrations in terrestrial and aquatic food items (plants, earthworms, small mammals, aquatic invertebrates, fish, and frogs) were modeled from maximum measured media concentrations and were not directly measured. The use of generic, literature-derived exposure models and bioaccumulation factors introduces some uncertainty into the resulting estimates. The values selected and the methodology employed were intended to provide a conservative estimate of potential food web exposure concentrations. This uncertainty was reduced in the refined risk evaluation, where mean media concentrations and mean or median BAFs/BCFs were used to estimate chemical concentrations in upper trophic level food items.

A second source of uncertainty associated with the food web models applies to the use of default assumptions for exposure parameters such as bioconcentration and bioaccumulation factors (BCFs/BAFs). Although BCFs or BAFs for many bioaccumulative chemicals were readily available from the literature and were used in the conservative and more realistic risk evaluations, the use of a default factor of 1.0 to estimate the concentration of some chemicals in receptor prey items is a source of uncertainty. For most chemicals, the assumption that the chemical body burden in the prey item is at the same concentration as in soil or sediment is conservative, particularly for many metals, including aluminum, iron, and manganese, which are known not to bioaccumulate to any significant degree.

The use of literature-based BAF and BCFs to estimate contaminant concentrations in aquatic invertebrates and fish also adds uncertainty to the risk assessment. Site specific sediment conditions, including acid volatile sulfides, total organic carbon, and sediment grain size can significantly influence the bioavailability of certain compounds. Although it is common for aquatic assessments to be conducted without such site-specific sediment information, especially at the screening level, the lack of this information adds considerable uncertainty to the risk assessment, and may result in an under or overestimation of actual risks at the site.

A third source of uncertainty associated with the food web models is the use of unrealistically conservative exposure parameters in the conservative evaluation. The use of maximum ingestion rates and minimum body weights result in a conservative estimate of exposure. In addition, area use factors were assumed to equal one. This is a conservative assumption since a significant percentage of each upper trophic level receptor species time could be spent foraging off-site or in unimpacted areas. This uncertainty was eliminated in the refined risk evaluation, where mean body weights and mean ingestion rates were used to estimate dietary intake doses.

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TABLE K-1

ASSESSMENT ENDPOINTS, RISK HYPOTHESES, MEASUREMENT ENDPOINTS, AND RECEPTOR SPECIES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor Species
TERRESTRIAL HABITAT			
Protection of carnivorous mammals to ensure that ingestion of contaminants in soil and prey does not have a negative impact on growth, survival, and reproduction	Are levels of site contaminants in surface soils and/or surface water sufficient to cause adverse effects on the growth, survival, and reproductive success of carnivorous mammals using the site?	Comparison of dietary HQs to a reference of 1.0. Dietary HQs are calculated for individual chemicals by dividing an estimated level of exposure by an ecotoxicity value that is associated with a NOAEL. A reference HQ of 1.0 represents a dietary dose that is equal to the NOAEL ecotoxicity value.	Red Fox
Protection of insectivorous mammals to ensure that ingestion of contaminants in soil and prey does not have a negative impact on growth, survival, and reproduction	Are levels of site contaminants in surface soils and/or surface water sufficient to cause adverse effects on the growth, survival, and reproductive success of insectivorous mammals using the site?	Comparison of dietary HQs to a reference of 1.0. Dietary HQs are calculated for individual chemicals by dividing an estimated level of exposure by an ecotoxicity value that is associated with a NOAEL. A reference HQ of 1.0 represents a dietary dose that is equal to the NOAEL ecotoxicity value.	Short-tailed shrew
Protection of herbivorous mammals to ensure that ingestion of contaminants in soil and vegetation does not have a negative impact on growth, survival, and reproduction	Are levels of site contaminants in surface soils and/or surface water sufficient to cause adverse effects on the growth, survival, and reproductive success of insectivorous mammals using the site?	Comparison of dietary HQs to a reference of 1.0. Dietary HQs are calculated for individual chemicals by dividing an estimated level of exposure by an ecotoxicity value that is associated with a NOAEL. A reference HQ of 1.0 represents a dietary dose that is equal to the NOAEL ecotoxicity value.	Meadow Vole
Protection of omnivorous mammals to ensure that ingestion of contaminants in soil, vegetation, and prey does not have negative impacts on growth, survival, and reproduction	Are levels of site contaminants in surface soil and/or surface water sufficient to cause adverse effects on the growth, survival, and reproductive success of herbivorous mammals using the site?	Comparison of dietary HQs to a reference of 1.0. Dietary HQs are calculated for individual chemicals by dividing an estimated level of exposure by an ecotoxicity value that is associated with a NOAEL. A reference HQ of 1.0 represents a dietary dose that is equal to the NOAEL ecotoxicity value.	White-footed Mouse

TABLE K-1 (Continued)

ASSESSMENT ENDPOINTS, RISK HYPOTHESES, MEASUREMENT ENDPOINTS, AND RECEPTOR SPECIES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor Species
Protection of insectivorous birds to ensure that ingestion of contaminants in soil or food items does not have negative impacts on growth, survival, and reproduction	Are levels of site contaminants in surface soils and/or surface water sufficient to cause adverse effects on the growth, survival, and reproductive success of insectivorous birds using the site?	Comparison of dietary HQs to a reference HQ of 1.0. Dietary HQs are calculated for individual chemicals by dividing an estimated level of exposure by an ecotoxicity value that is associated with a NOAEL. A reference HQ of 1.0 represents a dietary dose that is equal to the NOAEL ecotoxicity value.	American Robin
Protection of carnivorous birds to ensure that ingestion of contaminants in soil or food items does not have negative impacts on growth, survival, and reproduction	Are levels of site contaminants in surface soils and/or surface water sufficient to cause adverse effects on the growth, survival, and reproductive success of carnivorous birds using the site?	Comparison of dietary HQs to a reference HQ of 1.0. Dietary HQs are calculated for individual chemicals by dividing an estimated level of exposure by an ecotoxicity value that is associated with a NOAEL. A reference HQ of 1.0 represents a dietary dose that is equal to the NOAEL ecotoxicity value.	Eastern Screech-owl Red-tailed Hawk
AQUATIC HABITAT			
Protection of birds that feed on aquatic organisms from toxic effects of site-related chemicals present in surface water or sediment	Are levels of site contaminants in surface water and/or sediment sufficient to cause adverse effects on the growth, survival, and reproductive success of avian species using the site?	Comparison of dietary HQs to a reference HQ of 1.0. Dietary HQs are calculated for individual chemicals by dividing an estimated level of exposure by an ecotoxicity value that is associated with a NOAEL. A reference HQ of 1.0 represents a dietary dose that is equal to the NOAEL ecotoxicity value.	Great Blue Heron
Protection of insectivorous birds to ensure that ingestion of contaminants in sediment or food items does not have negative impacts on growth, survival, and reproduction	Are levels of site contaminants in sediment and/or surface water sufficient to cause adverse effects on the growth, survival, and reproductive success of insectivorous birds using the site?	Comparison of dietary HQs to a reference HQ of 1.0. Dietary HQs are calculated for individual chemicals by dividing an estimated level of exposure by an ecotoxicity value that is associated with a NOAEL. A reference HQ of 1.0 represents a dietary dose that is equal to the NOAEL ecotoxicity value.	Marsh Wren

TABLE K-1 (Continued)

ASSESSMENT ENDPOINTS, RISK HYPOTHESES, MEASUREMENT ENDPOINTS, AND RECEPTOR SPECIES
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO - 0219
 MCB CAMP LEJEUNE, NORTH CAROLINA

Assessment Endpoint	Risk Hypothesis	Measurement Endpoint	Receptor Species
Protection of mammals feeding on aquatic organisms from toxic effects of site-related chemicals present in surface water or sediment	Are levels of site contaminants in surface water and/or sediment sufficient to cause adverse effects on the growth, survival, and reproductive success of mammals that eat aquatic organisms and use the site?	Comparison of dietary HQs to a reference HQ of 1.0. Dietary HQs are calculated for individual chemicals by dividing an estimated level of exposure by an ecotoxicity value that is associated with a NOAEL. A reference HQ of 1.0 represents a dietary dose that is equal to the NOAEL ecotoxicity value.	Mink Raccoon

TABLE K-2
BIOACCUMULATIVE CHEMICALS LIST AND LOG K_{ow} VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Log K _{ow} Range	Selected log K _{ow}	Reference	Evaluate for Food Web Exposures? ⁽¹⁾
Semivolatile Organics				
Acenaphthene	3.77 to 4.49	3.92	USEPA 1995	YES
Anthracene	3.45 to 4.80	4.55	USEPA 1995	YES
Benzo(a)anthracene	4.00 to 5.79	5.70	USEPA 1995	YES
Benzo(a)pyrene	5.98 to 6.42	6.11	USEPA 1995	YES
Benzo(b)fluoranthene	5.79 to 6.40	6.20	USEPA 1995	YES
Benzo(g,h,i)perylene	6.63 to 7.05	6.70	USEPA 1995	YES
Benzo(k)fluoranthene	6.12 to 6.27	6.20	USEPA 1995	YES
Chrysene	5.41 to 5.79	5.70	USEPA 1995	YES
Dibenz(a,h)anthracene	6.50 to 6.88	6.69	USEPA 1995	YES
Fluoranthene	4.31 to 5.39	5.12	USEPA 1995	YES
Fluorene	4.04 to 4.40	4.21	USEPA 1995	YES
Indeno(1,2,3-cd)pyrene	6.58 to 6.72	6.65	USEPA 1995	YES
Phenanthrene	4.28 to 4.57	4.55	USEPA 1995	YES
Pyrene	4.76 to 5.52	5.11	USEPA 1995	YES
Pesticides/PCBs				
4,4'-DDD	4.73 to 6.65	6.10	USEPA 1995	YES
4,4'-DDE	5.63 to 6.96	6.76	USEPA 1995	YES
4,4'-DDT	3.98 to 7.01	6.53	USEPA 1995	YES
Alpha-BHC	3.75 to 3.81	3.80	USEPA 1995	YES
Alpha-Chlordane	5.80 to 6.41	6.32	USEPA 1995	YES
Aroclor-1248	Not reported	6.20	Jones et al. 1997	YES
Aroclor-1254	Not reported	6.50	Jones et al. 1997	YES
Aroclor-1260	Not reported	6.80	Jones et al. 1997	YES
Dieldrin	3.63 to 6.20	5.37	USEPA 1995	YES

TABLE K-2 (continued)
BIOACCUMULATIVE CHEMICALS LIST AND LOG K_{ow} VALUES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Log K _{ow} Range	Selected log K _{ow}	Reference	Evaluate for Food Web Exposures? ⁽¹⁾
Pesticides/PCBs (Continued)				
Endosulfan I	3.83 to 3.85	3.83	USEPA 1995	YES
Endrin	2.92 to 5.20	5.06	USEPA 1995	YES
Gamma-Chlordane	5.80 to 6.41	6.32	USEPA 1995	YES
Heptachlor	4.93 to 6.26	6.26	USEPA 1995	YES
Heptachlor epoxide	3.50 to 5.40	5.00	USEPA 1995	YES
Methoxychlor	3.31 to 5.60	5.08	USEPA 1995	YES
Inorganics				
Chromium	NA	NA	NA	YES
Copper	NA	NA	NA	YES
Lead	NA	NA	NA	YES
Mercury	NA	NA	NA	YES
Zinc	NA	NA	NA	YES

Notes:

⁽¹⁾ If "YES" the compound was identified as an "important bioaccumulative compound" in USEPA 2000.

NA = Not Applicable

TABLE K-3
SOIL BIOCONCENTRATION/BIOACCUMULATION FACTORS USED FOR PLANTS AND SOIL INVERTEBRATES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJUENE, NORTH CAROLINA

Chemical	Soil-Plant BCF (dry weight)		Soil-Invertebrate BAF (dry weight)	
	Value	Reference	Value	Reference
Inorganics				
Chromium	0.0075	Baer et al. 1984	3.162	Sample et al. 1998a
Copper	0.625	Bechtel Jacobs 1998a	1.531	Sample et al. 1998a
Lead	0.468	Bechtel Jacobs 1998a	1.522	Sample et al. 1998a
Mercury	5	Bechtel Jacobs 1998a	20.63	Sample et al. 1998a
Zinc	1.82	Bechtel Jacobs 1998a	12.89	Sample et al. 1998a
Pesticides/PCBs				
4,4'-DDD	0.0115	Travis and Arms 1988	2	Menzie et al. 1992
4,4'-DDE	0.0048	Travis and Arms 1988	10.6	Menzie et al. 1992
4,4'-DDT	0.0065	Travis and Arms 1988	0.7	Menzie et al. 1992
alpha-BHC	0.2464	Travis and Arms 1988	1	--
alpha-Chlordane	0.0089	Travis and Arms 1988	3	Menzie et al. 1992
Aroclor-1248	0.0101	Travis and Arms 1988	15.91	Sample et al. 1998a
Aroclor-1254	0.0068	Travis and Arms 1988	15.91	Sample et al. 1998a
Aroclor-1260	0.0045	Travis and Arms 1988	15.91	Sample et al. 1998a
Dieldrin	0.0305	Travis and Arms 1988	8	Beyer and Gish 1980
Endosulfan I	0.2367	Travis and Arms 1988	1	--
Endrin	0.0461	Travis and Arms 1988	1	--
Gamma-Chlordane	0.0086	Travis and Arms 1988	3	Menzie et al. 1992
Heptachlor	0.0093	Travis and Arms 1988	10	Roberts and Dorrough 1985
Heptachlor Epoxide	0.0499	Travis and Arms 1988	10	Roberts and Dorrough 1985
Methoxychlor	0.0448	Travis and Arms 1988	1	--

TABLE K-3 (continued)
SOIL BIOCONCENTRATION/BIOACCUMULATION FACTORS USED FOR PLANTS AND SOIL INVERTEBRATES
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJUENE, NORTH CAROLINA

Chemical	Soil-Plant BCF (dry weight)		Soil-Invertebrate BAF (dry weight)	
	Value	Reference	Value	Reference
Semivolatile Organics				
Acenaphthene	0.21	Travis and Arms 1988	0.3	Beyer and Stafford 1993
Anthracene	0.0908	Travis and Arms 1988	0.32	Beyer and Stafford 1993
Benzo(a)anthracene	0.0197	Travis and Arms 1988	0.27	Beyer and Stafford 1993
Benzo(a)pyrene	0.0114	Travis and Arms 1988	0.34	Beyer and Stafford 1993
Benzo(b)fluoranthene	0.0101	Travis and Arms 1988	0.21	Beyer and Stafford 1993
Benzo(g,h,i)perylene	0.0052	Travis and Arms 1988	0.15	Beyer and Stafford 1993
Benzo(k)fluoranthene	0.0101	Travis and Arms 1988	0.21	Beyer and Stafford 1993
Chrysene	0.0197	Travis and Arms 1988	0.44	Beyer and Stafford 1993
Dibenz(a,h)anthracene	0.0053	Travis and Arms 1988	0.49	Beyer and Stafford 1993
Fluoranthene	0.0425	Travis and Arms 1988	0.37	Beyer and Stafford 1993
Fluorene	0.1428	Travis and Arms 1988	0.2	Beyer and Stafford 1993
Indeno(1,2,3-cd)pyrene	0.0056	Travis and Arms 1988	0.41	Beyer and Stafford 1993
Phenanthrene	0.0908	Travis and Arms 1988	0.28	Beyer and Stafford 1993
Pyrene	0.0431	Travis and Arms 1988	0.39	Beyer and Stafford 1993

TABLE K-4
SOIL BIOACCUMULATION FACTORS USED FOR SMALL MAMMALS
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Soil-Mouse BAF (dry weight)		Soil-Vole BAF (dry weight)		Soil-Shrew BAF (dry weight)	
	Value	Reference	Value	Reference	Value	Reference
Inorganics						
Chromium	0.349	Sample et al. 1998b	0.309	Sample et al. 1998b	0.3333	Sample et al. 1998b
Copper	0.554	Sample et al. 1998b	1.29	Sample et al. 1998b	1.117	Sample et al. 1998b
Lead	0.286	Sample et al. 1998b	0.187	Sample et al. 1998b	0.339	Sample et al. 1998b
Mercury	0.13	Sample et al. 1998b	0.192	Sample et al. 1998b	0.192	Sample et al. 1998b
Zinc	2.7822	Sample et al. 1998b	2.3168	Sample et al. 1998b	2.9011	Sample et al. 1998b
Pesticides/PCBs						
4,4'-DDD	--	see text	--	see text	--	see text
4,4'-DDE	--	see text	--	see text	--	see text
4,4'-DDT	--	see text	--	see text	--	see text
alpha-BHC	--	see text	--	see text	--	see text
alpha-Chlordane	--	see text	--	see text	--	see text
Aroclor-1248	--	see text	--	see text	--	see text
Aroclor-1254	--	see text	--	see text	--	see text
Aroclor-1260	--	see text	--	see text	--	see text
Dieldrin	--	see text	--	see text	--	see text
Endosulfan I	--	see text	--	see text	--	see text
Endrin	--	see text	--	see text	--	see text
Gamma-Chlordane	--	see text	--	see text	--	see text
Heptachlor	--	see text	--	see text	--	see text
Heptachlor Epoxide	--	see text	--	see text	--	see text
Methoxychlor	--	see text	--	see text	--	see text

TABLE K-4 (Continued)
SOIL BIOACCUMULATION FACTORS USED FOR SMALL MAMMALS
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Soil-Mouse BAF (dry weight)		Soil-Vole BAF (dry weight)		Soil-Shrew BAF (dry weight)	
	Value	Reference	Value	Reference	Value	Reference
Semivolatile Organics						
Acenaphthene	--	see text	--	see text	--	see text
Anthracene	--	see text	--	see text	--	see text
Benzo(a)anthracene	--	see text	--	see text	--	see text
Benzo(a)pyrene	--	see text	--	see text	--	see text
Benzo(b)fluoranthene	--	see text	--	see text	--	see text
Benzo(g,h,i)perylene	--	see text	--	see text	--	see text
Benzo(k)fluoranthene	--	see text	--	see text	--	see text
Chrysene	--	see text	--	see text	--	see text
Dibenz(a,h)anthracene	--	see text	--	see text	--	see text
Fluoranthene	--	see text	--	see text	--	see text
Fluorene	--	see text	--	see text	--	see text
Indeno(1,2,3-cd)pyrene	--	see text	--	see text	--	see text
Phenanthrene	--	see text	--	see text	--	see text
Pyrene	--	see text	--	see text	--	see text

TABLE K-5
SEDIMENT BIOACCUMULATION FACTORS USED FOR AQUATIC INVERTEBRATES AND FISH
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Sediment-Invertebrate BAF (dry weight)		Sediment-Fish BAF (dry weight)	
	Value	Reference	Value	Reference
Inorganics				
Chromium	0.186	Bechtel Jacobs 1998b	0.038	Krantzberg and Boyd 1992
Copper	7.957	Bechtel Jacobs 1998b	0.1	Krantzberg and Boyd 1992
Lead	0.326	Bechtel Jacobs 1998b	0.07	Krantzberg and Boyd 1992
Mercury	1.735	Bechtel Jacobs 1998b	4.58	Cope et al. 1990
Zinc	4.759	Bechtel Jacobs 1998b	0.147	Pascoe et al. 1996
Pesticides/PCBs				
4,4'-DDD	0.5	Oliver 1987	2.61	Oliver and Niimi 1988
4,4'-DDE	4.3	Oliver 1987	20.39	Oliver and Niimi 1988
4,4'-DDT	0.5	Oliver 1987	9.11	Oliver and Niimi 1988
alpha-BHC	1	--	1	--
alpha-Chlordane	1	--	1	--
Aroclor-1248	21.89	Bechtel Jacobs 1998b	11.24	Oliver and Niimi 1988
Aroclor-1254	21.89	Bechtel Jacobs 1998b	11.24	Oliver and Niimi 1988
Aroclor-1260	21.89	Bechtel Jacobs 1998b	11.24	Oliver and Niimi 1988
Dieldrin	1	--	1	--
Endosulfan I	1	--	1	--
Endrin	1	--	1	--
Gamma-Chlordane	1	--	1	--
Heptachlor	1	--	1	--
Heptachlor Epoxide	1	--	1	--
Methoxychlor	1	--	1	--

TABLE K-5 (continued)
 SEDIMENT BIOACCUMULATION FACTORS USED FOR AQUATIC INVERTEBRATES AND FISH
 OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO - 0219
 MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Sediment-Invertebrate BAF (dry weight)		Sediment-Fish BAF (dry weight)	
	Value	Reference	Value	Reference
Semivolatile Organics				
Acenaphthene	2.04	Maruya et al. 1997	1	--
Anthracene	0.271	Maruya et al. 1997	1	--
Benzo(a)anthracene	1.4	Maruya et al. 1997	1	--
Benzo(a)pyrene	0.191	Maruya et al. 1997	1	--
Benzo(b)fluoranthene	0.16	Maruya et al. 1997	1	--
Benzo(g,h,i)perylene	0.295	Maruya et al. 1997	1	--
Benzo(k)fluoranthene	0.421	Maruya et al. 1997	1	--
Chrysene	0.335	Maruya et al. 1997	1	--
Dibenz(a,h)anthracene	1	--	1	--
Fluoranthene	0.312	Maruya et al. 1997	1	--
Fluorene	1.13	Maruya et al. 1997	1	--
Indeno(1,2,3-cd)pyrene	0.355	Maruya et al. 1997	1	--
Phenanthrene	0.652	Maruya et al. 1997	1	--
Pyrene	0.803	Maruya et al. 1997	1	--

TABLE K-6
CONSERVATIVE EXPOSURE PARAMETERS FOR UPPER TROPHIC LEVEL ECOLOGICAL RECEPTORS
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Receptor	Body Weight (kg)		Water Ingestion Rate (L/day)		Food Ingestion Rate (kg/day - dry)	
	Value	Reference	Value	Reference	Value	Reference
Birds						
American robin	0.0635	USEPA 1993	0.01442	USEPA 1993	0.0086154	Levey and Karasov 1989
Great blue heron	2.1	Butler 1992	0.1125	USEPA 1993	0.11025	USEPA 1993
Eastern screech-owl	0.145	Dunning 1993	0.02159	USEPA 1993	0.02191	USEPA 1993 (Nagy)
Marsh wren	0.00975	Dunning 1993	0.00365	USEPA 1993	0.0027636	USEPA 1993
Red-tailed hawk	0.957	USEPA 1993	0.07039	USEPA 1993	0.04352	Sample and Suter 1994
Mammals						
Meadow vole	0.03	Silva and Downing 1995	0.01334	USEPA 1993	0.00334	USEPA 1993
Mink	0.564	Silva and Downing 1995	0.10879	USEPA 1993	0.03934	USEPA 1993
Raccoon	4.2	USEPA 1993	0.6806	USEPA 1993	0.14557	Conover 1989
Red fox	3.17	Silva and Downing 1995	0.41395	USEPA 1993	0.14763	Sample and Suter 1994
Short-tailed shrew	0.0155	USEPA 1993	0.00479	USEPA 1993	0.00192	USEPA 1993
White-footed mouse	0.0141	Silva and Downing 1995	0.0058	USEPA 1993	0.00073	Sample and Suter 1994

TABLE K-6 (Continued)
CONSERVATIVE EXPOSURE PARAMETERS FOR UPPER TROPHIC LEVEL ECOLOGICAL RECEPTORS
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Receptor		Dietary Composition (percent)							Soil/ Sediment Ingestion (percent)	
		Terr. Plants	Soil Invert.	Small Mammals	Fish/ Frogs	Aquatic Plants	Aquatic Invert.	Reference	Value	Reference
Birds										
American robin		33.6	58	0	0	0	0	USEPA 1993	8.4	Sample and Suter 1994
Great blue heron		0	0	0	100	0	0	USEPA 1993; Sample and Suter 1994	0	Sample and Suter 1994
Eastern screech-owl		0	28	70	0	0	0	Johnsgard 1988	2	Assumed based on diet
Marsh wren		0	0	0	0	0	95	USEPA 1993	5	Assumed based on diet
Red-tailed hawk		0	0	100	0	0	0	USEPA 1993; Sample and Suter 1994	0	Sample and Suter 1994
Mammals										
Meadow vole		95.6	2	0	0	0	0	USEPA 1993	2.4	Beyer et al. 1994
Mink		0	0	6	89	1	4	USEPA 1993	0	Sample and Suter 1994
Raccoon		0	0	0	11 *	36	43.6	USEPA 1993 (MD)	9.4	Beyer et al. 1994
Red fox		7	2.8	87.4	0	0	0	USEPA 1993 (MD)	2.8	Beyer et al. 1994
Short-tailed shrew		4.7	82.3	0	0	0	0	USEPA 1993; Sample and Suter 1994	13	Sample and Suter 1994
White-footed mouse		54	44	0	0	0	0	USEPA 1993	2	Beyer et al. 1994

* Frogs only

TABLE K-7
INGESTION SCREENING VALUES FOR BIRDS
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Test Organism	Body Weight	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	NOAEL (mg/kg/d)	Reference
Inorganics								
Chromium	American black duck	1.25	10 months	oral in diet	reproduction	5	1	Sample et al. 1996
Copper	chicks	0.534	10 weeks	oral in diet	growth/mortality	61.7	47	Sample et al. 1996
Lead	Japanese quail	0.15	12 weeks	oral in diet	reproduction	11.3	1.13	Sample et al. 1996
Lead	American kestrel	0.13	7 months	oral in diet	reproduction	38.5	3.85	Sample et al. 1996
Mercury	Japanese quail	0.15	1 year	oral in diet	reproduction	0.9	0.45	Sample et al. 1996
Mercury	mallard	1	3 generations	oral in diet	reproduction	0.064	0.0064	Sample et al. 1996
Zinc	chicken	1.935	44 weeks	oral in diet	reproduction	131	14.5	Sample et al. 1996
Pesticides/PCBs								
4,4'-DDD	mallard	1.134	chronic	oral	reproduction	5.2	0.52	Stickel 1973
4,4'-DDD	American kestrel	0.115	2 years	oral	reproduction	0.5	0.05	McLane and Hall 1972
4,4'-DDE	brown pelican	3.5	chronic	oral	reproduction	1.31	0.131	Beyer et al. 1996
4,4'-DDE	American kestrel	0.115	2 years	oral	reproduction	0.5	0.05	McLane and Hall 1972
4,4'-DDT	mallard	1.134	chronic	oral	reproduction	1.04	0.104	Davison and Sell 1974
4,4'-DDT	American kestrel	0.115	2 years	oral	reproduction	0.5	0.05	McLane and Hall 1972
alpha-BHC	Japanese quail	0.15	90 days	oral in diet	reproduction	2.25	0.56	Sample et al. 1996
alpha-Chlordane	red-winged blackbird	0.064	84 days	oral in diet	mortality	10.7	2.14	Sample et al. 1996
Aroclor-1248	ring-necked pheasant	1	17 weeks	oral	reproduction	1.8	0.18	Sample et al. 1996
Aroclor-1254	ring-necked pheasant	1	17 weeks	oral	reproduction	1.8	0.18	Sample et al. 1996
Aroclor-1260	ring-necked pheasant	1	17 weeks	oral	reproduction	1.8	0.18	Sample et al. 1996
Dieldrin	barn owl	0.466	2 years	oral	reproduction	1.8	0.18	Sample et al. 1996
Endosulfan I	gray partridge	0.4	4 weeks	oral in diet	reproduction	0.77	0.077	Sample et al. 1996
Endrin	mallard	1.15	>200 days	oral in diet	reproduction	100	10	Sample et al. 1996
Endrin	screech owl	0.181	>83 days	oral in diet	reproduction	3	0.3	Sample et al. 1996
Endrin					reproduction	0.1	0.01	Sample et al. 1996

TABLE K-7 (continued)
INGESTION SCREENING VALUES FOR BIRDS
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Test Organism	Body Weight	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	NOAEL (mg/kg/d)	Reference
Pesticides/PCBs (Cont.)								
Gamma-Chlordane	red-winged blackbird	0.064	84 days	oral in diet	mortality	10.7	2.14	Sample et al. 1996
Heptachlor	quail	0.191	5 days	oral in diet	mortality	4.05	0.405	Hill et al. 1975
Heptachlor Epoxide	quail	0.191	5 days	oral in diet	mortality	4.05	0.405	Hill et al. 1975
Methoxychlor	quail	0.191	5 days	oral in diet	mortality	4050	405	Hill and Camardese 1986
Semivolatile Organics								
Acenaphthene	chicken	1.5	34 days	oral in diet	reproduction	395	39.5	Rigdon and Neal 1963
Anthracene	mallard	1.043	7 months	oral in diet	hepatic	228	22.8	Patton and Dieter 1980
Benzo(a)anthracene	chicken	1.5	34 days	oral in diet	reproduction	395	39.5	Rigdon and Neal 1963
Benzo(a)pyrene	chicken	1.5	34 days	oral in diet	reproduction	395	39.5	Rigdon and Neal 1963
Benzo(b)fluoranthene	chicken	1.5	34 days	oral in diet	reproduction	395	39.5	Rigdon and Neal 1963
Benzo(g,h,i)perylene	chicken	1.5	34 days	oral in diet	reproduction	395	39.5	Rigdon and Neal 1963
Benzo(k)fluoranthene	chicken	1.5	34 days	oral in diet	reproduction	395	39.5	Rigdon and Neal 1963
Chrysene	chicken	1.5	34 days	oral in diet	reproduction	395	39.5	Rigdon and Neal 1963
Dibenz(a,h)anthracene	chicken	1.5	34 days	oral in diet	reproduction	395	39.5	Rigdon and Neal 1963
Fluoranthene	chicken	1.5	34 days	oral in diet	reproduction	395	39.5	Rigdon and Neal 1963
Fluorene	chicken	1.5	34 days	oral in diet	reproduction	395	39.5	Rigdon and Neal 1963
Indeno(1,2,3-cd)pyrene	chicken	1.5	34 days	oral in diet	reproduction	395	39.5	Rigdon and Neal 1963
Phenanthrene	chicken	1.5	34 days	oral in diet	reproduction	395	39.5	Rigdon and Neal 1963
Pyrene	chicken	1.5	34 days	oral in diet	reproduction	395	39.5	Rigdon and Neal 1963

Notes:

? = Information not provided in reference.

TABLE K-8
INGESTION SCREENING VALUES FOR MAMMALS
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Test Organism	Body Weight (kg)	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	NOAEL (mg/kg/d)	Reference
Inorganics								
Chromium	rat	0.35	3 months	oral in water	mortality	13.14	1.314	Sample et al. 1996
Copper	mink	1	357 days	oral in diet	reproduction	15.14	11.7	Sample et al. 1996
Lead	rat	0.35	3 generations	oral in diet	reproduction	80	8	Sample et al. 1996
Mercury	rat	0.35	3 generations	oral in diet	reproduction	0.16	0.032	Sample et al. 1996
Mercury	mink	1	93 days	oral in diet	mortality/weight loss	0.025	0.015	Sample et al. 1996
Zinc	rat	0.35	GD 1-16	oral in diet	reproduction	320	160	Sample et al. 1996
Zinc	mink	1	25 weeks	oral	reproduction	208	20.8	ATSDR 1992a
Pesticides/PCBs								
4,4'-DDD	rat	0.35	2 years	oral in diet	reproduction	4	0.8	Sample et al. 1996
4,4'-DDD	dog	10	2 generations	oral	reproduction	5	1	ATSDR 1992b
4,4'-DDE	rat	0.35	2 years	oral in diet	reproduction	4	0.8	Sample et al. 1996
4,4'-DDE	dog	10	2 generations	oral	reproduction	5	1	ATSDR 1992b
4,4'-DDT	rat	0.35	2 years	oral in diet	reproduction	4	0.8	Sample et al. 1996
4,4'-DDT	dog	10	2 generations	oral	reproduction	5	1	ATSDR 1992b
alpha-BHC	rat	0.35	4 generations	oral in diet	reproduction	3.2	1.6	Sample et al. 1996
alpha-Chlordane	mouse	0.03	6 generations	oral in diet	reproduction	9.16	4.58	Sample et al. 1996
Aroclor-1248	mouse	0.03	5 weeks	oral in diet	immunological	13	1.3	ATSDR 1995a
Aroclor-1248	rhesus monkey	5	14 months	oral in diet	reproduction	0.1	0.01	Sample et al. 1996
Aroclor-1254	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.68	0.068	Sample et al. 1996
Aroclor-1254	mink	1	4.5 months	oral in diet	reproduction	0.69	0.14	Sample et al. 1996
Aroclor-1260	oldfield mouse	0.014	12 months	oral in diet	reproduction	0.68	0.068	Sample et al. 1996
Aroclor-1260	mink	1	4.5 months	oral in diet	reproduction	0.69	0.14	Sample et al. 1996
Dieldrin	rat	0.35	3 generations	oral in diet	reproduction	0.2	0.02	Sample et al. 1996
Endosulfan I	rat	0.35	30 days	oral (intubation)	reproduction	1.5	0.15	Sample et al. 1996
Endrin	mouse	0.03	120 days	oral in diet	reproduction	0.92	0.092	Sample et al. 1996
Gamma-Chlordane	mouse	0.03	6 generations	oral in diet	reproduction	9.16	4.58	Sample et al. 1996
Heptachlor	mink	1	181 days	oral in diet	reproduction	1	0.1	Sample et al. 1996
Heptachlor Epoxide	mink	1	181 days	oral in diet	reproduction	1	0.1	Sample et al. 1996
Methoxychlor	rat	0.35	11 months	oral in diet	reproduction	8	4	Sample et al. 1996

TABLE K-8 (continued)
INGESTION SCREENING VALUES FOR MAMMALS
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Test Organism	Body Weight (kg)	Duration	Exposure Route	Effect/Endpoint	LOAEL (mg/kg/d)	NOAEL (mg/kg/d)	Reference
Semivolatile Organics								
Acenaphthene	mouse	0.03	13 weeks	oral (gavage)	reproduction	3500	350	ATSDR 1995b
Anthracene	mouse	0.03	13 weeks	oral (gavage)	reproduction	10000	1000	ATSDR 1995b
Benzo(a)anthracene	mouse	0.03	GD 7-16	oral (intubation)	reproduction	10	1	Sample et al. 1996
Benzo(a)pyrene	mouse	0.03	GD 7-16	oral (intubation)	reproduction	10	1	Sample et al. 1996
Benzo(b)fluoranthene	mouse	0.03	GD 7-16	oral (intubation)	reproduction	10	1	Sample et al. 1996
Benzo(g,h,i)perylene	mouse	0.03	GD 7-16	oral (intubation)	reproduction	10	1	Sample et al. 1996
Benzo(k)fluoranthene	mouse	0.03	19 to 29 days	oral in diet	reproduction	1330	133	ATSDR 1995b
Chrysene	mouse	0.03	GD 7-16	oral (intubation)	reproduction	10	1	Sample et al. 1996
Dibenz(a,h)anthracene	mouse	0.03	GD 7-16	oral (intubation)	reproduction	10	1	Sample et al. 1996
Fluoranthene	mouse	0.03	GD 7-16	oral (intubation)	reproduction	10	1	Sample et al. 1996
Fluorene	mouse	0.03	13 weeks	oral (gavage)	hepatic	1250	125	ATSDR 1995b
Indeno(1,2,3-cd)pyrene	mouse	0.03	13 weeks	oral (gavage)	hematological	1250	125	ATSDR 1995b
Phenanthrene	mouse	0.03	GD 7-16	oral (intubation)	reproduction	10	1	Sample et al. 1996
Pyrene	mouse	0.03	19 to 29 days	oral in diet	reproduction	1330	133	ATSDR 1995
	mouse	0.03	19 to 29 days	oral in diet	reproduction	1330	133	ATSDR 1995

Notes:

? = Information not provided in reference.

TABLE K-9
SOIL BIOCONCENTRATION/BIOACCUMULATION FACTORS USED FOR PLANTS AND SOIL INVERTEBRATES
LESS CONSERVATIVE RISK SCENARIO - OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Soil-Plant BCF (dry weight)		Soil-Invertebrate BAF (dry weight)	
	Value	Reference	Value	Reference
Inorganics				
Chromium	0.0075	Baes et al. 1984	0.32	Sample et al. 1998a
Copper	0.123	Bechtel Jacobs 1998a	0.468	Sample et al. 1998a
Lead	0.0377	Bechtel Jacobs 1998a	0.307	Sample et al. 1998a
Mercury	0.344	Bechtel Jacobs 1998a	1.186	Sample et al. 1998a
Zinc	0.358	Bechtel Jacobs 1998a	2.482	Sample et al. 1998a
Pesticides/ PCBs				
4,4'-DDD	0.0115	Travis and Arms 1988	2	Menzie et al. 1992
4,4'-DDE	0.0048	Travis and Arms 1988	10.6	Menzie et al. 1992
4,4'-DDT	0.0065	Travis and Arms 1988	0.7	Menzie et al. 1992
alpha-BHC	0.2464	Travis and Arms 1988	1	--
alpha-Chlordane	0.0089	Travis and Arms 1988	3	Menzie et al. 1992
Aroclor-1248	0.0101	Travis and Arms 1988	4.297	Sample et al. 1998a
Aroclor-1254	0.0068	Travis and Arms 1988	4.297	Sample et al. 1998a
Aroclor-1260	0.0045	Travis and Arms 1988	4.297	Sample et al. 1998a
Dieldrin	0.0305	Travis and Arms 1988	8	Beyer and Gish 1980
Endosulfan I	0.2367	Travis and Arms 1988	1	--
Endrin	0.0461	Travis and Arms 1988	1	--
Gamma-Chlordane	0.0086	Travis and Arms 1988	3	Menzie et al. 1992
Heptachlor	0.0093	Travis and Arms 1988	10	Roberts and Dorrough 1985
Heptachlor Epoxide	0.0499	Travis and Arms 1988	10	Roberts and Dorrough 1985
Methoxychlor	0.0448	Travis and Arms 1988	1	--

TABLE K-9 (Continued)

SOIL BIOCONCENTRATION/BIOACCUMULATION FACTORS USED FOR PLANTS AND SOIL INVERTEBRATES
LESS CONSERVATIVE RISK SCENARIO - OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Soil-Plant BCF (dry weight)		Soil-Invertebrate BAF (dry weight)	
	Value	Reference	Value	Reference
Semivolatile Organics				
Acenaphthene	0.21	Travis and Arms 1988	0.3	Beyer and Stafford 1993
Anthracene	0.0908	Travis and Arms 1988	0.32	Beyer and Stafford 1993
Benzo(a)anthracene	0.0197	Travis and Arms 1988	0.27	Beyer and Stafford 1993
Benzo(a)pyrene	0.0114	Travis and Arms 1988	0.34	Beyer and Stafford 1993
Benzo(b)fluoranthene	0.0101	Travis and Arms 1988	0.21	Beyer and Stafford 1993
Benzo(g,h,i)perylene	0.0052	Travis and Arms 1988	0.15	Beyer and Stafford 1993
Benzo(k)fluoranthene	0.0101	Travis and Arms 1988	0.21	Beyer and Stafford 1993
Chrysene	0.0197	Travis and Arms 1988	0.44	Beyer and Stafford 1993
Dibenz(a,h)anthracene	0.0053	Travis and Arms 1988	0.49	Beyer and Stafford 1993
Fluoranthene	0.0425	Travis and Arms 1988	0.37	Beyer and Stafford 1993
Fluorene	0.1428	Travis and Arms 1988	0.2	Beyer and Stafford 1993
Indeno(1,2,3-cd)pyrene	0.0056	Travis and Arms 1988	0.41	Beyer and Stafford 1993
Phenanthrene	0.0908	Travis and Arms 1988	0.28	Beyer and Stafford 1993
Pyrene	0.0431	Travis and Arms 1988	0.39	Beyer and Stafford 1993

TABLE K-10
SOIL BIOACCUMULATION FACTORS USED FOR SMALL MAMMALS
LESS CONSERVATIVE RISK SCENARIO - OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Soil-Mouse BAF (dry weight)		Soil-Vole BAF (dry weight)		Soil-Shrew BAF (dry weight)	
	Value	Reference	Value	Reference	Value	Reference
Inorganics						
Chromium	0.092	Sample et al. 1998b	0.1249	Sample et al. 1998b	0.0939	Sample et al. 1998b
Copper	0.1107	Sample et al. 1998b	0.109	Sample et al. 1998b	0.5017	Sample et al. 1998b
Lead	0.0548	Sample et al. 1998b	0.0406	Sample et al. 1998b	0.1478	Sample et al. 1998b
Mercury	0.0731	Sample et al. 1998b	0.0672	Sample et al. 1998b	0.0672	Sample et al. 1998b
Zinc	0.5092	Sample et al. 1998b	0.2929	Sample et al. 1998b	0.862	Sample et al. 1998b
Pesticides/ PCBs						
4,4'-DDD	--	see text	--	see text	--	see text
4,4'-DDE	--	see text	--	see text	--	see text
4,4'-DDT	--	see text	--	see text	--	see text
alpha-BHC	--	see text	--	see text	--	see text
alpha-Chlordane	--	see text	--	see text	--	see text
Aroclor-1248	--	see text	--	see text	--	see text
Aroclor-1254	--	see text	--	see text	--	see text
Aroclor-1260	--	see text	--	see text	--	see text
Dieldrin	--	see text	--	see text	--	see text
Endosulfan I	--	see text	--	see text	--	see text
Endrin	--	see text	--	see text	--	see text
Gamma-Chlordane	--	see text	--	see text	--	see text
Heptachlor	--	see text	--	see text	--	see text
Heptachlor Epoxide	--	see text	--	see text	--	see text
Methoxychlor	--	see text	--	see text	--	see text

TABLE K-10 (continued)
 SOIL BIOACCUMULATION FACTORS USED FOR SMALL MAMMALS
 LESS CONSERVATIVE RISK SCENARIO - OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO - 0219
 MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Soil-Mouse BAF (dry weight)		Soil-Vole BAF (dry weight)		Soil-Shrew BAF (dry weight)	
	Value	Reference	Value	Reference	Value	Reference
Semivolatile Organics						
Acenaphthene	--	see text	--	see text	--	see text
Anthracene	--	see text	--	see text	--	see text
Benzo(a)anthracene	--	see text	--	see text	--	see text
Benzo(a)pyrene	--	see text	--	see text	--	see text
Benzo(b)fluoranthene	--	see text	--	see text	--	see text
Benzo(g,h,i)perylene	--	see text	--	see text	--	see text
Benzo(k)fluoranthene	--	see text	--	see text	--	see text
Chrysene	--	see text	--	see text	--	see text
Dibenz(a,h)anthracene	--	see text	--	see text	--	see text
Fluoranthene	--	see text	--	see text	--	see text
Fluorene	--	see text	--	see text	--	see text
Indeno(1,2,3-cd)pyrene	--	see text	--	see text	--	see text
Phenanthrene	--	see text	--	see text	--	see text
Pyrene	--	see text	--	see text	--	see text

TABLE K-11
SEDIMENT BIOACCUMULATION FACTORS USED FOR AQUATIC INVERTEBRATES AND FISH
LESS CONSERVATIVE RISK SCENARIO - OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Sediment-Invertebrate BAF (dry weight)		Sediment-Fish BAF (dry weight)	
	Value	Reference	Value	Reference
Inorganics				
Chromium	0.09	Bechtel Jacobs 1998b	0.038	Krantzberg and Boyd 1992
Copper	0.919	Bechtel Jacobs 1998b	0.1	Krantzberg and Boyd 1992
Lead	0.129	Bechtel Jacobs 1998b	0.07	Krantzberg and Boyd 1992
Mercury	1.022	Bechtel Jacobs 1998b	3.25	Cope et al. 1990
Zinc	0.954	Bechtel Jacobs 1998b	0.147	Pascoe et al. 1996
Pesticides/ PCBs				
4,4'-DDD	0.5	Oliver 1987	1.66	Oliver and Niimi 1988
4,4'-DDE	4.3	Oliver 1987	15.88	Oliver and Niimi 1988
4,4'-DDT	0.5	Oliver 1987	6.56	Oliver and Niimi 1988
alpha-BHC	1	--	1	--
alpha-Chlordane	1	--	1	--
Aroclor-1248	1.92	Bechtel Jacobs 1998b	8.64	Oliver and Niimi 1988
Aroclor-1254	1.92	Bechtel Jacobs 1998b	8.64	Oliver and Niimi 1988
Aroclor-1260	1.92	Bechtel Jacobs 1998b	8.64	Oliver and Niimi 1988
Dieldrin	1	--	1	--
Endosulfan I	1	--	1	--
Endrin	1	--	1	--
Gamma-Chlordane	1	--	1	--
Heptachlor	1	--	1	--
Heptachlor Epoxide	1	--	1	--
Methoxychlor	1	--	1	--

TABLE K-11 (continud)

SEDIMENT BIOACCUMULATION FACTORS USED FOR AQUATIC INVERTEBRATES AND FISH
 LESS CONSERVATIVE RISK SCENARIO - OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
 REMEDIAL INVESTIGATION, CTO - 0219
 MCB CAMP LEJEUNE, NORTH CAROLINA

Chemical	Sediment-Invertebrate BAF (dry weight)		Sediment-Fish BAF (dry weight)	
	Value	Reference	Value	Reference
Semivolatile Organics				
Acenaphthene	2.04	Maruya et al. 1997	1	--
Anthracene	0.191	Maruya et al. 1997	1	--
Benzo(a)anthracene	0.358	Maruya et al. 1997	1	--
Benzo(a)pyrene	0.127	Maruya et al. 1997	1	--
Benzo(b)fluoranthene	0.15	Maruya et al. 1997	1	--
Benzo(g,h,i)perylene	0.215	Maruya et al. 1997	1	--
Benzo(k)fluoranthene	0.232	Maruya et al. 1997	1	--
Chrysene	0.198	Maruya et al. 1997	1	--
Dibenz(a,h)anthracene	1	--	1	--
Fluoranthene	0.212	Maruya et al. 1997	1	--
Fluorene	0.481	Maruya et al. 1997	1	--
Indeno(1,2,3-cd)pyrene	0.173	Maruya et al. 1997	1	--
Phenanthrene	0.294	Maruya et al. 1997	1	--
Pyrene	0.435	Maruya et al. 1997	1	--

TABLE K-12
REFINED EXPOSURE PARAMETERS FOR UPPER TROPHIC LEVEL ECOLOGICAL RECEPTORS
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Receptor	Body Weight (kg)		Water Ingestion Rate (L/day)		Food Ingestion Rate (kg/day - dry)	
	Value	Reference	Value	Reference	Value	Reference
Birds						
American robin	0.0773	USEPA 1993	0.01082	USEPA 1993	0.0064604	Levey and Karasov 1989
Great blue heron	2.23	Quinney 1982	0.10035	USEPA 1993	0.098343	USEPA 1993
Eastern screech-owl	0.181	Dunning 1993	0.01877	USEPA 1993 (Nagy)	0.01913	USEPA 1993 (Nagy)
Marsh wren	0.01125	Dunning 1993	0.00304	USEPA 1993	0.0015834	USEPA 1993
Red-tailed hawk	1.126	Sample and Suter 1994	0.06418	USEPA 1993	0.03488	Sample and Suter 1994
Mammals						
Meadow vole	0.0428	Silva and Downing 1995	0.00749	USEPA 1993	0.00209	USEPA 1993
Mink	0.777	Silva and Downing 1995	0.08159	USEPA 1993	0.02704	USEPA 1993
Raccoon	5.98	USEPA 1993	0.49036	USEPA 1993	0.10488	Conover 1989
Red fox	4.06	Silva and Downing 1995	0.3451	USEPA 1993	0.12308	Sample and Suter 1994
Short-tailed shrew	0.0183	USEPA 1993	0.00408	USEPA 1993	0.00163	USEPA 1993
White-footed mouse	0.0208	Silva and Downing 1995	0.00395	USEPA 1993	0.00050	Sample and Suter 1994

Notes:

Refined exposure parameters represent measurements of central tendency

TABLE K-12 (Continued)
REFINED EXPOSURE PARAMETERS FOR UPPER TROPHIC LEVEL ECOLOGICAL RECEPTORS
OPERABLE UNIT 19, SITE 84/BUILDING 45 AREA
REMEDIAL INVESTIGATION, CTO - 0219
MCB CAMP LEJEUNE, NORTH CAROLINA

Receptor	Dietary Composition (percent)						Soil/ Sediment Ingestion (percent)	
	Terr. Plants	Soil Invert.	Small Mammals	Fish/Frogs	Aquatic Plants	Aquatic Invert.	Reference	Value
Birds								
American robin	33.6	58	0	0	0	0	USEPA 1993	8.4
Great blue heron	0	0	0	100	0	0	USEPA 1993; Sample and Suter 1994	0
Eastern screech-owl	0	28	70	0	0	0	Johnsgard 1988	2
Marsh wren	0	0	0	0	0	95	USEPA 1993	5
Red-tailed hawk	0	0	100	0	0	0	USEPA 1993; Sample and Suter 1994	0
Mammals								
Meadow vole	95.6	2	0	0	0	0	USEPA 1993	2.4
Mink	0	0	6	89	1	4	USEPA 1993	0
Raccoon	0	0	0	11 *	36	43.6	USEPA 1993 (MD)	9.4
Red fox	7	2.8	87.4	0	0	0	USEPA 1993 (MD)	2.8
Short-tailed shrew	4.7	82.3	0	0	0	0	USEPA 1993; Sample and Suter 1994	13
White-footed mouse	54	44	0	0	0	0	USEPA 1993	2
								Beyer et al. 1994
								Sample and Suter 1994
								Beyer et al. 1994
								Beyer et al. 1994
								Sample and Suter 1994
								Beyer et al. 1994
								Sample and Suter 1994
								Beyer et al. 1994

Notes:

Refined exposure parameters represent measurements of central tendency

* Frogs only

