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FACILITY ASSESSMENT
PRELIMINARY REVIEW DOCUMENT

For

MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

VOLUME II

Prepared For

Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia

Environmental and Safety Designs, Inc
Memphis, Tennessee

October 27, 1995

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HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
MARINE CORPS BASE, CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL COORDINATORS (HMDC)

PRIMARY George Radford, Environmental Management
Building: 67
Extension: 5063
Appt Date: 10 Mar 93
Training: 27-29 July 93

Updated
20 Aug 93)

ALTERNATE MGySgt Palombi
Building: 67
Extension: 5063
Appt Date: 2 Sep 92
Training: 27-29 July 93

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION		BUILDING	EXTENSION
Assistant	Chief of Staff, Logistics		
PRIMARY	Arlene Waters	914	2535/2507
	Appt Date:		
	Training: 28-30 Jul 92		
ALTERNATE	Sgt P. Patridge	914	2535/2507
	Appt Date:		
	Training: 18 Aug 93		
	Hazardous Waste Sites:	908, AS-118, 1502, 80	
Assistant	Chief of Staff, Morale, Welfare, and Recreation		
PRIMARY	Fred Schmitt	1401	2517/2862
	Appt Date:		
	Training: 27-29 Jul 93		
ALTERNATE	Fred Patterson	1015	2135/5392
	Appt Date:		
	Training: 19 Aug 92		
	Hazardous Waste Sites and Hazardous Material Site Managers and Handlers: on separate lists		
Base Maintenance Division			
PRIMARY	Jim Waldrop	1202	3046
	Appt Date:		
	Training: 27-29 Jul 93		
ALTERNATE	Tim Jewell	1105	5158
	Appt Date:		
	Training: 27-29		
	Hazardous Waste Sites:	1102, 1202	

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION		BUILDING	EXTENSION
Brig Co.,	HQ & Supt Bn		
PRIMARY	SSgt Phillip Bradshaw	1041	1967
	Appt Date: 1 Apr 92		
	Training: 28-30 Jul 92		
ALTERNATE	Cpl Reyna	1041	1967
	Appt Date:		
	Training: Feb 93		
	Hazardous Waste Site:	1041	
Brig Co.,	Correctional Custody Unit (Rifle Range)		
PRIMARY	SSgt Gene A. Rued		
	Appt Date: 5 Mar 93		
	Training:		
	HM/HW Handler at Brig at Rifle Range		
	- Sgt Karn		
	Appt: 25 Feb 92		
Communications Electronics Division			
PRIMARY	George E. Krentz	1101	5422/2625
	Appt Date: 25 Jun 91		
	Training: 27-29 Jul 93		
ALTERNATE	Bob Critcher	24	1661
	Appt Date: ?		
	Training:		
	Hazardous Waste Sites:	24	
	Hazardous Waste Managers/Handlers	none appointed	
Field Medical Service School			
PRIMARY	HM1 Bodine	M105	0742
	Appt Date:		
	Training: 28-30 Jul 92		
ALTERNATE	Sgt Couch	M105	
	0742/0982 Appt Date:		
	Training:		
	Hazardous Waste Sites:	M105/104, M308	
Headquarters & Support Battalion			
PRIMARY	SSgt Fraser	12	3852
	Appt Date:		
	Training: ? Jan 93		
ALTERNATE	LCpl Hudson	1117	3107
	Appt Date: 19 Aug 91		
	Training:		

Hazardous Waste Sites: 12, 1117

Dependent Schools

<u>PRIMARY</u> Joe Jones 2461 Apt

Date: Training: 27-29 July 93

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
MARINE CORPS BASE, CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION	BUILDING	EXTENSION
Marine Corps Engineer School		
PRIMARY CWO2 J. G. DePoorter	BB-28	7528/7233
Appt Date: 30 June 93		(up dated
Training: 27 - 29 July 93 scheduled		5 July 93)
ALTERNATE GySgt S. Snow	BB-49	7506/7262
Appt Date: 30 June 93		
Training: 27-29 Jul 93		
Hazardous Waste Sites:	BB-86, BB-51	
Marine Corps Service Support School		
PRIMARY Capt Colmenares	M130	0839
Appt Date:		
Training:		
ALTERNATE MGySgt Smith	moved to new office	0839
Appt Date:		
Training: 27-29 July 93		
Hazardous Waste Sites:	M90, M119, M171	
Reserve Affairs Department		
PRIMARY Capt McGrath	1211	2221/1732
Appt Date: ?		
Training: ?		
ALTERNATE SSgt Alltop	1403	2221/1732
Appt Date:		
Training: 7 April 93		
Hazardous Waste Sites:	1111	

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION	BUILDING	EXTENSION
Rifle Range Detachment		
PRIMARY MGySgt Harmon	RR11	7937/7952
Appt Date:		(new)
Training: 27-29 July 93		
ALTERNATE MSgt Phillips	RR11	7952
Appt Date:		(new)
Training: 27-29 July 93		
Hazardous Waste Sites:	RR13	
School of Infantry		
PRIMARY GySgt St. Hilaire	TC-846	0248/0461
Appt Date:		
Training: 28-30 Jul 92		
ALTERNATE SSgt A. Smith	TC-611	0399
Appt Date:		
Training: 28-30 July 92		
Site Manager Cpl M. S. Chaban	TC-816	0676
Cpl H. M. Hostetter	TC-816	0676
Hazardous Waste Sites:	TC-411, TC-820/822	
AC/S, Training and Operations Dept		
Training Support Division		
PRIMARY Cpl John E. Wood, Jr.	1404	5479/3331
Appt Date: 15 June 93		
Training:		
ALTERNATE LCpl Dennis M. Sanders	1404	5479/3331
Appt Date: 7 Nov 91		
Training:		
Hazardous Waste Sites: (send mail here)	1410	

Site Manager
Cpl J. J. Hansen (June 93) Assistant Site Manager

Range Control Division

Site Manager - Boat Crew
EN2 H.L. Dunn (16 July 91)

Assistant Site Manager
EN2 J. D. Andrews (16 July 91)

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
2D MARINE DIVISION, CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL COORDINATORS (HMDC)

PRIMARY Major Howard (will be replaced by Major Cook in Aug)
Building: H-1
Extension: 8047/8502
Appt Date:
Training: 27-29 July 93

Updated 20 Aug 93

ALTERNATE WO2 Marker
Building: H-1
Extension: 8047/8502
Appt Date: 15 Apr 93
Training:

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION	BUILDING	EXTENSION
Headquarters Battalion		
PRIMARY Lt Chiapello	423	5305/5294
Appt Date: July 93 ?		
Training:		
ALTERNATE LT Belson	423	5305/5294
Appt Date: July 91		
Training:		
2d Assault Amphibian Battalion		
PRIMARY GySgt McCullough	BB-6	7176
Appt Date:		
Training:		
ALTERNATE LCpl Belkenstan	A-47	7436/7586
Appt Date:		
Training:		
2d Tank Battalion		
PRIMARY Maj. Clippard	407	3861/3725
Appt Date:		
Training:		
ALTERNATE SSgt Ford	407	3861/3725
Appt Date:		
Training: 27-29 July 93		

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION	BUILDING	EXTENSION
2d Reconnaissance Battalion		
PRIMARY HMC Geurrero	BA-102	7327
Appt Date:		
Training:		
ALTERNATE GySgt Walkers	BA-102	7327
Appt Date:		
Training:		
2d Light Armored Infantry Battalion		
PRIMARY Capt Coglianese	503	2211/1992
Appt Date:		
Training:		
ALTERNATE Sgt Cook	503	2211/1992
Appt Date:		
Training:		
2d Combat Engineer Battalion		
PRIMARY Lt Hyams	417	3704
Appt Date: June 91		
Training:		
ALTERNATE None		
2d Marine Regiment PRIMARY CWO3 Detzel		
HP-250 3400		
Appt Date: Jan 92		
Training:		
ALTERNATE SSgt Friend	HP-250	3400
Appt Date: June 91		
Training:		
1st Battalion, 2d Marine Regiment		
PRIMARY Lt Seldon	1506	3288
Appt Date:		
Training:		
ALTERNATE None		
Appt Date:		
Training:		
2d Battalion, 2d Marine Regiment		
PRIMARY Lt Miller	HP-250	1803
Appt Date:		
Training:		
ALTERNATE Sgt Edwards	HP-250	1803
Appt Date: Jan 92		
Training:		

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
2D MARINE DIVISION, CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION	BUILDING	EXTENSION
3d Battalion, 2d Marine Regiment		
PRIMARY Lt Heimen Appt Date: Training:	HP-250	3277
ALTERNATE None Apt. date: Training:		
6th Marine Regiment		
PRIMARY Capt Wasilewski Apt. date: Training:	TC-773	2884
ALTERNATE SSgt Thompson Apt. date: Training:	TC-773	2884
1st Battalion, 6th Marine Regiment		
PRIMARY Lt Bettondorf Apt. date: Training:	TC-608	0247
ALTERNATE Sgt Jones Apt. date: Training:	TC-608	0247
3rd Battalion, 6th Marine Regiment		
PRIMARY Lt Banton Apt. date: Training:	TC-774	0132
ALTERNATE None Apt. date: Training:		
8th Marine Regiment		
PRIMARY CWO Clark Apt. date: Training:	HP-100	3460
ALTERNATE SSgt Jones Apt. date: Training:	HP-100	3460

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
2D MARINE DIVISION, CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION	BUILDING	EXTENSION
1st Battalion, 8th Marine Regiment		
PRIMARY None		
Apt. date:		
Training:		
ALTERNATE None		
Apt. date:		
Training:		
2d Battalion, 8th Marine Regiment		
PRIMARY Lt Coutet	118	2559
Apt. date:		
Training:		
ALTERNATE Lt Kelliher	118	2559
Apt. date:		
Training:		
3rd Battalion, 8th Marine Regiment		
PRIMARY None		
Apt. date:		
Training:		
ALTERNATE None		
Apt. date:		
Training:		
2d Battalion, 4th Marine Regiment		
PRIMARY Lt McKee	HP-100	2137
Apt. date:		
Training:		
ALTERNATE Cpl Watson	HP-100	2137
Apt. date:		
Training:		
10th Marine Regiment		
PRIMARY Capt Rassel	1775	3933
Apt. date:		
Training:		
ALTERNATE MGySgt Arnold	1775	3933
Apt. date:		
Training:		
1st Battalion, 10th Marine Regiment		
PRIMARY Lt McGhee	525	5102
Apt. date:		
Training:		
ALTERNATE	525	5102

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
2D MARINE DIVISION, CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION	BUILDING	EXTENSION
2d Battalion, 10th Marine Regiment		
PRIMARY Cpl Bentey	501	1569
Apt. date:		
Training:		
ALTERNATE LCpl Krickham	501	1569
Apt. date:		
Training:		
3rd Battalion, 10th Marine Regiment		
PRIMARY Lt Tormenti	HP-560	1498
Apt. date: Dec 91		
Training:		
ALTERNATE LCpl Tatum	HP-560	1498
Apt. date:		
Training:		
5th Battalion, 10th Marine Regiment		
PRIMARY Lt Malone	516	1032
Apt. date:		
Training:		
ALTERNATE MSgt Myers	516	1032
Apt. date:		
Training:		
Headquarters Battery, 10th Marine Regiment		
PRIMARY LCpl Poirier	1841	3897
Apt. date:		
Training:		
ALTERNATE LCpl Hucklerry	1841	3897
Apt. date:		
Training:		

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
2D FORCE SERVICE SUPPORT GROUP, CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL COORDINATORS (HMDC)

Updated
20 Aug 93

PRIMARY Lt Carrell
Building: 317
Extension: 3924/2292
Apt. date: 27-29 July 93
Training:

ALTERNATE HM2 Hockenberry
Building: 317
Extension: 3924
Apt. date: 27-29 July 93
Training:

ALTERNATE MSgt Toles
Building: 317
Extension: 3924
Apt. date: 27-29 July 93
Training:

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION	BUILDING	EXTENSION
Headquarters & Service Battalion		
PRIMARY 1stLt McGeehan	FC-400	1655/1728
Apt. date: 23 Jun 93	FC-263	3360/3461
Training: 27-29 July 93		
ALTERNATE MSgt Bowman	FC-263	3360/3461
Apt. date: 23 Jun 93		
Training:		
LCpl Laurent		3549
Hazardous Waste Sites: FC-253, FC-255		
2d Maintenance Battalion		
PRIMARY 1stLt Flagg	FC-500	5222/3989
Apt. date:		
Training: 27-29 July 93		
ALTERNATE SSgt Mitchell	FC-500	3983
Apt. date:		
Training: 27-29 July 93		
CIV Marie Silence Date: 27-29 July 93		5510
Hazardous Waste Sites: FC-40, FC-50, FC-45, FC-280, 902, 1601, 1771		

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
2D FORCE SERVICE SUPPORT GROUP, CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION		BUILDING	EXTENSION
2d Supply Battalion			
PRIMARY	1st Lt Cole	FC-500	3405/3256
	Apt. date:		try 3418
	Training: 27-29 July 93		
ALTERNATE	GySgt Reyes	FC-500	3405/3256
	Apt. date:		
	Training: 27-29 July 93		
	Hazardous Waste Sites: FC-263, 907, 916		
2d Landing Support Battalion			
PRIMARY	1stLt Linquist (T. C.)	FC-400	3753/3418
	Apt. date:		
	Training: 27-29 July 93		
ALTERNATE	Sgt T. C. Smith	FC-400	3753/3418
	Apt. date: 11 Jan 93		
	Training: 30 June 93, 1 July 93 27-29 July 93		
	Hazardous Waste Sites: FC-120, 1871		
2d Medical Battalion			
PRIMARY	1stLt Hartman	FC-263	3571/5099
	Apt. date:		
	Training: 27-29 July ???		
ALTERNATE	HM1 Janowsky	FC-263	3571/5099
	Apt. date:		
	Training:		
	Hazardous Waste Sites: FC-263		
2d Dental Battalion			
PRIMARY	ENS McElyea	FC-400	2831/2935
	Apt. date:		
	Training:		
ALTERNATE	LtJg Jacobson	FC-400	2831/2935
	Apt. date:		
	Training:		
	Hazardous Waste Sites: FC-308, 460		

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
2D FORCE SERVICE GROUP, CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION		BUILDING	EXTENSION
8th Engineer Support Battalion			
PRIMARY	2d LT Stover	FC-300	2622/1889
	Apt. date:		
	Training:		
ALTERNATE	Sgt Lang	FC-300	2622/1889
	Apt. date:		
	Training: 27-29 July 93		
	Hazardous Waste Sites: FC-200, SFC-221, SGP-31		
8th Motor Transport Battalion			
PRIMARY	1stLt DePalma	FC-400	1684/1892
	Apt. date:		
	Training:		
ALTERNATE	LCpl Guillory	FC-400	1684/1892
	Apt. date:		
	Training: 27-29 July 93		
	Hazardous Waste Sites: FC-270, 928		

DEPLOYING UNITS

NAME OF ORGANIZATION		BUILDING	EXTENSION
MSSG-22			
PRIMARY	Capt Skeens	FC-100	1333/1360
	Apt. date:		
	Training:		
ALTERNATE	Sgt Brunson	FC-100	1333/1360
	Apt. date:		
	Training:		
	Hazardous Waste Sites: FC-100		
MSSG-24			
PRIMARY	1stLt Glass	FC-100	2641/2643
	Apt. date:		
	Training:		
ALTERNATE	Sgt Knottey	FC-100	2641/2643
	Apt. date:		
	Training:		
	Hazardous Waste Sites: FC-100		

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
2D FORCE SERVICE GROUP, CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION		BUILDING	EXTENSION
MSSG-26			
PRIMARY	1stLt Ruane Apt. date: Training:	FC-100	2151/3513
ALTERNATE	SSgt Finley Apt. date: Training:	FC-100	2151/3513
	Hazardous Waste Sites: FC-100		
BSSG-4			
PRIMARY	Capt Null unit not in service Apt. date: Training:	60	2820
ALTERNATE	GySgt Flemming Apt. date: Training:	60	2820
	Hazardous Waste Sites: None listed		
BSSG-6			
PRIMARY	Capt Whieldon ? Apt. date: Training:	60	5083
ALTERNATE	NMSgt Thompson ? Apt. date: Training:	60	5083
	Hazardous Waste Sites: None listed		

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
2D SURVEILLANCE, RECONNAISSANCE, AND INTELLIGENCE GROUP
CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL COORDINATORS (HMDC)

Updated
13 May 93

PRIMARY GySgt Polk also Precious Metals
Building: 58
Apt. date: 02 Mar 92
Training: 29 Apr 92
Extension: 5038/9

ALTERNATE Sgt Babb
Building: 58
Apt. date:
Training: 27-29 July 93
Extension: 5038/9

Hazardous Waste Sites: FC-241, FC-251, FC-365, 1309, 1310, 1604, 1605, 1747, 1827

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION	BUILDING	EXTENSION
Headquarters & Service Company		
PRIMARY Sgt Pence	1309	2692/2698
Apt. date: 7 Oct 91		
Training: 5 Aug 91		
ALTERNATE Cpl Swink	1309	2677
Apt. date: 28 Aug 90		
Training: 25 Sept 91		
Intelligence Company		
2d MAGTF All-Source Fusion Center		
PRIMARY WO Good	H-17N	8449
Apt. date:		
Training:		
ALTERNATE Sgt Walsh	H-17N	8449
	1747	1310
Apt. date:		
Training:		
SITE MANAGER		
SSgt Mc Kenny	1309/1310	2677
Sgt Weaver	H-1	no phone
HANDLERS SSgt Messier	H-1	no phone
Sgt Benavitas	H-1	no phone
Cpl Chapel	FC-300	2926

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
2D SURVEILLANCE, RECONNAISSANCE, AND INTELLIGENCE GROUP
CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION	BUILDING	EXTENSION
Remote Piloted Vehicle Company		
PRIMARY Capt Desalva Apt. date: Training:	1747	deployed
ALTERNATE Cpl Choquette extension 3024/3163 Apt. date: Training:	1747	deployed
2d Anglico Company		
PRIMARY Sgt Robertson Apt. date: Training:	FC-251	2028/5212
ALTERNATE Cpl Dittmer Apt. date: Training:	FC-251	2028/5212
2d Force Reconnaissance Company		
PRIMARY SSgt Rodrizuez Apt. date: Training:	FC-251	1664
ALTERNATE Apt. date:	FC-251	1860
2d Radio Battalion		
PRIMARY Lt Sparks Apt. date: Training:	FC-365	1086
ALTERNATE SSgt Dolan Apt. date: Training:	FC-365	5114
8th Comunications Battalion		
PRIMARY Maj Lee Apt. date: Training:	FC-300	1622/1025
ALTERNATE Cpl Perez Apt. date: Training:	FC-300	1622/1025

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
II MARINE EXPEDITIONARY FORCE, CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL COORDINATORS (HMDC)

PRIMARY

Building: H-21
Extension: 8277
Apt. date: 22 July 92
Training: scheduled for 28-30 July 92 for contract 92

ALTERNATE

Building: 1205
Extension: 3380
Apt. date: Dec 91
Training:

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

NAME OF ORGANIZATION		BUILDING	EXTENSION
Headquarters & Service Company			
PRIMARY	WO J.L. Sprague Apt. date: 22 July 92 Training: scheduled 28-30 July 92 contract	H-21	8276
ALTERNATE	Cpl Emery Apt. date: Training:	1206/1205	3380

Hazardous Waste Sites: H-22, H-36, 1205

NAVAL HOSPITAL

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

		BUILDING	EXTENSION
PRIMARY	Lt C. C. Smith Apt. date: June 92 Training: 28-30 July 92 scheduled		
ALTERNATE	EM1 Mann Apt. date: Training:	HM-118	4904

NAVAL DENTAL CLINIC
2d Dental Bn

HAZARDOUS MATERIAL DISPOSAL OFFICERS (HMDO)

		BUILDING	EXTENSION
PRIMARY	DTC Bruce Tolson Apt. date: Training:		
ALTERNATE	DT2 Amos		5331/2270

Apt. date:
Training: 28 July 92

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
2d MARINE EXPEDITIONARY BRIGADE, CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL COORDINATORS (HMDC)

		BUILDING	EXTENSION
PRIMARY	Apt. date: Training:		
ALTERNATE	Apt. date: Training:	H-1	8771

HAZARDOUS MATERIAL DISPOSAL OFFICER (HMDO)

PRIMARY	SSgt G. C. Brown Apt. date: 1 Apr 91 (?) Training:	H-1	8771

ALTERNATE SSgt F. L. Cativelia Apt. date: 1 Apr 91 (?)
Training:

materials go to RSU

HAZARDOUS MATERIAL/WASTE MANAGEMENT PERSONNEL
24TH MARINE EXPEDITIONARY UNIT, CAMP LEJEUNE

HAZARDOUS MATERIAL DISPOSAL COORDINATORS (HMDC)

PRIMARY Have no written appointments at this date.
(/css/9/11/92)
They are actively generating materials.

ALTERNATE

FINAL

SITE ASSESSMENT REPORT

THE CAMPBELL STREET
JP-5 PIPELINE
NEW RIVER MARINE CORPS AIR STATION
JACKSONVILLE, NORTH CAROLINA

CONTRACT TASK ORDER 0013

Prepared For:

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

Under the:

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Prepared By:

BAKER ENVIRONMENTAL, INC.
Coraopolis, Pennsylvania

AUGUST 12, 1992

EXECUTIVE SUMMARY

In accordance with the State of North Carolina's Underground Storage Tank (UST) Regulations, a Site Assessment Investigation was performed at the New River Air Station, Jacksonville, North Carolina. The Site Assessment Investigation was performed to address concerns related to the Campbell Street JP-5 Pipeline. The pipeline is used to transfer JP-5 aviation fuel from the Campbell Street Fuel Farm to the aircraft direct refueling area, approximately 1.0 mile southeast of the Campbell Street Fuel Farm. The underground pipeline currently in use was installed in 1985 as a replacement for the previous system. The former pipeline running from the Campbell Street Fuel Farm to the flightline was abandoned in place, except for a 400-foot section located at the flightline, which was removed.

The field investigation was initiated on December 9, 1991, and concluded on February 6, 1992. Assessment activities included reviewing background information, performing a soil gas survey, performing 20 penetrometers (hydropunches), installing 15 soil borings, subsurface soil screening, soil sampling and analysis, installing seven shallow monitoring wells and four deep monitoring wells, and groundwater sampling for chemical analysis. Hydraulic conductivity tests were also performed on two selected monitoring wells.

Chemical analyses performed on the selected soil samples indicated that total petroleum hydrocarbons (TPH) exceed the State of North Carolina action level of 35 mg/kg (established by the Site Sensitivity Evaluation) in 10 soil samples. The highest TPH concentrations were detected along the northern portion of the pipeline, east of the steam-generating building (Building AS-4151); and at the southern end of the pipeline, near the aircraft direct refueling area.

Volatile organic compounds (VOCs) were detected in all groundwater samples collected from the penetrometers and seven of the eleven samples from the monitoring wells. No groundwater monitoring wells were detected to have methyl tertiary butyl ether (MTBE). One groundwater sample, from MW-1, was detected to contain base neutral/acid extractables (BNAs). Benzene concentrations did not exceed the Federal Maximum Contaminant Level (MCL) of 5.0 μg/L while the State Water Quality Standard (WQS) of 1.0 μg/L was exceeded in three monitoring wells (MW-1, DW-1, and DW-3) as well as 11 penetrometers (HPs 5, 6, 7, 8, 10, 11, 12, 14, 18, 19, and 20). Three groundwater samples from the penetrometers (HP-10, HP-12, and HP-18) exceeded the interim state WQS of 50 μg/L for MTBE.

No direct exposure pathways for contamination are considered to exist at the Campbell Street Fuel Farm or along the JP-5 Pipeline. Typical exposure pathways might be groundwater ingestion, inhalation of volatile organics and direct contact with surface soils. There are three known water supply wells within a 1/4-mile radius of the pipeline, but these wells are either inactive or screened significantly deeper than the shallow aquifer that is beneath the pipeline. Therefore, groundwater ingestion is an unlikely exposure pathway at this site. The entire area along the pipeline is paved, or grass-covered; therefore, the risk of inhalation of volatile organics from the soil is relatively low.

Based on the analytical findings, remediation only of the subsurface soils in the northern and southern portions of the pipeline is recommended. Although groundwater contamination is found at the site, the levels of contamination detected are such that the groundwater does not have to be remediated immediately. Rather, it is recommended that the source of contamination, the soils, be addressed. Periodic monitoring of the groundwater will assist in evaluating whether groundwater remediation will eventually be required.

2.0 SITE HISTORY/PREVIOUS INVESTIGATIONS

The flightline for the MCAS is supplied with fuel from the CSFF via an underground pipeline. The underground pipeline from the CSFF runs south along White Street (Figure 2), then turns to the east and connects to the aircraft direct refueling stations, which are located approximately 0.7 miles southeast of the CSFF.

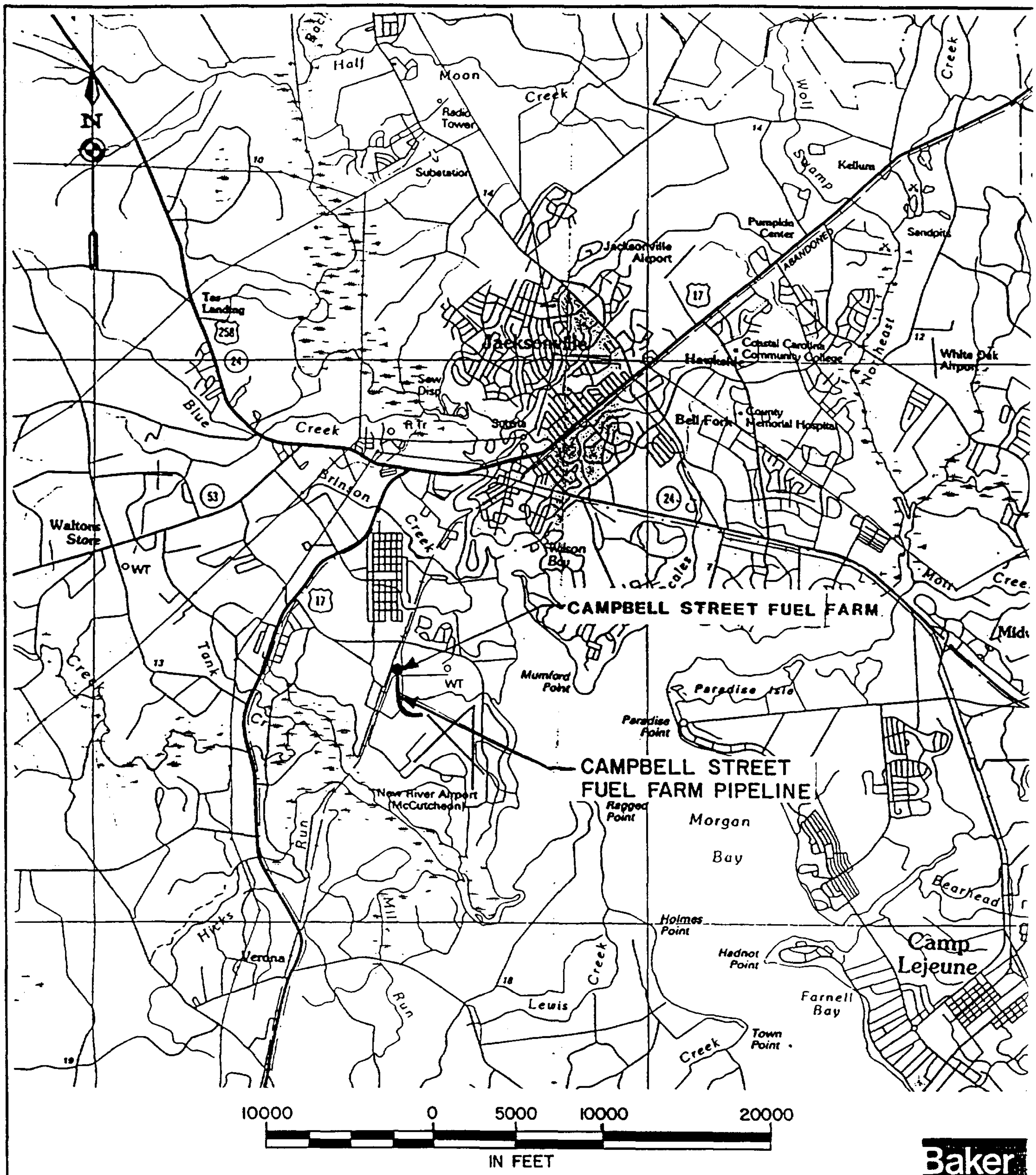
The underground pipeline currently in use was installed in 1985 as a replacement for the previous system. The previous underground pipeline was abandoned in place for most of its length. A 400-foot section of the abandoned pipeline was removed along the flightline as shown on Figure 2. For most of its length, the current, active pipeline is adjacent to the original, abandoned pipeline system. The approximate locations of the abandoned and currently used pipelines are shown on Figure 2. The previous underground pipeline was allowed to gravity empty before it was abandoned. The possibility of small amounts of JP-5 remaining in the line still exists.

The CSFF is located on the northwest corner of the intersection of White Street and Campbell Street. The CSFF consists of four above-ground storage tanks (AST). The ASTs were installed in 1985 and are constructed of steel. Each AST has a capacity of 215,000 gallons. The ASTs are used for storage of JP-5 aviation fuel.

A known release of JP-5 aviation fuel occurred from the Campbell Street JP-5 Pipeline approximately 0.35 miles south of the CSFF, in the vicinity of Buildings AS-4141 and AS-4146. This release was associated with the operation of the now-abandoned pipeline. Free product was identified in the area and an interim recovery system was installed and began operation in 1986; it is still ongoing. In June 1991, O'Brien and Gere submitted a Corrective Action Plan (CAP) for this area. The affected area is shown on Figure 2.

The southern end of the pipeline, where the aircraft direct refueling station is located, also has a history of releases. This area is reportedly being investigated by the Activity. The approximate limits of the area under investigation are shown on Figure 2.

Three groundwater monitoring wells, from previous hydrogeologic assessments were found by Baker personnel in the vicinity of the Campbell Street JP-5 Pipeline. The locations of these wells are shown on Figure 2. Baker personnel checked the fluid level measurements in the two northern monitoring wells with an oil/water interface probe. The third well could not be



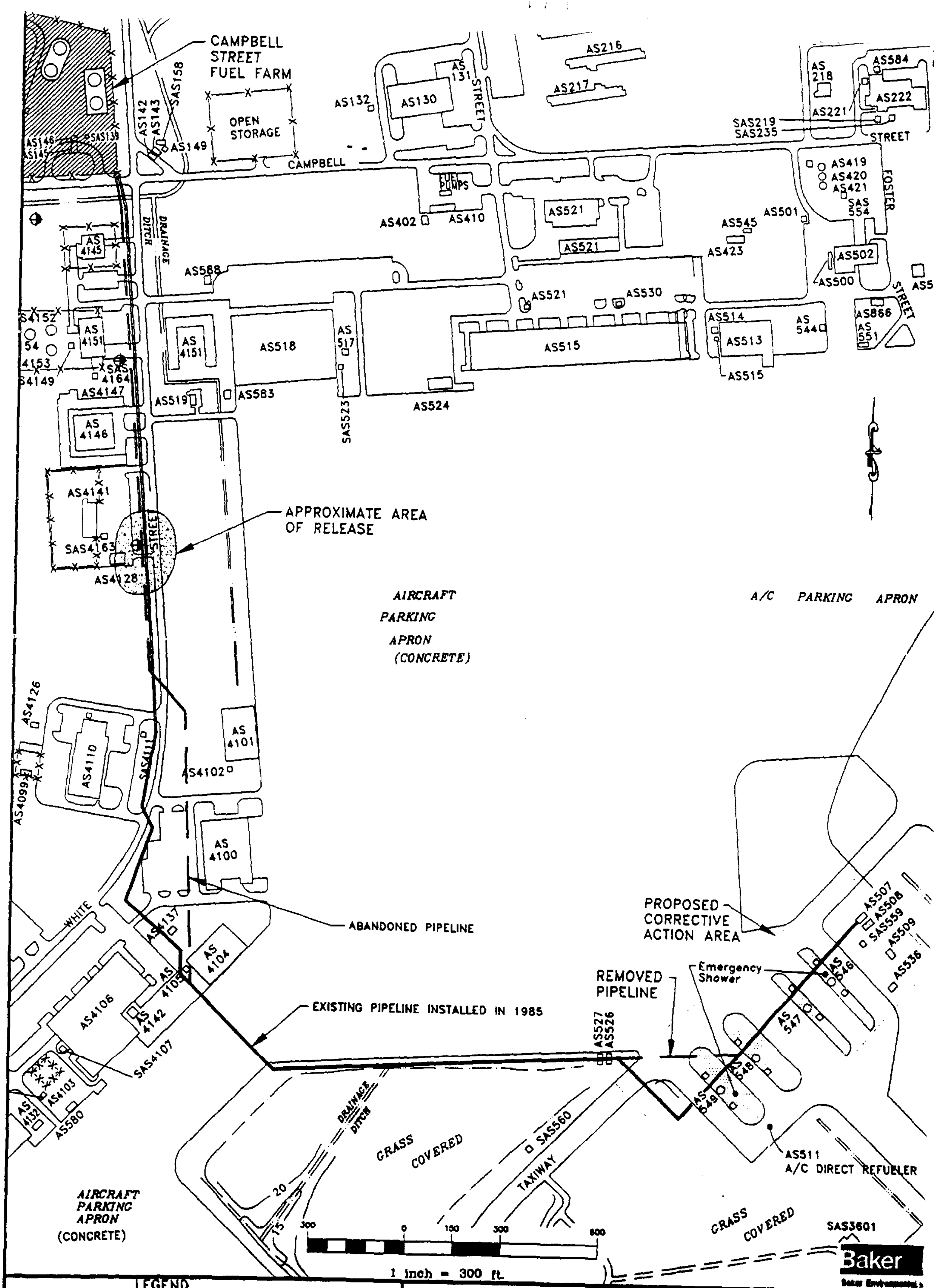
SOURCE: U.S. TOPOGRAPHIC MAP, NEW RIVER, NORTH CAROLINA QUADRANGLE

Baker Environment

FIGURE 1
CAMPBELL STREET JP-5 PIPELINE
SITE LOCATION MAP

NEW RIVER MARINE CORPS AIR STATION
JACKSONVILLE, NORTH CAROLINA

accessed. No free product was detected in the two wells which were checked. Information regarding the reason for installation, date installed, well construction details, etc., were not obtainable at the time this report was prepared. Additional monitoring wells are likely located along the Campbell Street JP-5 Pipeline or other areas of the Activity through which the pipeline travels. Baker is not aware of such wells at this time.



LEGEND

- ⊕ EXISTING MONITORING WELL
- ☐ BUILDING WITH RELATED PETROLEUM SYSTEM
- ◌ APPROXIMATE AREA OF RELEASE
- ▨ CAMPBELL STREET FUEL FARM
- — — ABANDONED PIPELINE
- ━━ EXISTING PIPELINE INSTALLED IN 1985

SOURCE: LANTDIV, OCT. 1991; OBRIEN & GERE, "CORRECTIVE ACTION PLAN, JP-5 LINE AREA", JUNE 1991.

FIGURE 2
CAMPBELL STREET JP-5 PIPELINE
POTENTIAL PETROLEUM SOURCES

NEW RIVER MARINE CORPS AIR STATION
JACKSONVILLE, NORTH CAROLINA

11.0 CONCLUSIONS

The following conclusions are based on the results of Site Assessment Investigation:

- The soil gas survey results and the petroleum type evaluation based on the TPH analyses, indicate that petroleum releases detected during this investigation are related to the abandoned pipeline. The current pipeline that is in use has not experienced a petroleum release.

- Two areas of the pipeline, the northern portion near Building AS-4151 and the southern end near the aircraft refueling station, had TPH concentrations that exceeded the DEHNR action level of 35 mg/kg. Maximum TPH concentrations in these two areas were 391.10 mg/kg and 893.46 mg/kg, respectively.

- If the laboratory's difficulty in evaluating EDB in the groundwater samples is not taken into consideration, none of the chemical constituents present exceeded the Federal MCLs. The State WQS for benzene (1.0 µg/L) was exceeded in 14 of the 31 groundwater samples. The maximum benzene concentration detected was 3.16 µg/L. Two groundwater samples, hydropunches HP-10 and HP-12, had MTBE concentrations of 81.98 µg/L and 194.56 µg/L, respectively. These two samples did not exceed Federal MCLs but did exceed the State WQS of 50 µg/L.

- Groundwater in some areas of the MCAS has been impacted by other contaminant sources; however, no off-site sources appear to be contributing to the groundwater contamination detected along the pipeline.

- The direction of groundwater flow in the vicinity of the site appears to be southward at a rate of approximately 0.04 ft./year.

- The average hydraulic conductivity for tests run on MW-2 and MW-3 was 1.6×10^{-2} ft./day.

- The groundwater gradient for the site (calculated from the hydraulic conductivity tests) was 0.002.

- Estimated porosity for the site was 0.28 (Fetter 1980).

- Remediation of the soils in the vicinity of Building AS-4151 and the aircraft rapid refueling station are recommended. It is anticipated that if these soils are remediated, the condition of the shallow aquifer will improve without performing active groundwater remediation. After remediation of the soils is completed, periodic monitoring of monitoring wells should be performed to evaluate groundwater conditions.

- Soils in the vicinity of Building AS-4151 should be remediated by excavating the abandoned pipeline and removing the contaminated soils.

- Because low TPH concentrations in the soil are within the limits set by the SSE and low VOC concentrations in the groundwater, it is recommended that the central area of the pipeline not be addressed at this time. The levels of contamination present indicate that this area is not a major petroleum source area.

- It is recommended that the abandoned pipeline be flushed to confirm that it is no longer a source of contamination.

FINAL

SITE ASSESSMENT REPORT

THE CAMPBELL STREET FUEL FARM
AND UST SYSTEM AS-143
NEW RIVER MARINE CORPS AIR STATION
JACKSONVILLE, NORTH CAROLINA

CONTRACT TASK ORDER 0013

Prepared For:

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

Under the:

LANTDIV CLEAN Program
Contract N62470-89-D-4814

Prepared By:

BAKER ENVIRONMENTAL, INC.
Coraopolis, Pennsylvania

AUGUST 12, 1992

EXECUTIVE SUMMARY

In accordance with the State of North Carolina's Underground Storage Tank (UST) Regulations, a Site Assessment Investigation was performed at the New River Marine Corps Air Station, Jacksonville, North Carolina. The Site Assessment Investigation was performed to address concerns related to the Campbell Street Fuel Farm (CSFF) and a UST located at Building AS-143. The CSFF formerly operated eight USTs. These USTs were replaced in 1985 with four aboveground storage tanks (ASTs). The CSFF is used for storing aviation fuels. The UST located at Building AS-143 is used for the storage of gasoline products for refueling military vehicles.

The field investigation was initiated on December 9, 1991 and concluded on January 17, 1992. Assessment activities included reviewing background information, performing 15 penetrometers (hydropunches), installing of 14 soil borings, subsurface soil screening, soil sampling and analysis, installing of seven shallow monitoring wells and three deep monitoring wells, and groundwater sampling for chemical analysis. Hydraulic conductivity tests were also performed on two selected monitoring wells.

Chemical analyses performed on the selected soil samples indicated that total petroleum hydrocarbons (TPHs) exceed the State of North Carolina Action Level of 35 mg/kg in one soil sample. This soil sample was obtained from soil boring MW-4 (4.0 to 6.0 foot), which is located in the center of the CSFF, adjacent to the former location of the UST's.

Volatile organic compounds (VOCs) were detected in all groundwater samples. Several groundwater monitoring wells were detected to have methyl tertiary butyl ether (MTBE), benzene, and other purgeable aromatics. Only one groundwater sample, from DW-2, was detected to contain base neutral/acid extractables (BNAs). Benzene concentrations did exceed the Federal Maximum Contaminant Level (MCL) of 5.0 µg/L at only one sampling location (HP-15) while the State Water Quality Standard of 1.0 µg/L was exceeded at seven sampling locations.

No direct exposure pathways for contamination are considered to exist at the CSFF. Typical exposure pathways are groundwater ingestion, inhalation of volatile organics, and direct contact with surface soils. Since there is only one known drinking water source within a 1/4-mile radius of the site, and since it is screened significantly deeper than the shallow aquifer that is beneath the CSFF, groundwater ingestion is an unlikely exposure pathway at this site. The entire site is paved, or grass-covered; therefore, the risk of inhalation of volatile organics from the soil is relatively low. The presence of benzene and chlorinated VOCs in the groundwater mildly pose a risk of potential impact to surface water and aquatic life, if natural or manmade drainage pathways to the New River exist.

Based on the analytical findings, remediation only of the subsurface soils is recommended. Though groundwater contamination is at the site, the levels of contamination detected are such that the groundwater does not have to be remediated immediately. Rather, it is recommended that the source of contamination, the soils, be addressed. Periodic monitoring of the groundwater will assist in evaluating if groundwater remediation will eventually be required.

2.0 SITE HISTORY/PREVIOUS INVESTIGATIONS

The CSFF consists of four above-ground storage tanks (AST). The ASTs were installed in 1985 and are constructed of steel. Each AST has a capacity of 215,000 gallons. The ASTs are used for storage of JP-5 aviation fuel.

The ASTs are replacement tanks for a UST system which existed prior to 1985 at the CSFF. Prior to 1985, eight USTs of varying capacities were reportedly used. Six of the eight USTs were used for the storage of JP-5. Three of these six USTs had capacities of 120,000 gallons, 106,000 gallons, and 100,000 gallons. The other three JP-5 USTs had capacities of 50,000 gallons each. Capacities of the other two USTs are unknown at this time. Seven of the USTs and associated piping systems were removed and replaced by the existing AST system in 1985. One aviation gasoline (AVGAS) UST was filled with sand and has remained in place. The location of this UST is not known at this time.

The flight line for the Air Station is supplied with fuel from the CSFF via an underground pipeline. The underground pipeline from the CSFF runs south along White Street (Figure 2), then turns to the east and connects to the aircraft direct refueling stations, which are located approximately 1.0 mile southeast of the CSFF.

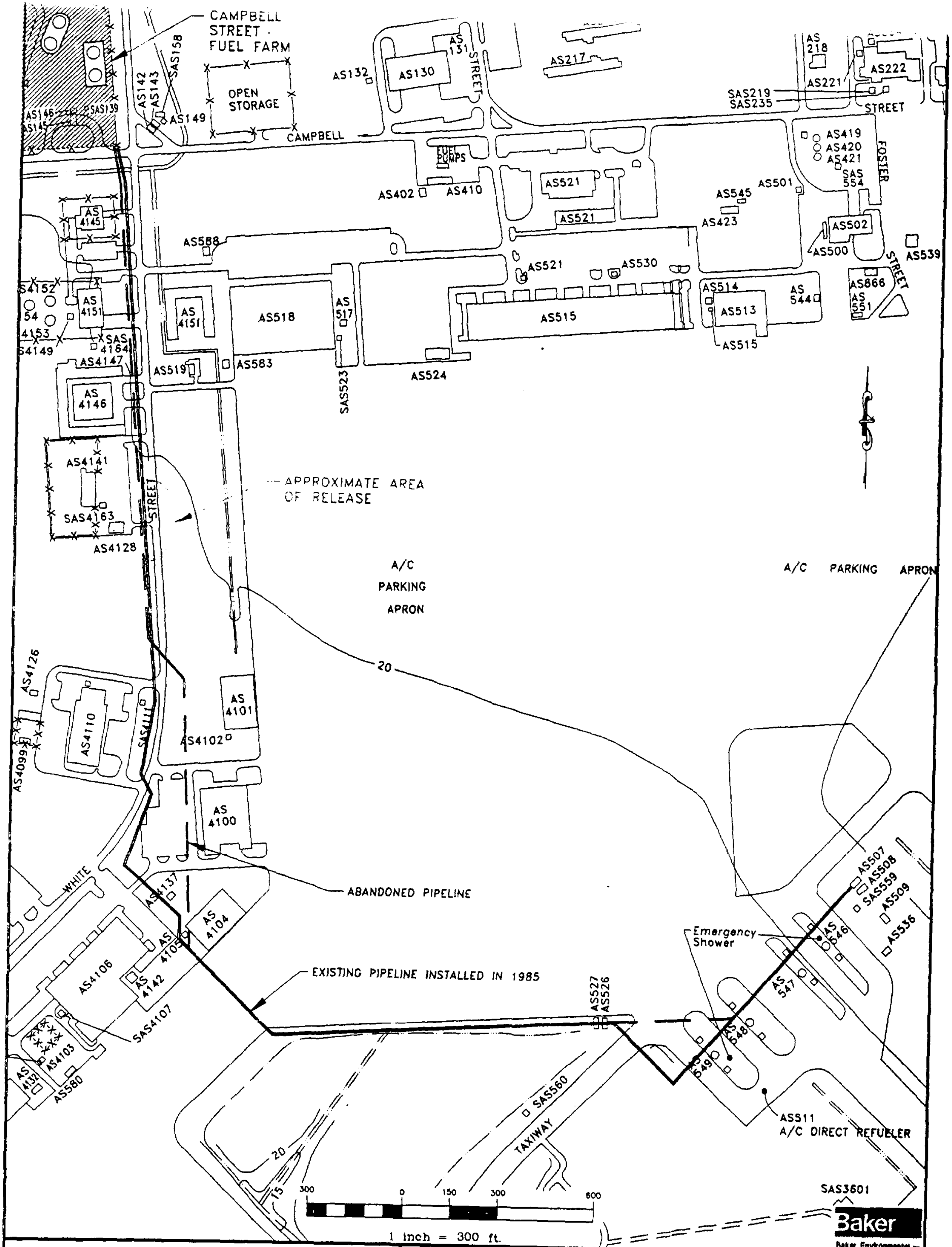
The underground pipeline currently in use was installed in 1985 as a replacement for the previous system. The previous underground pipeline was allowed to gravity empty before it was abandoned in place. For most of its length, the current, active pipeline is adjacent to the original, abandoned pipeline system. The approximate location of the abandoned and currently used pipelines are shown on Figure 2. The possibility of small amounts of JP-5 remaining in the line still exists.

A known release of JP-5 aviation fuel occurred approximately 0.35 miles south of the CSFF, in the vicinity of Buildings AS-4141 and AS-4146. This release was associated with the operation of the now abandoned pipeline. Free product was identified in the area and an interim recovery system was installed and began operation in 1986 and is still ongoing. In June 1991, O'Brien and Gere submitted a Corrective Action Plan (CAP) for this area. The affected area is shown on Figure 2.

UST AS-143 is associated with Building AS-143, which is located on the eastern side of White Street across from the CSFF. Building AS-143 serves as a military vehicle refueling station.

UST AS-143 is constructed of steel and contains unleaded gasoline. The UST is equipped with a suction system with one pump, which is used to dispense the fuel. UST AS-143 was installed in 1961 and has a capacity of 10,000 gallons.

Four groundwater monitoring wells, from a previous hydrogeologic assessment, are located in the vicinity of CSFF and UST AS-143. The location of these wells are shown on Figure 3. Baker personnel checked the fluid level measurements in each monitoring well with an oil/water interface probe. No free product was detected in any of the four wells. Information regarding the reason for installation, date installed, well construction details, etc., were not obtainable at the time this report was prepared.



Baker
Baker Environmental, Inc.

LEGEND

APPROXIMATE AREA OF RELEASE

▨ CAMPBELL STREET FUEL FARM

— — ABANDONED PIPELINE

—— EXISTING PIPELINE INSTALLED IN 1985

SOURCE: LANTDIV, OCT. 1991; OBRIEN & GERE, "CORRECTIVE ACTION PLAN, JP-5 LINE AREA", JUNE 1991.

FIGURE 2
CAMPBELL STREET FUEL FARM
AND ASSOCIATED PIPELINE

NEW RIVER MARINE CORPS AIR STATION
JACKSONVILLE, NORTH CAROLINA

11.0 CONCLUSIONS

The following conclusions are based on the results of Site Assessment Investigation:

- Only one area of the site was detected to have TPH concentrations greater than 35 mg/kg. This area is west of the Filter Pump building (in the vicinity of monitoring well MW-4). The TPH concentrations detected in the soils near monitoring well MW-4 is apparently related to the soils associated with the former UST located at the site. Considering the direction of groundwater flow and the shallow depth the TPH was detected in boring DW-3, the TPH in this area is most likely due to past site activities in the area.

- Groundwater contamination at the site appears to have two possible sources: the soils west of the Filter Pump Building and the UST at AS-143. The VOC levels detected in monitoring wells MW-4 and DW-2 indicate that the groundwater has been impacted in this area. VOC concentrations detected in hydropunch HP-15 indicates that a potential release may be associated with this UST.

- No off-site sources appear to be contributing to the groundwater contamination detected at the site.

- The direction of groundwater flow in the vicinity of the site appears to be south-southeast at a rate of approximately 2 ft./year.

- The average hydraulic conductivity for tests run on MW-2 and MW-3 was 2.3×10^{-2} ft./day.

- The groundwater gradient for the site (calculated from the hydraulic conductivity tests) was 0.006.

- Estimated porosity for the site was 0.28 (Fetter 1980).

- Remediation of the soils west of the Filter Pump Building is recommended. It is anticipated that if these soils are remediated, the condition of the shallow aquifer will improve without performing active groundwater remediation. After remediation of the soils is completed, periodic monitoring of monitoring wells should be performed to evaluate groundwater conditions.

- The UST and associated piping system at AS-143 should be tested for tightness to determine if the system is in proper condition.

GROUNDWATER
TECHNOLOGY
GOVERNMENT SERVICES

Groundwater Technology Government Services, Inc.
1244 B Executive Boulevard, Suite 106, Chesapeake, VA 23320
Tel: (804) 436-7881 Fax: (804) 436-2312

THREE WELL SITE CHECK REPORT
BUILDING 903
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB No. 830011088.25

August 25, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Prepared by:

William L. Hughes

William L. Hughes
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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
DON A. SKOMSKY
37070-R

2.0 BACKGROUND

2.1 Site Description

The site is located in the central region of the Marine Corps Base, Camp Lejeune, North Carolina (Figure 1). The site map (Figure 2) illustrates the location of the installed wells near Building 903. Building 903 serves as a warehouse at the base. According to past documents provided by the government, one steel 550-gallon capacity underground storage tank (UST) used to store kerosine adjacent to the building was excavated and removed in December 1992. No further information was provided documenting the condition of the UST when removed. According to the Site Check Request Form completed for the site by the Point of Contact for the site on January 14, 1993, two soil samples were collected during excavation activities and were analyzed for the presence of total petroleum hydrocarbons (TPH)-as-kerosine. The methods used in the laboratory analysis and the soil sample locations were not documented. Analytical results indicated the samples contained 5,760 parts per million (ppm) and 108 ppm TPH-as-kerosine.

2.2 Land and Water Use

Building 903 is located on the north side of the base. The area immediately adjacent Building 903 is comprised of buildings that house maintenance and other support facilities for the base. The site is situated in an area dominated by relatively flat topography. The nearest body of surface water is Bearhead Creek located approximately 2,000 feet towards the north. Potable water for the base is supplied by wells located approximately 500 feet towards the west-northwest that tap the Castle Hayne aquifer.

2.3 Regional Geology

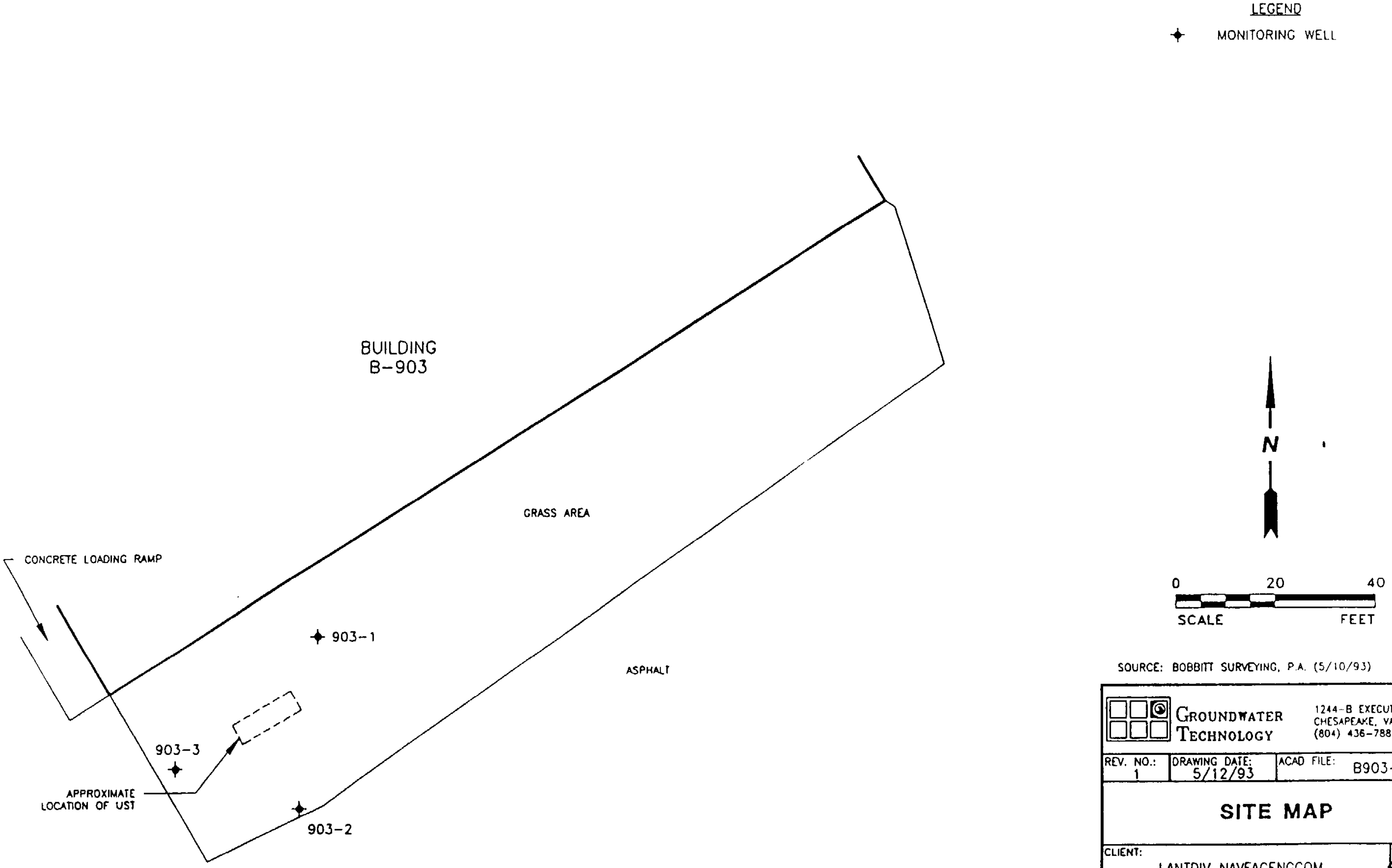
The coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits of Miocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie bedrock of Pre-Cretaceous age, thicken and dip eastward with thicknesses ranging from 1,500 feet in the west to 6,000 feet in the east. The geologic units in the area are divided into six formations: the Castle Hayne Formation of the Eocene series; the River Bend Formation of the Oligocene Series; the Pungo River of the Miocene Series; the Yorktown Formation of the

Pliocene series; and the James City and Flanner Beach Formations of the Pleistocene series. The Castle Hayne Formation is composed of limestones and marls. The Castle Hayne Formation is overlain by the River Bend Formation. The Pungo River Formation is composed of interbedded phosphatic sands silts and clays, diatomaceous clays, phosphatic and nonphosphatic limestones and silty claystones (Hoffman and Ward, 1989). The Yorktown Formation is defined as a medium-to-coarse-grained, poorly sorted, shelly sand (Blackwelder and Ward, 1980). In the Camp Lejeune area, the Yorktown Formation is characterized by fine to medium-grain quartz sand (Harned et al., 1989). The basal unit consists of contiguous clays. The James City Formation unconformably overlies the Yorktown Formation. The James City Formation consists primarily of unconsolidated calcareous sandy clays and argillaceous sands (Hoffman and Ward, 1989). The Flanner Beach Formation, which immediately underlies the site, overlies the James City Formation. The Flanner Beach Formation is composed of fine, well-sorted sand to silty sand.

2.4 Regional Hydrogeology

In the eastern part of the North Carolina coastal plain, groundwater is obtained from an unconfined surficial aquifer and the confined Yorktown and Castle Hayne aquifers. The depth to groundwater typically ranges from three to twelve feet below the surface.

The surficial unconfined aquifer consists of sediments of the Flanner Beach Formation. The surficial aquifer is underlain by a confining unit of the James City Formation. The Yorktown aquifer underlies this confining layer at approximately 50-feet below mean sea level (Harned et al., 1989). A confining layer is created by the upper clay and sandy silt beds of the Pungo River Formation separates the Yorktown and underlying Castle Hayne aquifer. The general groundwater flow is in the direction of lower hydraulic head to discharge areas like the New River and its tributaries or the ocean.



SOURCE: BOBBITT SURVEYING, P.A. (5/10/93)

GROUNDWATER TECHNOLOGY

1244-B EXECUTIVE BLVD.
CHESAPEAKE, VA. 23320
(804) 436-7881

REV. NO.: 1
DRAWING DATE: 5/12/93
ACAD FILE: B903-STE

SITE MAP

CLIENT: LANTDIV NAVFACENGCOM
PM:
LOCATION: BUILDING B-903
CAMP LEJEUNE MARINE CORPS BASE, N.C.
PE/RG:
DESIGNED: BH
DETAILED: PJC
PROJECT NO.: 830011088.2501
FIGURE: **2**

- BTEX by EPA Method 8020.
- Polychlorinated Biphenyls by EPA Method 8080.
- Total Petroleum Hydrocarbons by modified EPA Method 418.1.
- Metals using the toxicity characteristic leaching procedure (TCLP) by EPA Methods 6010 and 7470.
- Extractable Organic Halides by EPA Method 9020.
- Percentage Moisture by EPA CLP Method.

On June 7, 1993, the soils were disposed of accordingly, in compliance with contract, state, federal and local regulations. The drums were transported with a waste manifest to a remediation facility located in Fayetteville, North Carolina for treatment and disposal. Prior to transport, a completed material characterization form and copy of the composite soil sample analytical results was provided to the remediation contractor for acceptance of the soils. A copy of the application for the treatment of petroleum-contaminated soil and non-hazardous waste manifest is presented in Appendix E.

Within the treatment facility, the soils are emptied from the drums upon a thick low-permeability soil floor in a large, enclosed building. An inoculum of known hydrocarbon-digesting microbes is added to the material and the pH is adjusted to approximately 7 to 8. A bulking agent such as chicken manure may be added and the materials are agitated. Following a period of approximately 30 days of biodegradation, one composite soil sample is collected from each 50 tons of treated material to assess the treatment conducted and insure proper clean-up levels are achieved. Once cleanup levels are attained, the material is then used for road base, asphalt mixes, fill material, and other appropriate uses. Upon completion of remediation, a certificate, with complete analytical data will be forwarded to the generator to remove this portion of responsibility.

During monitoring well development and groundwater sample collection, purge water was stored in one 55-gallon drum on site. The purge water was treated using a portable carbon adsorption unit and discharged on site.

4.5 Technical Summary

Groundwater Technology Government Services, Inc. has completed a three well site check at Building 903 located at the Marine Corps Base, Camp Lejeune, North Carolina. The site check was designed to comply with NAVFAC contractual requirements.

Three soil borings/monitoring wells were drilled and installed at the site on April 8, 1993. Soils in the area are characterized as fine-grained sand and silt. Analytical results indicate that adsorbed-phase hydrocarbon concentrations in all of the soil samples collected from the soil borings are less than the laboratory's reported method detection limits.

Based on liquid-level measurements, the depth to groundwater ranges between approximately 3 and 5 feet. Liquid-phase hydrocarbons were not measured or observed in monitoring wells 903-1 through 903-3 during the April 9, 1993 well gauging event. The hydraulic gradient across the site on April 9, 1993, was 0.023 feet per foot towards the north. Groundwater samples were collected from the monitoring wells and analyzed for purgeable aromatic hydrocarbons by modified EPA Method 602. Dissolved-phase hydrocarbon concentrations in all of the groundwater samples collected were less than the laboratory's reported method detection limit.

2.0 BACKGROUND

2.1 Site Description

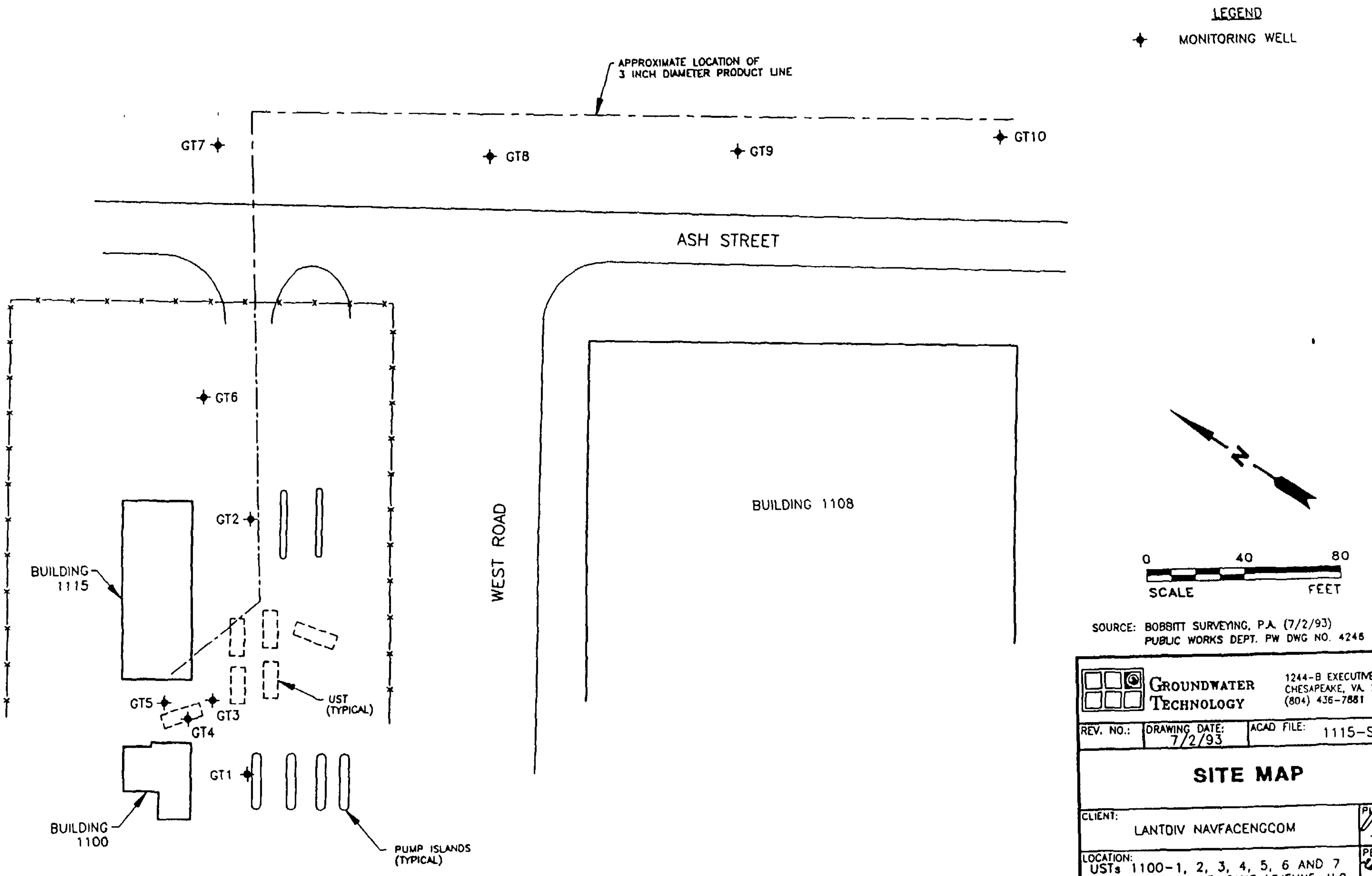
The site is located in the central region of the Marine Corps Base, Camp Lejeune, North Carolina (Figure 1). The area south of Building 1115 formerly contained seven underground storage tanks (USTs). According to past documentation, all seven USTs (1100-1 through 1100-7) were used to contain regular gasoline as part of the PX service station in this area. Construction drawings provided to GSI indicated that the tanks were used to store diesel fuel. According to the construction drawings provided, six of the seven reported tanks could be located approximately on the site map (Figure 2). Tanks 1100-1 through 1100-3 were installed in the 1940s and deactivated in 1951. Tanks 1100-4 through 1100-7 were installed in 1951. The deactivation date of these four tanks is unavailable. All USTs were of single-wall steel construction without cathodic or corrosion protection. One three-inch diameter steel gravity product pipeline was installed from Tank 1100-1 northeast along West Road and southeast along Ash Street, as shown on Figure 2. According to the site check request form completed by the point-of-contact (POC) at the base, all seven USTs and the three-inch diameter product line were excavated and removed.

2.2 Land and Water Use

Building 1115 is located approximately 1,500 feet south of the Beaverdam Creek. The area immediately adjacent Building 1115 is comprised of buildings that house maintenance and other support facilities for the base. The site is situated in an area dominated by relatively flat topography. The nearest body of surface water is Beaverdam Creek. Potable water for the base is supplied by wells located approximately 2,000 feet towards the west-northwest that tap the Castle Hayne Aquifer.

2.3 Regional Geology

The coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits of Miocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie bedrock of Pre-Cretaceous age, thicken and dip eastward with thicknesses ranging from 1,500 feet in the west to 6,000 feet in the east. The geologic units in the area are divided into six formations: the Castle Hayne Formation of the Eocene series; the River Bend Formation of



SOURCE: BOBBITT SURVEYING, P.A. (7/2/93)
PUBLIC WORKS DEPT. PW DWG NO. 4246

GROUNDWATER TECHNOLOGY

1244-B EXECUTIVE BLVD.
CHESAPEAKE, VA. 23320
(804) 436-7881

REV. NO.:	DRAWING DATE: 7/2/93	ACAD FILE: 1115-STE

SITE MAP

CLIENT: LANTDIV NAVFACENGCOM	PM:
LOCATION: USTs 1100-1, 2, 3, 4, 5, 6 AND 7 MARINE CORPS BASE, CAMP LEJEUNE, N.C.	PE/RG:

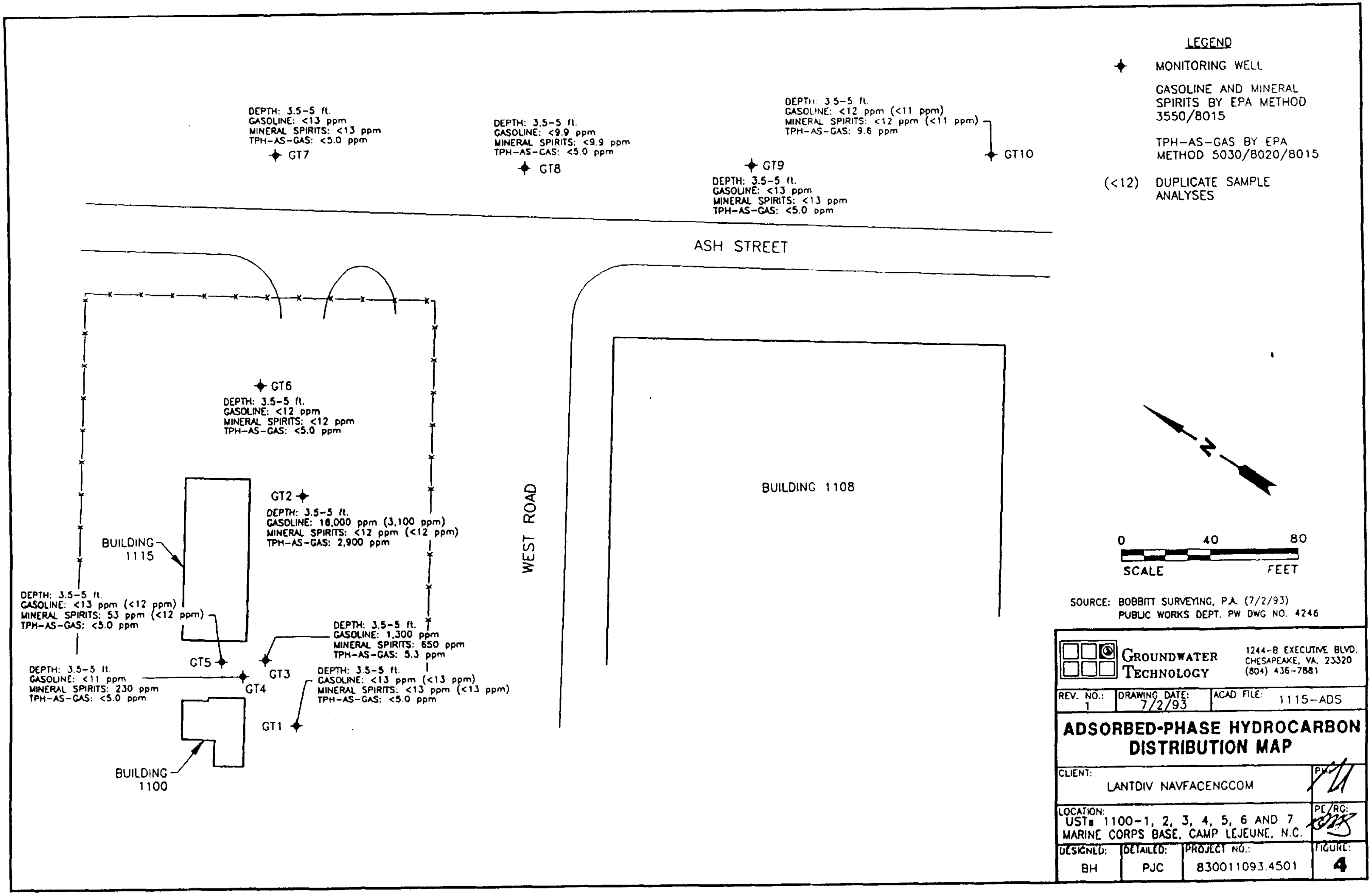
DESIGNED: BH	DETAILED: PJC	PROJECT NO.: 830011093.4501	FIGURE: 2

the Oligocene Series; the Pungo River of the Miocene Series; the Yorktown Formation of the Pliocene series; and the James City and Flanner Beach Formations of the Pleistocene series. The Castle Hayne Formation is composed of limestones and marls. The Castle Hayne Formation is overlain by the River Bend Formation. The Pungo River Formation is composed of interbedded phosphatic sands silts and clays, diatomaceous clays, phosphatic and nonphosphatic limestones and silty claystones (Hoffman and Ward, 1989). The Yorktown Formation is defined as a medium-to-coarse-grained, poorly sorted, shelly sand (Blackwelder and Ward, 1980). In the Camp Lejeune area, the Yorktown Formation is characterized by fine to medium-grain quartz sand (Harned et al., 1989). The basal unit consists of contiguous clays. The James City Formation unconformably overlies the Yorktown Formation. The James City Formation consists primarily of unconsolidated calcareous sandy clays and argillaceous sands (Hoffman and Ward, 1989). The Flanner Beach Formation, which immediately underlies the site, overlies the James City Formation. The Flanner Beach Formation is composed of fine, well-sorted sand to silty sand.

2.4 Regional Hydrogeology

In the eastern part of the North Carolina coastal plain, groundwater is obtained from an unconfined surficial aquifer and the confined Yorktown and Castle Hayne aquifers. The depth to groundwater typically ranges from three to twelve feet below the surface.

The surficial unconfined aquifer consists of sediments of the Flanner Beach Formation. The surficial aquifer is underlain by a confining unit of the James City Formation. The Yorktown aquifer underlies this confining layer at approximately 50-feet below mean sea level (Harned et al., 1989). A confining layer is created by the upper clay and sandy silt beds of the Pungo River Formation separates the Yorktown and underlying Castle Hayne aquifer. The general groundwater flow is in the direction of lower hydraulic head to discharge areas like the New River and its tributaries or the ocean.



SOURCE: BOBBITT SURVEYING, P.A. (7/2/93)
PUBLIC WORKS DEPT. PW DWG NO. 4246

GROUNDWATER TECHNOLOGY
1244-B EXECUTIVE BLVD.
CHESAPEAKE, VA. 23320
(804) 436-7881

REV. NO.: 1
DRAWING DATE: 7/2/93
ACAD FILE: 1115-ADS

ADSORBED-PHASE HYDROCARBON DISTRIBUTION MAP

CLIENT: LANTDIV NAVFACENGCOM
PM:
LOCATION: USTs 1100-1, 2, 3, 4, 5, 6 AND 7
MARINE CORPS BASE, CAMP LEJEUNE, N.C.
PC/RG:
DESIGNED: BH
DETAILED: PJC
PROJECT NO.: 830011093.4501
FIGURE: 4

4.5 Technical Summary

Groundwater Technology Government Services, Inc. has completed a five well, plus five additional well site check at Building 1115 located at the Marine Corps Base, Camp Lejeune, North Carolina. The site check was designed to comply with NAVFAC contractual requirements.

Ten soil borings/monitoring wells were drilled and installed at the site on July 14, 15 and 16, 1993. Soils in the area are characterized as fine-grained sand and silt. Analytical results indicate that adsorbed-phase hydrocarbon concentrations were detected in the soil samples collected from the monitoring wells GT-2, GT-3, GT-4, GT-5, and GT-10.

Based on liquid-level measurements, the depth to groundwater ranges between approximately 5 and 7 feet. Liquid-phase hydrocarbons thicknesses of 7.65, 0.17 and 10.18 feet were measured in monitoring wells GT-3, GT-4, and GT-10, respectively, during the June 16, 1993 well gauging event. The hydraulic gradient across the site on June 16, 1993, was 0.050 feet per foot towards the north. Groundwater samples were collected from the monitoring wells and analyzed for purgeable aromatic hydrocarbons by modified EPA Method 602 and purgeable halocarbons by EPA Method 601. Dissolved-phase hydrocarbon concentrations in all of the groundwater samples collected were detected in all of the samples collected from the monitoring wells and are greater than State Water Quality Standards established by the NCDEHNR.

GROUNDWATER TECHNOLOGY GOVERNMENT SERVICES

Groundwater Technology Government Services, Inc.
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FIVE WELL PLUS FIVE ADDITIONAL WELL SITE CHECK REPORT
BUILDING 1115
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB No. 830011088.45

October 14, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6299

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Prepared by:

William L. Hughes
William L. Hughes
Lead Geologist

William L. Hughes for
P. Taylor Sword, C.P.G.
Project Manager/Remediation Specialist

GROUNDWATER TECHNOLOGY
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Approved by:

Don Skomsky, P.E.
Operations Manager

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FIVE WELL PLUS TWO ADDITIONAL WELL SITE CHECK REPORT
BUILDING A-47, UST-47-3, AMPHIBIOUS AREA
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.31

May 21, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

OUNDWATER TECHNOLOGY
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pared by:

William L. Hughes
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F. TAYLOR SWORD

GROUNDWATER TECHNOLOGY
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Don Skomsky, P.E.
Operations Manager

DON A. SKOMSKY
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Offices throughout the U.S., Canada and Overseas

Site Description

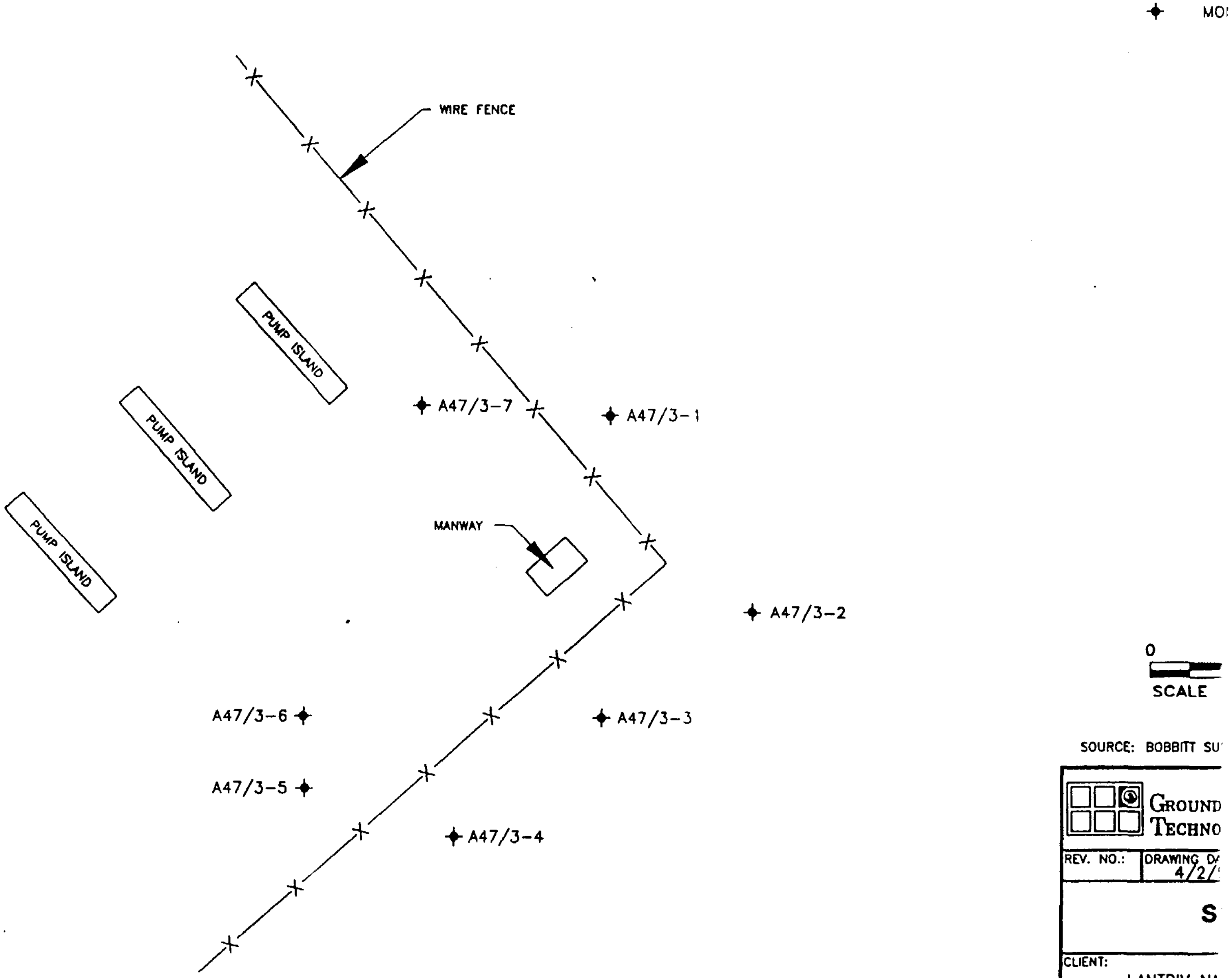
site is located in the southern region of the Marine Corps Base, Camp Lejeune, North Carolina ure 1). The site map (Figure 2) illustrates the location of the installed wells near the access manway A-47-3 and the pump islands. Building 47 serves as a maintenance facility for amphibious cles at the base. There are five USTs located at the site. Underground storage tank A-47-3 is a 00-gallon capacity tank and consists of single-wall steel construction. According to past documents, esel fuel leak was discovered in a product line leading from UST-A-47-3 during a hydrostatic test on l 30, 1992. According to a memo from the Commanding General, Marine Corps Base to the mmander Atlantic Division Naval Facilities Engineering Command (LANTDIV NAVFACENGCOM), ng repair activities to the UST and ancillary equipment, the manhole cover to the UST and fuel enser return line were damaged. The damage was not reported and allowed water to enter the UST ng rain storms displacing approximately 1,000 gallons of diesel fuel. The release was discovered on ust 17, 1992. The UST system has been repaired and returned to service. No soil and water ples were collected during repair activities.

Land and Water Use

is located approximately 200 feet north of Courthouse Bay. The area immediately adjacent ding A-47 is comprised of buildings that house maintenance facilities for the base and woodlands. site is situated in an area dominated by relatively flat topography. The nearest body of surface er is located approximately 200 feet towards the southeast. Potable water for the base is supplied by s located approximately 2,500 feet towards the east that tap the Castle Hayne aquifer.

Regional Geology

coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits liocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie rock of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the Camp une area (Harned et al., 1989). The geologic units in the area are divided into six formations: the



SOURCE: BOBBITT SU

GROUND
TECHNO

REV. NO.:	DRAWING DA 4/2/

S

CLIENT:
LANTDIV NA

LOCATION:
BUILDING 47, A
MARINE CORPS BASE

DESIGNED:	DETAILED:
BH	PJC

Carolina for treatment and disposal. Prior to transport, a copy of the composite soil sample analytical results will be provided to the remediation contractor cceptance of the soils.

e treatment facility, the soils are emptied from the drums upon a thick low-permeability soil floor large, enclosed building. An inoculum of known hydrocarbon-digesting microbes is added to the erial and the pH is adjusted to approximately 7 to 8. A bulking agent such as chicken manure may dded and the materials are agitated. Following a period of approximately 30 days of egradation, one composite soil sample is collected from each 50 tons of treated material to assess reatment conducted and insure proper clean-up levels are achieved. Once cleanup levels are ned, the material is then used for road base, asphalt mixes, fill material, and other appropriate uses. n completion of remediation, a certificate, with complete analytical data will be forwarded to the erator to remove this portion of responsibility.

disposal of the soil cuttings is currently pending.

ing monitoring well development and groundwater sample collection, purge water was stored in three gallon drums on site. The purge water was treated using a portable carbon adsorption unit and harged on site.

Technical Summary

undwater Technology Government Services, Inc. has completed a five well plus two additional well check at UST-47-3 located at Building A-47, Camp Lejeune Marine Corps Base, North Carolina. The check was designed to comply with NAVFAC contractual requirements.

en soil borings/monitoring wells were drilled and installed at the site on March 16 and 17, 1993. ls in the area are characterized as fine-grained sand and silt. Analytical results indicate that sorbed-phase hydrocarbon concentrations in the gasoline, mineral spirits, diesel and fuel oil range of TPH spectrum in all of the soil samples collected from the soil borings are less than the laboratory's orted method detection limits. All of the soil samples collected from the soil borings contained TPH-lubricating oil. Concentrations of TPH-as-lubricating oil ranged from 410 ppm to 3,000 ppm.

'/3-1 through A47/3-7 during the March 17, 1993, well gauging event. Groundwater samples were ected from the monitoring wells and analyzed for aromatic purgeable hydrocarbons by modified EPA hod 602. Dissolved-phase hydrocarbon concentrations in all of the groundwater samples collected s than the laboratory's reported method detection limit with the exception of samples collected n monitoring wells A47/3-3, A47/3-5 and A47/3-6. Dissolved-phase benzene concentrations in ıples collected from monitoring wells A47/3-5 and A47/3-6 were greater than the State Water Quality ndards.

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THREE WELL SITE CHECK REPORT
BUILDING AS-114
MARINE CORPS AIR STATION, NEW RIVER, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.15

May 21, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

OUNDWATER TECHNOLOGY
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American Institute of Professional Geologists
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GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

Commonwealth of Pennsylvania
Registered Professional
Don A. Skomsky
Engineer
37070-R

te Description

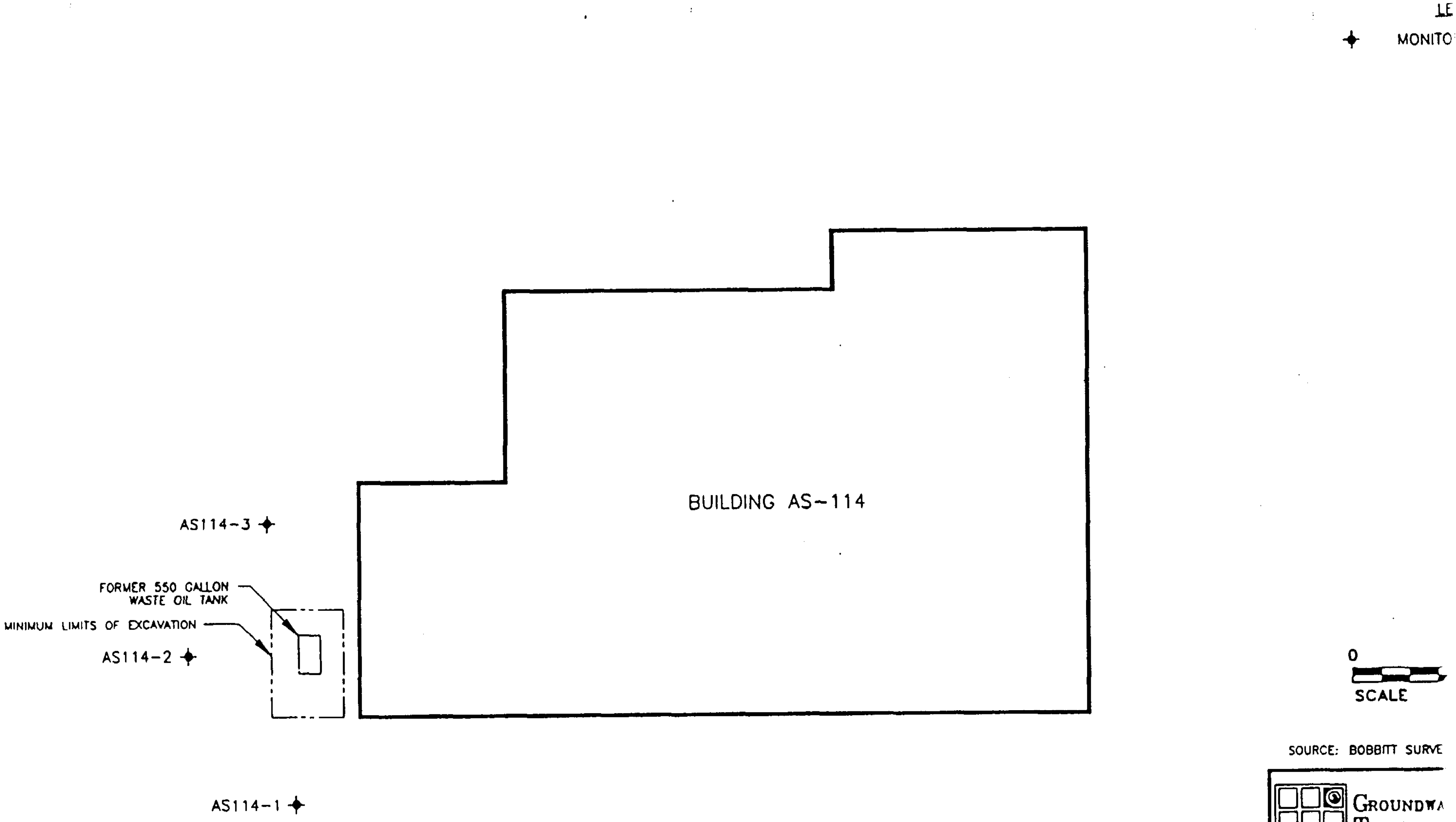
ite is located in the central region of the Marine Corps Air Station, New River, North Carolina
e The site map (Figure 2) illustrates the location of the installed wells near Building AS-114.
ng AS-114 serves as a vehicle maintenance facility for base equipment. According to past
nents, one steel 550-gallon capacity underground storage tank (UST) used to store waste oil
ent to the building was excavated and removed on July 15, 1992. GSI could not identify any
ation documenting the age or condition of the UST when removed. According to the Closure
t prepared for the site by Environmental and Regulatory Consultants, Inc. on September 15, 1993,
amples screened with a flame ionization detector (FID) indicated that 60.0 parts per million (ppm)
atic petroleum hyrocarbons were detected in the headspace of soil samples collected from the
m of the excavation. A composite soil sample was subsequently collected from the bottom of the
ation and was analyzed for the presence of total petroleum hydrocarbons (TPH) as fuel by U.S.
onmental Protection Agency (EPA) Method 3550 and TPH as oil and grease by EPA Method 9071.
tical results from the Tank Removal Report indicated that the sample contained 320 ppm TPH as
il. The TPH concentration as oil and grease concentration was below the 10 ppm quantitation limit.

and and Water Use

ng AS-114 is located approximately 2,000 feet north of the Marine Corps Air Station. The area
diately adjacent Building AS-114 is comprised of buildings that house equipment maintenance and
support facilities for the base. The site is situated in an area dominated by relatively flat
graphy. The nearest body of surface water is the New River located approximately 4,100 feet
ds the east. Potable water for the base is supplied by wells located approximately 2,100 feet
ds the west that tap the Castle Hayne Aquifer.

egional Geology

oastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits
ocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie
ock of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the Camp
ne area (Harned et al., 1989). The geologic units in the area are divided into six formations: the



SOURCE: BOBBITT SURVE

GROUNDWA
TECHNOLO

REV. NO.: 1

DRAWING DATE: 3/30/93

SIT

CLIENT:
LANTDIV NAVF

LOCATION:
BUILDING
MCAS, NEW F

DESIGNED: BH

DETAILED: PJC

:ated at the Marine Corps Air Station, New River, North Carolina. The site check was designed to comply with ,VFAC contractual requirements.

ree soil borings/monitoring wells were drilled and installed at the site on March 11, 1993. Soils in the area are acterized as fine-grained sand and silt. Analytical results indicate that adsorbed-phase hydrocarbon ncentrations in all of the soil samples collected from the soil borings are less than the laboratory's reported :thod detection limits with the exception of 450 ppm TPH-as-lubricating oil in the sample collected at 3.5 to 5 t below the surface in monitoring well AS114-3.

sed on liquid level measurements, the depth to groundwater ranges between approximately four and five feet. ɘ groundwater flow direction across the site is towards the north-northwest and the hydraulic gradient is 0.008 t per foot. Liquid-phase hydrocarbons were not measured or observed in monitoring wells AS114-1 through 114-3 during the March 12, 1993 well gauging event. Groundwater samples were collected from the nitoring wells and analyzed for aromatic purgeable hydrocarbons by EPA Method 602. Dissolved-phase lrocarbon concentrations in all of the groundwater samples collected were less than the laboratory's reported thod detection limit.

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THREE WELL SITE CHECK REPORT
BUILDING AS-118
MARINE CORPS AIR STATION, NEW RIVER
A&E CONTRACT NO: N62470-91-D-6652
JOB No. 830011088.08

May 21, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

OUNDWATER TECHNOLOGY
VERNMENT SERVICES, INC.
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GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DON A. SKOMSKY
ENGINEER
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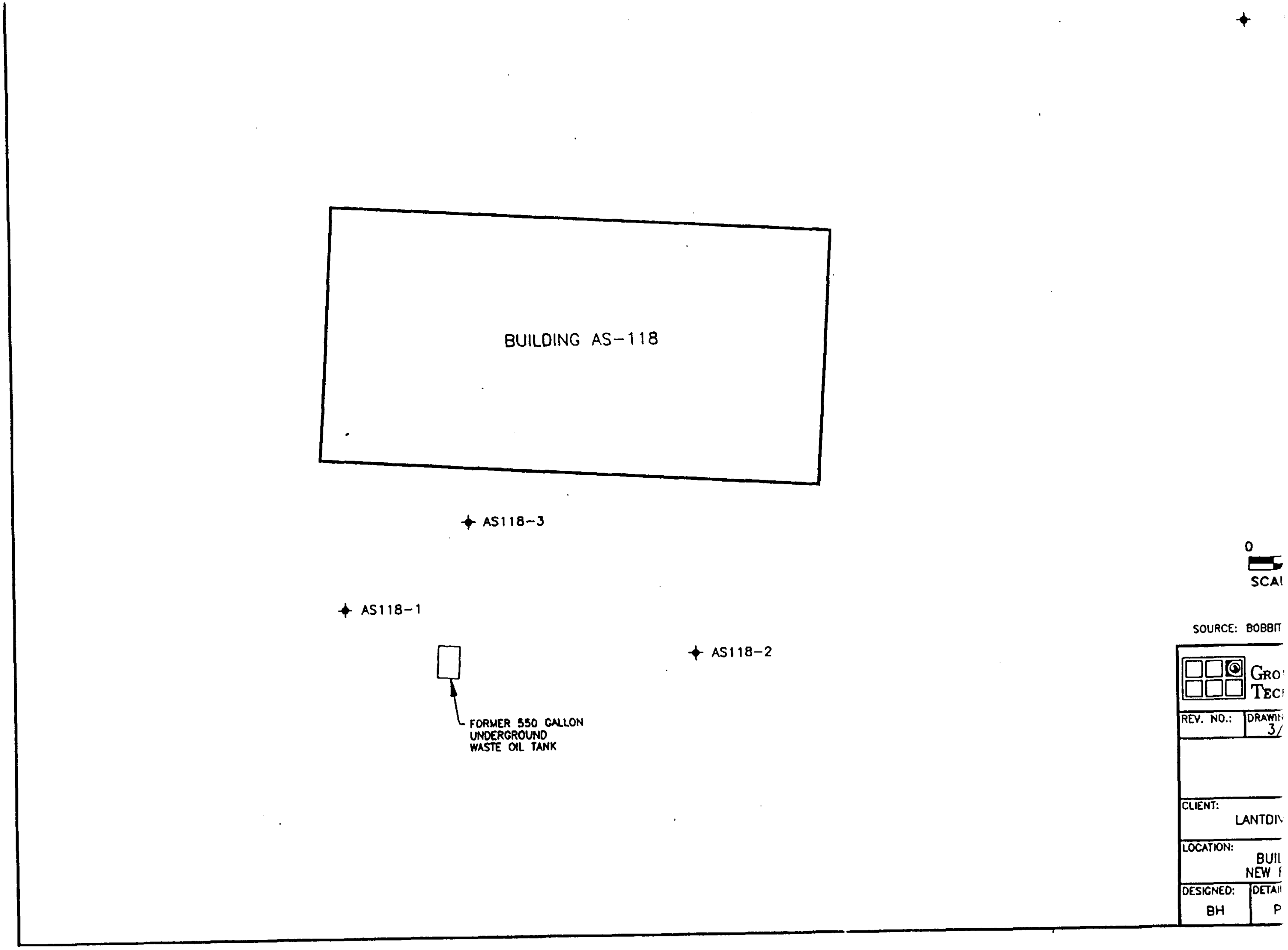
te is located in the central region of the Marine Corps Air Station, New River, NC (Figure 1). The ap (Figure 2) illustrates the location of the installed wells near Building AS-118. Building AS-118 an equipment facility at the base. According to past documents, one steel 550-gallon capacity ground storage tank (UST) used to store waste oil adjacent to the building was excavated and ved on August 18, 1992. GSI could not identify any information documenting the age or condition UST when removed. According to the Closure Report prepared for the site by Environmental and atory Consultants, Inc. on September 29, 1992, no soil samples were collected during excavation ies. A water sample was collected from the water infiltrating into the excavation and was analyzed e presence of aromatic volatile organic compounds by U.S. Environmental Protection Agency Method 602. Analytical results indicated that the sample contained 16.4 parts per billion (ppb) ne, 16.4 ppb ethylbenzene, and 764 ppb xylenes. The benzene concentration was below the titation limit. The sample was also analyzed for the bases, neutrals and acids extractables. tical results indicate that all of the compounds analyzed were below the quantitation limit with the ption of 2-methyl naphthalene, which was detected at a concentration of 20.4 ppb.

Land and Water Use

AS-118 is located approximately 2,000 feet north of the Marine Corps air field. The area ediately adjacent Building AS-118 is comprised of buildings that house maintenance and other ort facilities for the base. The site is situated in an area dominated by relatively flat topography. nearest body of surface water is the New River located approximately 5,900 feet towards the east. ble water for the base is supplied by wells located approximately 6,500 feet towards the west- nwest that tap the Castle Hayne Aquifer.

Regional Geology

coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits Miocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie rock of Precambrian age, thicken and dip eastward with thicknesses ranging from 1,500 feet in the t to 6,000 feet in the east. The geologic units in the area are divided into six formations: the Castle



SOURCE: BOBBIT

REV. NO.:
DRAWIN 3/

CLIENT: LANTDI

LOCATION: BUIL NEW

DESIGNED: BH
DETAI P

ils will be disposed of accordingly, in compliance with contract, state, federal and local regulations. e drums will be transported with a waste manifest to a remediation facility located in Fayetteville, orth Carolina for treatment and disposal. Prior to transport, a completed material characterization form py of the composite soil sample analytical results will be provided to the remediation contractor r acceptance of the soils.

ithin the treatment facility, the soils are emptied from the drums upon a thick low-permeability soil floor a large, enclosed building. An inoculum of known hydrocarbon-digesting microbes is added to the aterial and the pH is adjusted to approximately 7 to 8. A bulking agent such as chicken manure may e added and the materials are agitated. Following a period of approximately 30 days of iodegradation, one composite soil sample is collected from each 50 tons of treated material to assess e treatment conducted and insure proper clean-up levels are achieved. Once cleanup levels are ttained, the material is then used for road base, asphalt mixes, fill material, and other appropriate uses. pon completion of remediation, a certificate, with complete analytical data will be forwarded to the enerator to remove this portion of responsibility.

n May 21, 1993, three drums of soil cuttings were removed from the site and transported to the emediation facility for recycling.

uring monitoring well development and groundwater sample collection, purge water was stored in three 5-gallon drums on site. The purge water was treated using a portable carbon adsorption unit and ischarged on site.

4.5 Technical Summary

Groundwater Technology Government Services, Inc. has completed a three well site check at Building AS-118 located at the Marine Corps Air Station, New River, North Carolina. The site check was designed to comply with NAVFAC contractual requirements.

od detection limits.

d on liquid-level measurements, the depth to groundwater ranges between approximately 9.5 and 11 feet. i hase hydrocarbons were not measured or observed in monitoring wells AS118-1 through AS118-3 during March 11, 1993 well gauging event. The hydraulic gradient across the site on March 11, 1993, was 0.034 per foot towards the south. Groundwater samples were collected from the monitoring wells and analyzed urgeable aromatic hydrocarbons by EPA Method 602. Dissolved-phase hydrocarbon concentrations in all of groundwater samples collected were less than the laboratory's reported method detection limit.

GOVERNMENT SERVICES

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THREE WELL SITE CHECK REPORT
BUILDING AS-410 North
MARINE CORPS AIR STATION, NEW RIVER, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.30

May 21, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

OUNDWATER TECHNOLOGY
VERNMENT SERVICES, INC.
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GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DON A SKOMSKY
ENGINEER
37070-R

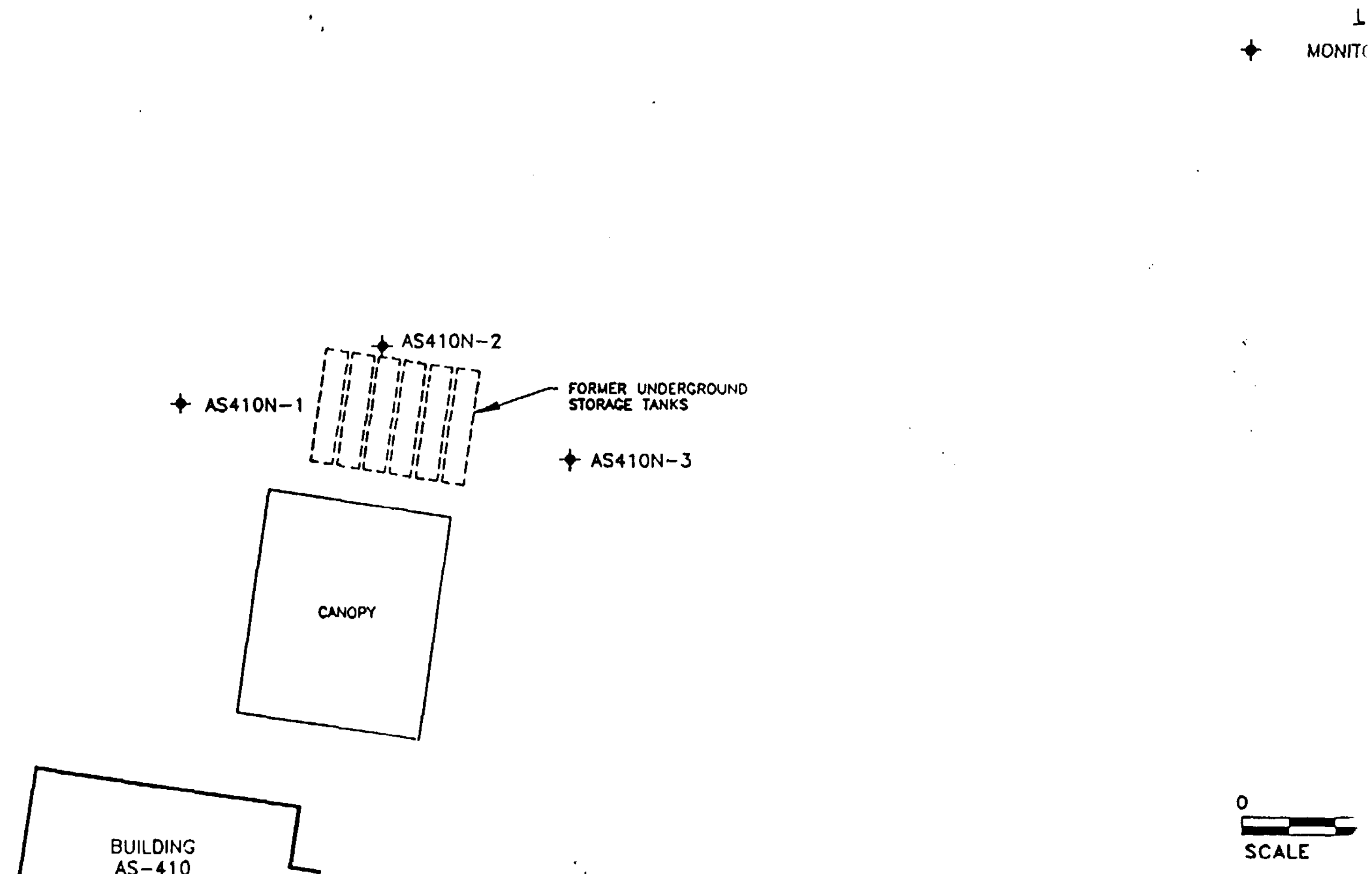
ite is located in the central region of the Marine Corps Air Station, New River, North Carolina re 1). The site map (Figure 2) illustrates the location of the installed wells on the north side of ing AS-410. Building 410 serves as a service station for the Marine Corps Commissary at the base. rding to past documents, six 4,000 gallon capacity underground storage tanks (UST) used to store line on the north side of the building were excavated and removed on July 28, 1992. GSI could not ify any information documenting the age or condition of the USTs when removed. According to the ure Report prepared for the site by Environmental and Regulatory Consultants, Inc. on September 992, no soil samples were collected during excavation activities. A water sample was collected the water infiltrating into the excavation and analyzed for the presence of benzene, toluene, benzene, xylenes and methyl tertiary butyl ether (MTBE) by U.S. Environmental Protection Agency) Method 602. Analytical results from the Closure Report indicated that the water sample contained) parts per billion (ppb) benzene, 1,990 ppb ethylbenzene, 4,320 ppb xylenes and 7,390 ppb MTBE. toluene concentration was below the 125 ppb quantitation limit. Following the removal of the USTs, xcavated soils were returned to the excavation.

and and Water Use

AS-410 is located approximately 2,000 feet north of the Marine Corps air field. The area ediately adjacent Building AS-410 is comprised of buildings that house maintenance and support ties for the base. The site is situated in an area dominated by relatively flat topography. The est body of surface water is the New River located approximately 2 miles towards the east. Potable r for the base is supplied by wells located approximately 3,000 feet towards the west-northwest that he Castle Hayne aquifer.

Regional Geology

coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits iocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie ock of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the Camp une area (Harned et al., 1989). The geologic units in the area are divided into six formations: the



SOURCE: BOBBITT SURVE

GROUNDWA
TECHNOLO

REV. NO.: 1

DRAWING DATE: 3/30/93

SIT

CLIENT:
LANTDIV NAFA

LOCATION:
BUILDING AS-
MCAS, NEW

DESIGNED: BH

DETAILED: PJC

rged on site.

chnical Summary

ater Technology Government Services, Inc. has completed a three well site check on the north f Building AS-410 located at the Marine Corps Air Station, New River, North Carolina. The site was designed to comply with NAVFAC contractual requirements.

soil borings/monitoring wells were drilled and installed at the site on March 11 and 12, 1993. in the area are characterized as silty and clayey fine-grained sand. Analytical results indicate that bed-phase hydrocarbon concentrations in all of the soil samples collected from the soil borings are han the laboratory's reported method detection limits.

on liquid-level measurements, the depth to groundwater is at approximately 9 feet. The dwater flow direction across the site is towards the north and the hydraulic gradient is 0.006 feet ot. Liquid-phase hydrocarbons were not measured or observed in monitoring wells AS410N-1 gh AS410N-3 during the March 15, 1993 well gauging event. Groundwater samples were collected the monitoring wells and analyzed for aromatic purgeable hydrocarbons by EPA Method 602. -phase hydrocarbon concentrations were detected in all of the groundwater samples collected. ene and ethylbenzene concentrations in all of the groundwater samples collected are greater than tate water quality standards established by the NCDEHR. The toluene and xylenes concentrations groundwater sample collected from monitoring well AS410N-2 are greater than the state water y standards.

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THREE WELL SITE CHECK REPORT
BUILDING AS-410 South
MARINE CORPS AIR STATION, NEW RIVER, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.29

May 26, 1993

Prepared for:
Commander
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Norfolk, Virginia 23511-6287

OUNDWATER TECHNOLOGY
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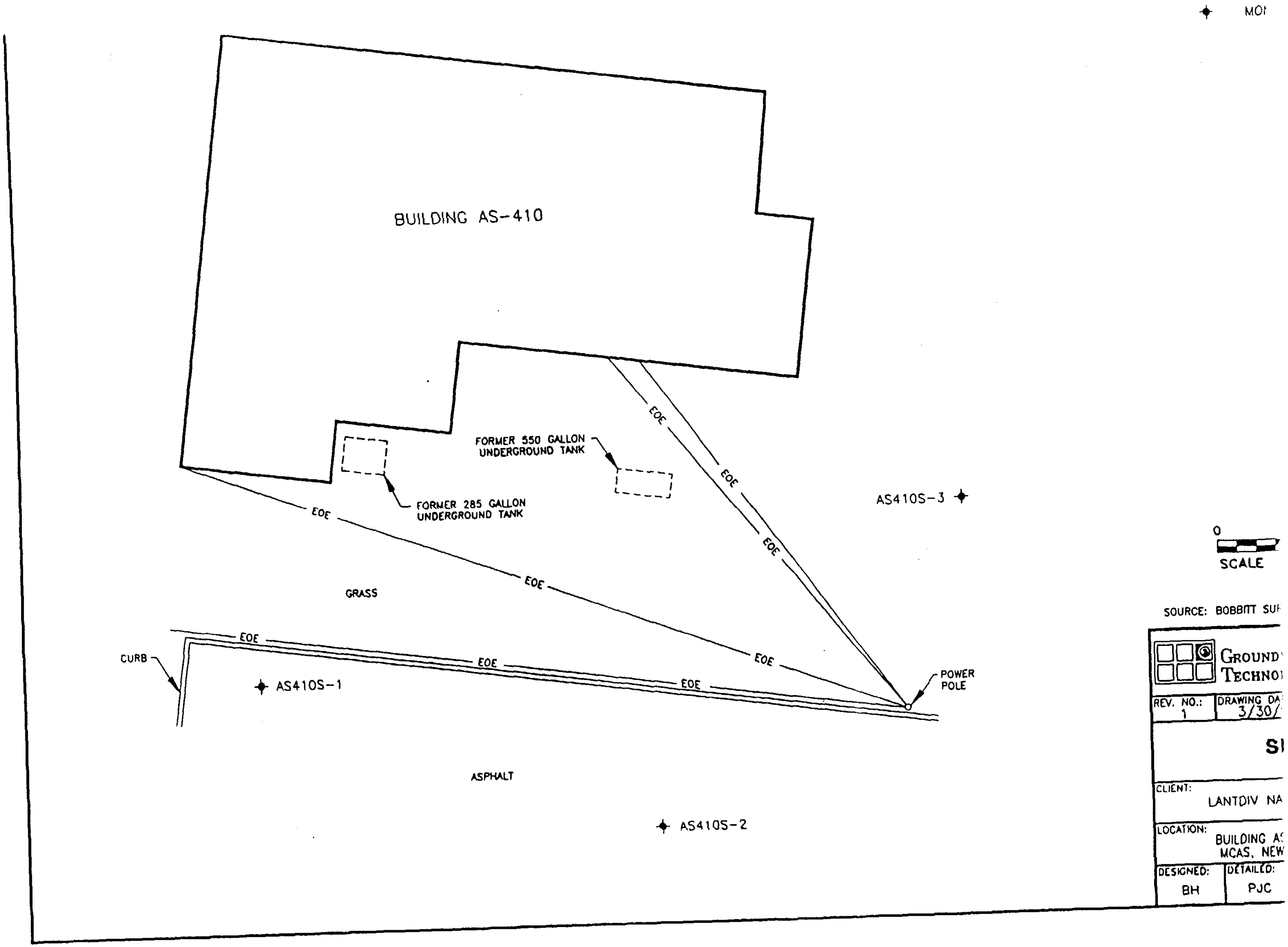
Offices throughout the U.S., Canada and Overseas

escription

located in the central region of the Marine Corps Air Station, New River, North Carolina e site map (Figure 2) illustrates the location of the installed wells on the south side of S-410. Building 410 serves as a service station for the Marine Corps Commissary at the base. to past documents, one steel 550-gallon capacity heating oil underground storage tank (UST) 85-gallon capacity waste oil UST were excavated and removed on July 30, 1992. GSI could y any information documenting the age or condition of the USTs when removed. According to re Report prepared by Environmental and Regulatory Consultants, Inc. on September 29, 1992, e, no soil samples were collected during UST-removal activities from the waste oil excavation tory analysis. A soil sample was collected from the bottom of the heating oil excavation and with a flame ionization detector (FID). The FID indicated the presence of aromatic petroleum ons in concentrations greater than 1,000 parts per million (ppm) in the headspace of the A soil sample was subsequently collected from the west end of the bottom of the heating oil vation and was analyzed for the presence of total petroleum hydrocarbons (TPH)-as-fuel oil by od 3550 and TPH-as-gasoline by EPA Method 5030. Analytical results from the Closure Report that the sample contained 6,900 ppm TPH-as-fuel oil and 1,200 ppm TPH-as-gasoline.

Water Use

S-410 is located approximately 2,000 feet north of the Marine Corps air field. The area ely adjacent Building AS-410 is comprised of buildings that house maintenance and other acilities for the base. The site is situated in an area dominated by relatively flat topography. est body of surface water is the New River located approximately one mile towards the east of Potable water for the base is supplied by wells located approximately 3,000 feet towards the t of the site that tap the Castle Hayne aquifer.


MOI
BUILDING AS-410
FORMER 550 GALLON UNDERGROUND TANK
FORMER 285 GALLON UNDERGROUND TANK
EOE
AS410S-3
GRASS
CURB
AS410S-1
POWER POLE
ASPHALT
AS410S-2
0
SCALE
SOURCE: BOBBITT SUI
GROUND
TECHNO
REV. NO.: 1
DRAWING DA 3/30/
SI
CLIENT:
LANTDIV NA
LOCATION:
BUILDING A
MCAS, NEW
DESIGNED: BH
DETAILED: PJC

will be disposed of accordingly, in compliance with contract, state, federal and local regulations. rums will be transported with a waste manifest to a remediation facility located in Fayetteville, olina for treatment and disposal. Prior to transport, a completed material characterization form opy of the composite soil sample analytical results will be provided to the remediation contractor ceptance of the soils.

the treatment facility, the soils are emptied from the drums upon a thick low-permeability soil floor arge, enclosed building. An inoculum of known hydrocarbon-digesting microbes is added to the ial and the pH is adjusted to approximately 7 to 8. A bulking agent such as chicken manure may lded and the materials are agitated. Following a period of approximately 30 days of gradation, one composite soil sample is collected from each 50 tons of treated material to assess eatment conducted and insure proper clean-up levels are achieved. Once cleanup levels are ed, the material is then used for road base, asphalt mixes, fill material, and other appropriate uses. completion of remediation, a certificate, with complete analytical data will be forwarded to the ator to remove this portion of responsibility.

ay 7, 1993, the drums of soil cuttings were removed from the site and transported to the n facility for recycling. A copy of the application for treatment of petroleum contaminated soil on-hazardous waste manifest is presented in Appendix E.

g monitoring well development and groundwater sample collection, purge water was stored in three llon drums on site. The purge water was treated using a portable carbon adsorption unit and arged on site.

echnical Summary

dwater Technology Government Services, Inc. has completed a three well site check on the south f Building AS-410 located at the Marine Corps Air Station, New River, North Carolina. The site was designed to comply with NAVFAC contractual requirements.

centrations in all of the soil samples collected from the soil borings are less than the laboratory's reported hod detection limits.

e n liquid-level measurements, the depth to groundwater ranges between approximately 8.5 and 9 feet. hydraulic gradient across the site is 0.005 feet per foot towards the south. Liquid-phase hydrocarbons were measured or observed in monitoring wells AS410S-1 through AS410S-3 during the March 15, 1993, well ging event. Groundwater samples were collected from the monitoring wells and analyzed for aromatic geable hydrocarbons by EPA Method 602. Dissolved-phase hydrocarbon concentrations in all of the undwater samples collected were less than the laboratory's reported method detection limit.

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THREE WELL SITE CHECK REPORT
BUILDING AS-522
MARINE CORPS AIR STATION, NEW RIVER, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.24

May 21, 1993

Prepared for:
Commander
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Naval Facilities Engineering Command
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UNDWATER TECHNOLOGY
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AMERICAN INSTITUTE OF PROFESSIONAL GEOLOGISTS
CERTIFICATE NUMBER 8334
AIPG
P. TAYLOR SWORD
CERTIFIED PROFESSIONAL GEOLOGIST

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DON A. SKOMSKY
ENGINEER
37070-R

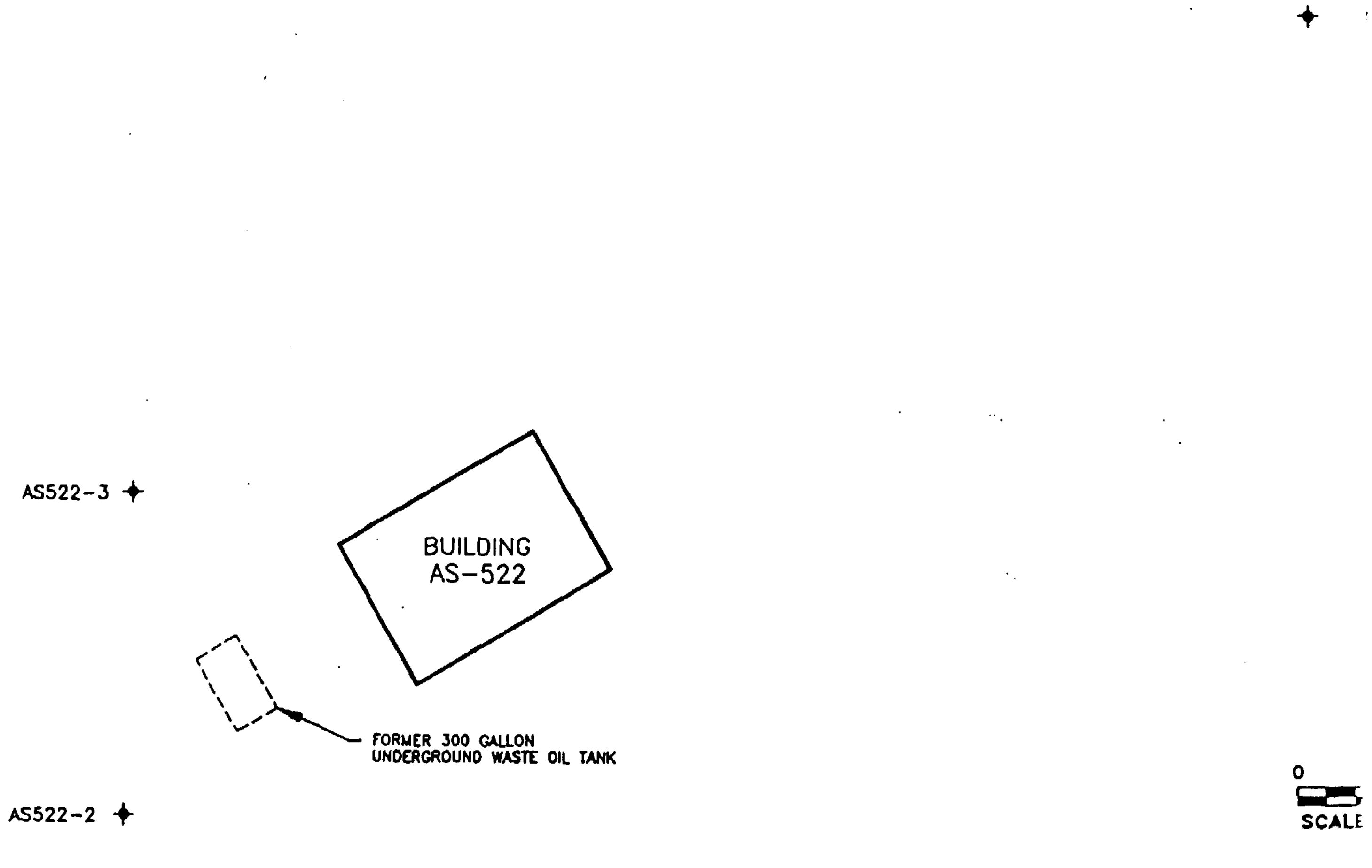
ite is located in the central region of the Marine Corps Air Station, New River, North Carolina re 1). The site map (Figure 2) illustrates the location of the installed wells near Building AS-522. n to past documents, one steel 300-gallon capacity underground storage tank (UST) used to waste oil adjacent to the building was excavated and removed on October 13, 1992. GSI could lentify any information documenting the age or condition of the UST when removed. According to losure Report prepared by Environmental Regulatory Consultants, Inc., on October 29, 1993, for te, soil samples were collected from the bottom of the excavation and screened with a flame ation detector (FID). Volatile organic vapor concentrations in the soil samples screened in the head e of the sample with a FID ranged from 0 parts per million (ppm) to 22.0 ppm. Two soil samples collected from the bottom of the excavation and analyzed for the presence of oil and grease by od 9071. Analytical results indicate that the soil sample collected at two feet below the north end of ST contained 140 ppm waste oil and 34 ppm in the soil sample collected at the sample depth at outh end of the UST.

and and Water Use

ng AS-522 is located approximately 4,600 feet towards the west of the New River at the Marine field. The area immediately adjacent to Building AS-522 is comprised of buildings that house enance and other support facilities for the air field. The site is situated in an area dominated by ely flat topography. The nearest body of surface water is the New River located approximately feet east. Potable water for the base is supplied by wells located approximately one mile towards orthwest that tap the Castle Hayne aquifer.

egional Geology

oastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits ocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie ock of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the Camp ne area (Harned et al., 1989). The geologic units in the area are divided into six formations: the e Hayne Formation of the Eocene Series; the River Bend Formation of the Oligocene Series; the



SOURCE: BOBBITT

Grou
Tech

REV. NO.: 1	DRAWING 3/3

CLIENT:
LANTDIV

LOCATION:
BUILDI
MCAS, N

DESIGNED: BH	DETAILED: PJC

undwater Technology Government Services, Inc. has completed a three [illegible] 522 located at the Marine Corps Air Station, New River, North Carolina. The site check was designed omply with NAVFAC contractual requirements.

oil borings/monitoring wells were drilled and installed at the site on March 18 and 19, 1993. ls in the area are characterized as silty and clayey fine-grained sand. Analytical results indicate that orbed-phase hydrocarbon concentrations in all of the soil samples collected from the soil borings are than the laboratory's reported method detection limits.

sed on liquid-level measurements, the depth to groundwater is at approximately four feet. The raulic gradient across the site on March 19, 1993 was 0.187 feet per foot towards the southwest. uid-phase hydrocarbons were not measured or observed in monitoring wells AS522-1 through 522-3 during the March 19, 1993, well gauging event. Groundwater samples were collected from the nitoring wells and analyzed for aromatic purgeable hydrocarbons by modified EPA Method 602. solved-phase hydrocarbon concentrations in all of the groundwater samples collected were less than laboratory's reported method detection limit, with the exception of the duplicate sample collected m monitoring well AS522-3. Benzene, toluene, ethylbenzene, and xylenes concentrations in the undwater samples are less than the state water quality standards established by the NCDEHNR.

GOVERNMENT SERVICES

Groundwater Technology Government Services, Inc.
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THREE WELL SITE CHECK REPORT
BUILDING AS-804
MARINE CORPS AIR STATION, NEW RIVER NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.19

May 26, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

ROUNDWATER TECHNOLOGY
OVERNMENT SERVICES, INC.
epared by:

William L. Hughes
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ead Geologist

Taylor Sword
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roject Manager/Remediation Specialist

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GROUNDWATER TECHNOLOGY
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Approved by:

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Operations Manager

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Offices throughout the U.S., Canada and Overseas

1 Site Description

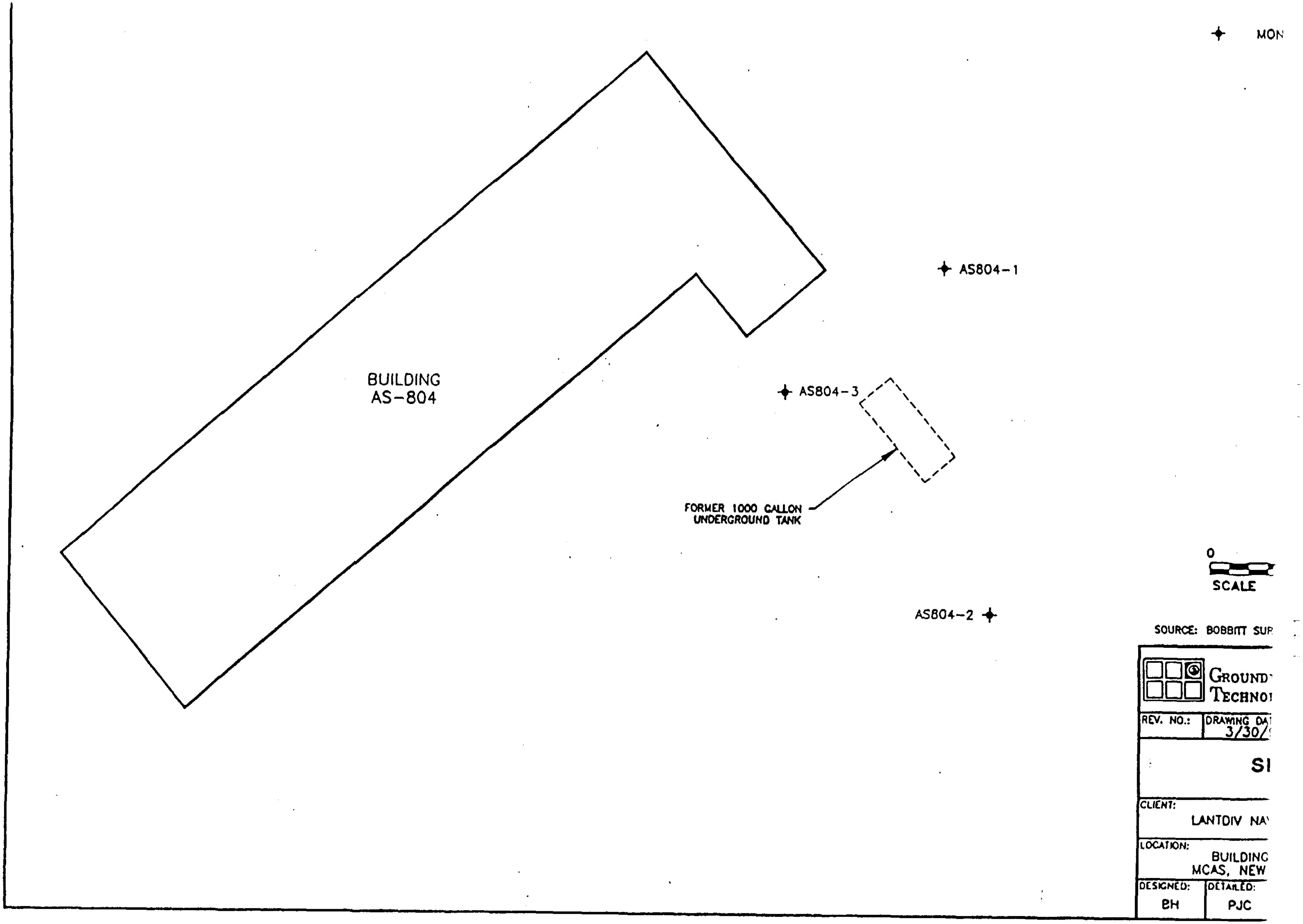
e site is located in the central region of the Marine Corps Air Station (MCAS), New River, North na (Figure 1). The site map (Figure 2) illustrates the location of the Building AS-804, the proximate location of the underground storage tank (UST), and the location of the installed wells. ilding AS-804 formerly served as a photographic development facility. According to documents ovided to GSI by LANTDIV, one steel 1,000-gallon capacity UST was excavated and removed on igust 25, 1992. This UST is believed to have been used as a storage and dispensing vessel for fuel oil. oundwater Technology GSI could not identify any information documenting the age or condition of the T when removed. A new 1,000-gallon capacity aboveground storage tank was installed to replace the moved UST. According to the Closure Report prepared for the site by Environmental Regulatory nsultants, Inc. (ERC) dated September 15, 1992, no soil samples were collected for laboratory alysis at the time the UST was removed. According to the ERC report, a water sample collected from e excavation was not submitted for analysis due to the presence of liquid-phase hydrocarbons on the rface of the sample.

2 Land and Water Use

g AS-804 is located approximately 150 feet west of the New River at the MCAS air field. The area mediately adjacent Building AS-804 is comprised of buildings that house support facilities for the air ld. The site is situated in an area dominated by relatively flat topography. The nearest body of rface water is the New River located 150 feet towards the east. Potable water for the base is supplied a well that taps the Castle Hayne aquifer located approximately 1.7 miles towards the northwest of s location.

3 Regional Geology

e coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits Miocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie drock of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the MCAS area amed et al., 1989). The geologic units in the area are divided into six formations: the Castle Hayne rmation of the Eocene Series; the River Bend Formation of the Oligocene Series; the



SOURCE: BOBBITT SUR

GROUND
TECHNO

REV. NO.:

DRAWING DA
3/30/

SI

CLIENT:
LANTDIV NA

LOCATION:
BUILDING
MCAS, NEW

DESIGNED:
BH

DETAILED:
PJC

water Technology GSI has completed a three well site check for Building AS-804 located at the
Corps Air Station, New River, North Carolina. The site check was designed to comply with
C contractual requirements.

borings/monitoring wells were drilled and installed at the site on March 22, 1993. Soils in the
e characterized as silt and fine-grained sand from the surface to 2 feet deep. A clay layer
s from 2 feet to a depth of 9 feet. Underlying the clay is a water bearing fine-grained sand and
alytical results indicate that adsorbed-phase hydrocarbon concentrations in all of the soil samples
ed from the soil borings are less than the laboratory's reported method detection limits, with the
on of 19 ppm TPH-as diesel in the sample collected at 3.5 to 5 feet in monitoring well AS804-3.

on liquid-level measurements, the depth to groundwater is at approximately 9 feet. The hydraulic
t across the site on March 23, 1993 was 0.066 feet per foot towards the southeast. Liquid-phase
arbons were not measured or observed in monitoring wells AS804-1 through AS804-3 during the
23, 1993, well gauging event. Groundwater samples were collected from the monitoring wells and
ed for aromatic purgeable hydrocarbons by modified EPA Method 602. Dissolved-phase
arbon concentrations in all of the groundwater samples collected were less than the laboratory's
d method detection limit, with the exception of 0.5 ppb toluene in the sample collected from
well AS804-2 and 1.1 ppb ethylbenzene in monitoring well AS804-3. Benzene, toluene,
ene, and xylenes concentrations in the groundwater samples are less than the State Water
Standards established by the NCDEHNR.

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THREE WELL SITE CHECK REPORT
BUILDING AS-822
MARINE CORPS AIR STATION, NEW RIVER, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.17

May 21, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

UNDWATER TECHNOLOGY
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ared by:

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GOVERNMENT SERVICES, INC.
Approved by:

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Operations Manager

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
DON A. SKOMSKY
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Site Description

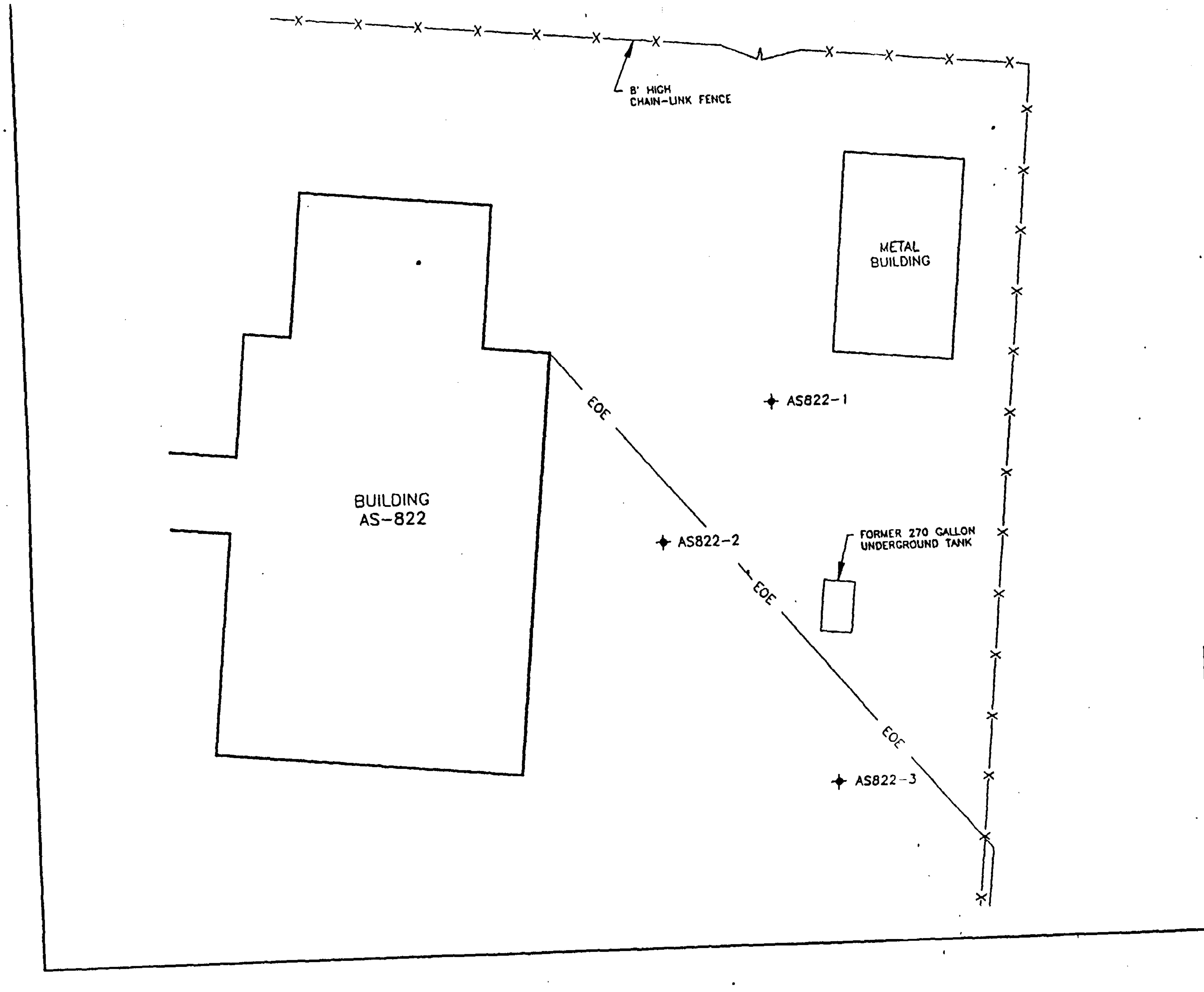
site is located in the central region of the Marine Corps Air Station, New River, North Carolina). The site map (Figure 2) illustrates the location of the installed wells near Building AS-822. ding AS-822 serves as a communications facility at the base. According to past documents, one 550-gallon capacity underground storage tank (UST) used to store waste oil adjacent to the ding was excavated and removed on August 25, 1992. GSI could not identify any information umenting the age or condition of the UST when removed. According to the Closure Report prepared nvironmental Regulatory Consultants, Inc., on September 17, 1992, for the site, no soil samples collected for laboratory analysis during excavation activities. Soil samples collected from the om of the excavation which were screened with a flame ionization detector (FID) did not indicate the ence of aromatic petroleum hydrocarbons. A water sample was collected from the water infiltrating the excavation. The water sample was not submitted to the analytical laboratory because of the ence of liquid-phase hydrocarbons on the surface of the sample.

Land and Water Use

ding AS-822 is located approximately 1,100 feet west of the New River on the edge of the Marine field. The area immediately adjacent to Building AS-822 is comprised of buildings that house ort facilities for the Base. The site is situated in an area dominated by relatively flat topography. nearest body of surface water is the New River located approximately 1,100 feet towards the east. ble water for the base is supplied by wells located approximately two miles towards the northwest tap the Castle Hayne aquifer.

Regional Geology

coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits iocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie ock of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the Camp une area (Harned et al., 1989). The geologic units in the area are divided into six formations: the le Hayne Formation of the Eocene Series; the River Bend Formation of the Oligocene Series; the



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SCALE

SOURCE: BOBBITT SU

GROUND
TECHNO

REV. NO.:	DRAWING DA
1	3/30/

SI

CLIENT:
LANTDIV NA

LOCATION:
BUILDIN
MCAS, NEW

DESIGNED:	DETAILED:
BH	PJC

- Extractable Organic Halides by EPA Method 9020; and
- Percentage Moisture by EPA CLP Method.

disposed of accordingly, in compliance with contract, state, federal and local regulations. ums were transported with a waste manifest to a remediation facility located in Fayetteville, North a for treatment and disposal. Prior to transport, a completed material characterization form and f the composite soil sample analytical results were provided to the remediation contractor for tance of the soils.

the treatment facility, the soils are emptied from the drums upon a thick low-permeability soil floor rge, enclosed building. An inoculum of known hydrocarbon-digesting microbes is added to the ial and the pH is adjusted to approximately 7 to 8. A bulking agent such as chicken manure may ded and the materials are agitated. Following a period of approximately 30 days of biodegra-, one composite soil sample is collected from each 50 tons of treated material to assess the nent conducted and insure proper clean-up levels are achieved. Once cleanup levels are attained, aterial is then used for road base, asphalt mixes, fill material, and other appropriate uses. Upon letion of remediation, a certificate, with complete analytical data will be forwarded to the generator move this portion of responsibility.

lay 7, 1993, three drums of soil cuttings were removed from the site and transported to the diation facility for recycling. A copy of the application for treatment of petroleum contaminated and non-hazardous waste manifest are presented in Appendix E.

ng monitoring well development and groundwater sample collection, purge water was stored in three allon drums on site. The purge water was treated using a portable carbon adsorption unit and harged on site.

Technical Summary

undwater Technology Government Services, Inc. has completed a three well site check at Building -822 located at the Marine Corps Air Station, New River, North Carolina. The site check was designed comply with NAVFAC contractual requirements.

rbon concentrations in all of the soil samples collected from the soil borings are less than the ry's reported method detection limits in the gasoline, mineral spirits, kerosene, fuel oil No. 6 and ng oil range of the TPH spectrum. Concentrations of TPH-as-diesel in the soil samples were 250 ppm in ir well AS822-1, 5,100 ppm in monitoring well AS822-2, and 61 ppm in monitoring well AS822-3.

n liquid-level measurements, the depth to groundwater is at approximately 2 to 3 feet. Liquid-phase rbons were not measured or observed in monitoring wells AS822-1 through AS822-3 during the March 3 well gauging event. The groundwater flow direction across the site is towards the north and the ic gradient is 0.043 feet per foot. Groundwater samples were collected from the monitoring wells and d for aromatic purgeable hydrocarbons by modified EPA Method 602. Dissolved-phase hydrocarbon trations were detected in all of the groundwater samples collected. Benzene and ethylbenzene trations in all of the groundwater samples are greater than the state water quality standards.

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THREE WELL SITE CHECK REPORT
BUILDING AS-843
MARINE CORPS AIR STATION, NEW RIVER, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.40

October 14, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6299

UNDWATER TECHNOLOGY
ERNMENT SERVICES, INC.
ared by:

William L. Hughes
m L. Hughes
Geologist

William L. Hughes for
ylor Sword, C.P.G.
ct Manager/Remediation Specialist

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

Offices throughout the U.S., Canada and Overseas

ite Description

ite is located in the central region of the Marine Corps Air Station (MCAS), New River, Carolina (Figure 1). The site map (Figure 2) illustrates the location of Building AS-843 and the of the installed monitoring wells. Building AS-843 serves as the airfield operations building at ase. According to documents provided to GSI by LANTDIV, one steel 550-gallon capacity rground storage tank (UST) and one steel 285-gallon capacity UST, used to store diesel fuel, were ated and removed on September 1, 1992. There was no information available documenting the r condition of the USTs when removed. According to the Closure Report prepared for the site, a ample was collected but not sent for laboratory analysis during excavation activities. The soil le was not submitted to the analytical laboratory because of the presence of liquid-phase carbons on the surface of the sample. Additionally, the soil sample collected from the bottom of xcavation was not screened with a flame-ionization detector (FID) because of the presence of these -phase hydrocarbons.

and and Water Use

ng AS-843 is located approximately 1,100 feet west of the New River on the edge of the air field. immediately adjacent Building AS-843 is comprised of buildings that house support facilities for ase. The site is situated in an area dominated by relatively flat topography. The nearest body of e water is the New River. Potable water for the Base is supplied by wells located approximately iles towards the northwest that tap the Castle Hayne aquifer.

egional Geology

oastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits cene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie ck of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the MCAS area ed et al., 1989). The geologic units in the area are divided into six formations: the Castle Hayne ation of the Eocene Series; the River Bend Formation of the Oligocene Series; the Belgrade, Pungo and Eastover Formations of the Miocene Series; the Yorktown Formation of the Pliocene Series; ndifferentiated units of the Quaternary Series. The Castle Hayne Formation is composed of ones and marls. The Castle Hayne Formation is overlain by the River Bend Formation.

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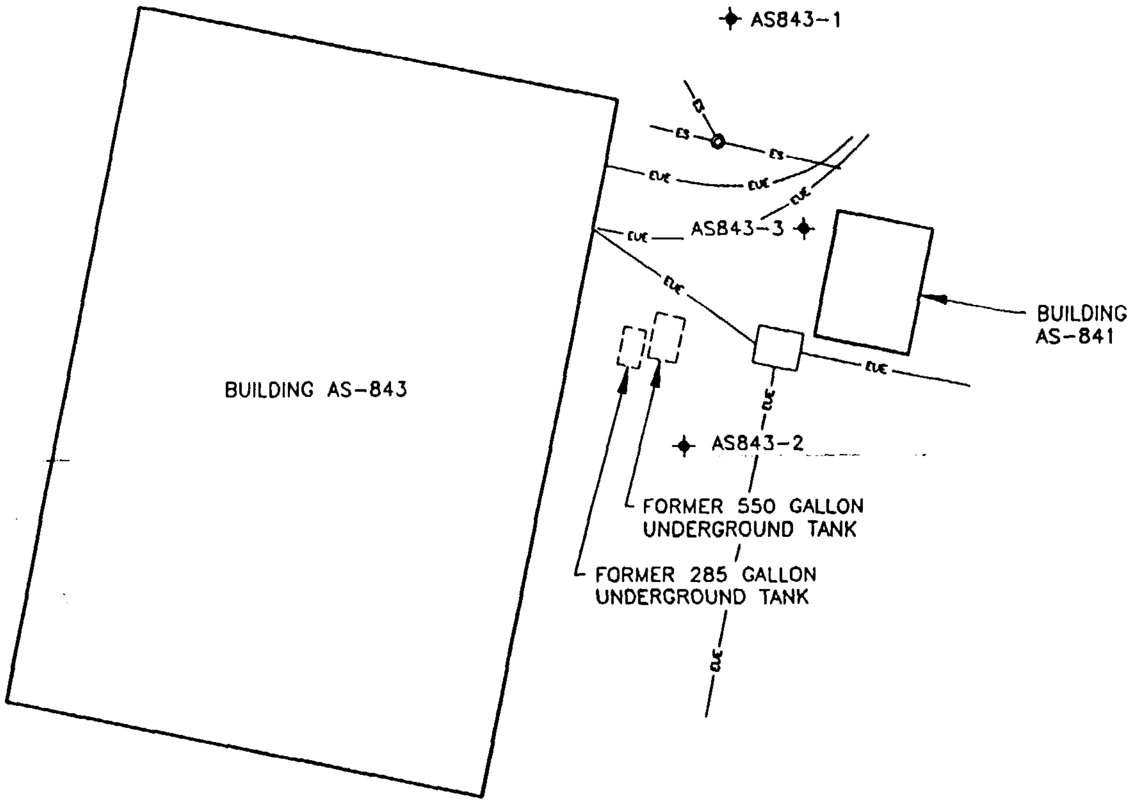

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SOURCE: BOBBITT SURV

GROUNDW
TECHNOL

REV. NO.:	DRAWING DATE
1	7/2/93

SI

CLIENT:
LANTDIV NAV

LOCATION:
BUILDING
MCAS, NEW

DESIGNED:	DETAILED:
BH	PJC

dwater Technology GSI has completed a three well site check at Building AS-843 located at the e Corps Air Station, New River, North Carolina. The site check was designed to comply with AC contractual requirements.

borings/monitoring wells were drilled and installed at the site on June 24 and 25, 1993. Soils area are characterized as silty and clayey fine-grained sand. Analytical results indicate that bed-phase hydrocarbon concentrations in all of the soil samples collected from the soil borings are han the laboratory's reported method detection limits in the gasoline, diesel mineral spirits, ene, fuel oil No. 6, and lubricating oil range of the TPH spectrum. The concentration of TPH by Method 418.1 in the composite soil sample collected for the purpose of soil disposal was 1,900

on liquid-level measurements, the depth to groundwater is at approximately 6 to 9 feet. Liquid-hydrocarbons were not measured or observed in monitoring wells AS843-1 through AS843-3 the July 20, 1993 well gauging event. The hydraulic gradient across the site is 0.016 feet per foot ds the northeast. Groundwater samples were collected from the monitoring wells and analyzed for tic purgeable hydrocarbons by modified EPA Method 602 and base/neutral, acid semi-volatile ounds by EPA Method 625. Dissolved-phase BTEX concentrations in all of the groundwater es collected were less than the State Water Quality Standards established by the North Carolina nt of Environment, Health and Natural Resources (NCDEHNR). The sample collected from oring well AS843-3 contained 16 parts per billion (ppb) naphthalene. The duplicate e collected from monitoring well AS843-3 contained 17 ppb naphthalene and 280 ppb ethylhexyl)phethalate. The laboratory report indicates that the analyte *bis*(2-ethylhexyl)phethalate und in the blank as well as the sample. This indicates possible/probable blank contamination. ate Water Quality Standards for these analytes are the practical quantitation limits.

GOVERNMENT SERVICES

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THREE WELL SITE CHECK REPORT
BUILDING AS-849
MARINE CORPS AIR STATION, NEW RIVER NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.14

May 26, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

OUNDWATER TECHNOLOGY
VERNMENT SERVICES, INC.
pared by:

William L. Hughes
liam L. Hughes
ad Geologist

Taylor Sword, C.P.G.
oject Manager/Remediation Specialist

8334
F. TAYLOR SWORD

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

DON A. SKOMSKY
37070-R

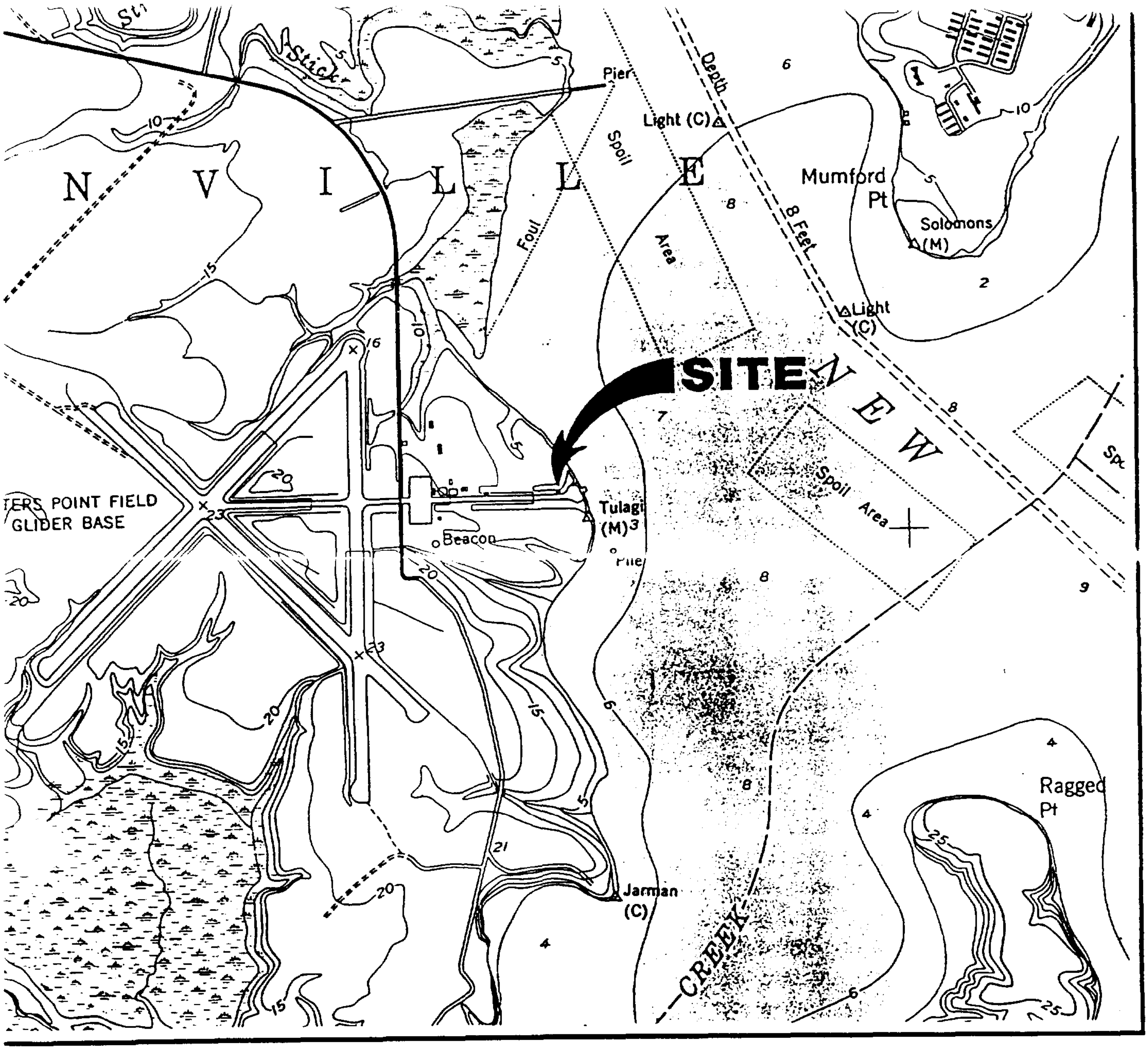
ite is located on the east side of the Marine Corps Air Station (MCAS), New River, North Carolina re 1). The site map (Figure 2) illustrates the location of the Building AS-849, the approximate f the underground storage tank (UST), and the location of the installed wells. Building AS-849 s as a nuclear, biological and chemical warfare training facility at the base. According to ments provided, one steel 550-gallon capacity UST used to store diesel fuel was excavated and ved on August 24, 1992. Groundwater Technology Government Services, Inc. could not identify nformation documenting the age or condition of the UST when removed. According to the Closure rt prepared for the site by Environmental Regulatory Consultants, Inc. (ERC) dated September 15, , no soil samples were collected for laboratory analysis during excavation activities. A water sample subsequently collected from the water infiltrating into the excavation. According to the ERC report, sample was not submitted for analysis because of the presence of liquid-phase hydrocarbons on the ce of the sample.

and and Water Use

ling AS-849 is located approximately 150 feet west of the New River. The area immediately adjacent lin AS-849 is comprised of grassy fields and buildings that house support facilities for the base. is situated in an area dominated by relatively flat topography. The nearest body of surface r is the New River located 150 feet towards the east. Potable water for the base is supplied by a that taps the Castle Hayne aquifer located approximately 1.7 miles towards the northwest of this tion.

Regional Geology

coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits iocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie rock of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the MCAS area med et al., 1989). The geologic units in the area are divided into six formations: the Castle Hayne nation of the Eocene Series; the River Bend Formation of the Oligocene Series; the rade, Pungo River, and Eastover Formations of the Miocene Series; the Yorktown Formation of the cene Series; and undifferentiated units of the Quaternary Series. The Castle Hayne Formation is ed limestones and marls. The Castle Hayne Formation is overlain by the River Bend Formation.



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE
JACKSONVILLE SOUTH, N.C.
7.5 MINUTE SERIES
N3437.5–W7722.5/7.5
1971

SCALE 1:24,000

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SCALE FEET

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GROUNDWATER
TECHNOLOGY

B EXECUTIVE BLVD.
APEAKE, VA. 23320
304) 436-7881

DESIGNED: BH

DETAILED: PJC

CHECKED:

SITE LOCATION

CLIENT: LANTDIV NAVFAC

DRAWING DATE: 3/9/93

LOCATION: BUILDING AS–849
MCAS NEW RIVER, N.C.

FIGURE: 1

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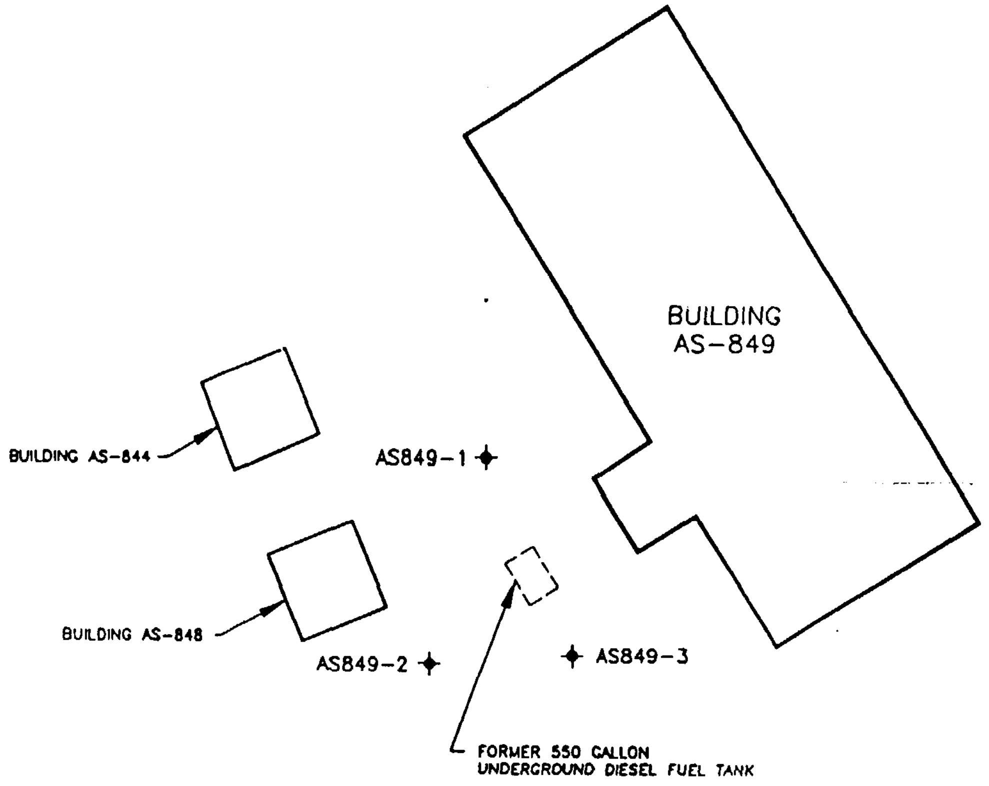

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SCALE

SOURCE: BOBBITT SURVE

GROUNDWA
TECHNOLO

REV. NO.:	DRAWING DATE: 3/30/93

SIT

CLIENT:
LANTDIV NAVF

LOCATION:
BUILDING
MCAS, NEW R

DESIGNED: BH	DETAILED: PJC

- Percentage Moisture by EPA CLP Method.

were disposed of accordingly, in compliance with contract, state, federal and local regulations. were transported with a waste manifest to a remediation facility located in Fayetteville, North na for treatment and disposal. Prior to transport, a completed material characterization form and of the composite soil sample analytical results was provided to the remediation contractor for tance of the soils.

the treatment facility, the soils are emptied from the drums onto a thick low-permeability soil floor a large, enclosed building. An inoculum of known hydrocarbon-digesting microbes is added to aterial and the pH is adjusted to approximately 7 to 8. A bulking agent such as chicken manure e added and the materials are agitated. Following a period of approximately 30 days of gradation, one composite soil sample is collected from each 50 tons of treated material to assess atment conducted and insure proper clean-up levels are achieved. Once cleanup levels are ed, the material is then used by the Cumberland County for road base, asphalt mix, fill material, ther appropriate uses. Upon completion of remediation, a certificate, with complete analytical data forwarded to the generator to remove this portion of responsibility.

, 1993, three 55-gallon drums of soil cuttings were removed from the site and transported to atment facility for recycling. A copy of the application for treatment of petroleum-contaminated d non-hazardous waste manifest is presented in Appendix E.

monitoring well development and groundwater sample collection, purge water was stored in lon drums on site. The purge water was treated using a portable carbon adsorption unit and rged on site.

chnical Summary

dwater Technology Government Services, Inc. has completed a three well site check at Building 9 located at the Marine Corps Air Station, New River, North Carolina. The site check was designed nply with NAVFAC contractual requirements.

the laboratory's reported method detection limits.

liquid-level measurements, the depth to groundwater ranges between approximately 3.5 and 4 hydraulic gradient across the site is 0.062 feet per foot towards the northeast. Liquid-phase L s were not measured or observed in monitoring wells AS849-1 through AS849-3 during the , 1993, well gauging event. Groundwater samples were collected from the monitoring wells and for aromatic purgeable hydrocarbons by modified EPA Method 602. Dissolved-phase bon concentrations in all of the groundwater samples collected were less than the laboratory's method detection limit.

GOVERNMENT SERVICES

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THREE WELL SITE CHECK REPORT
BUILDING AS-3000
MARINE CORPS AIR STATION, NEW RIVER, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.20

July 9, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

OUNDWATER TECHNOLOGY
VERNMENT SERVICES, INC.
pared by:

William L. Hughes
liam L. Hughes
d Geologist

Taylor Sword, C.P.G.
Manager/Remediation Specialist

8334
TAYLOR SWORD

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

A. SKOMSKY
37070-R

escription

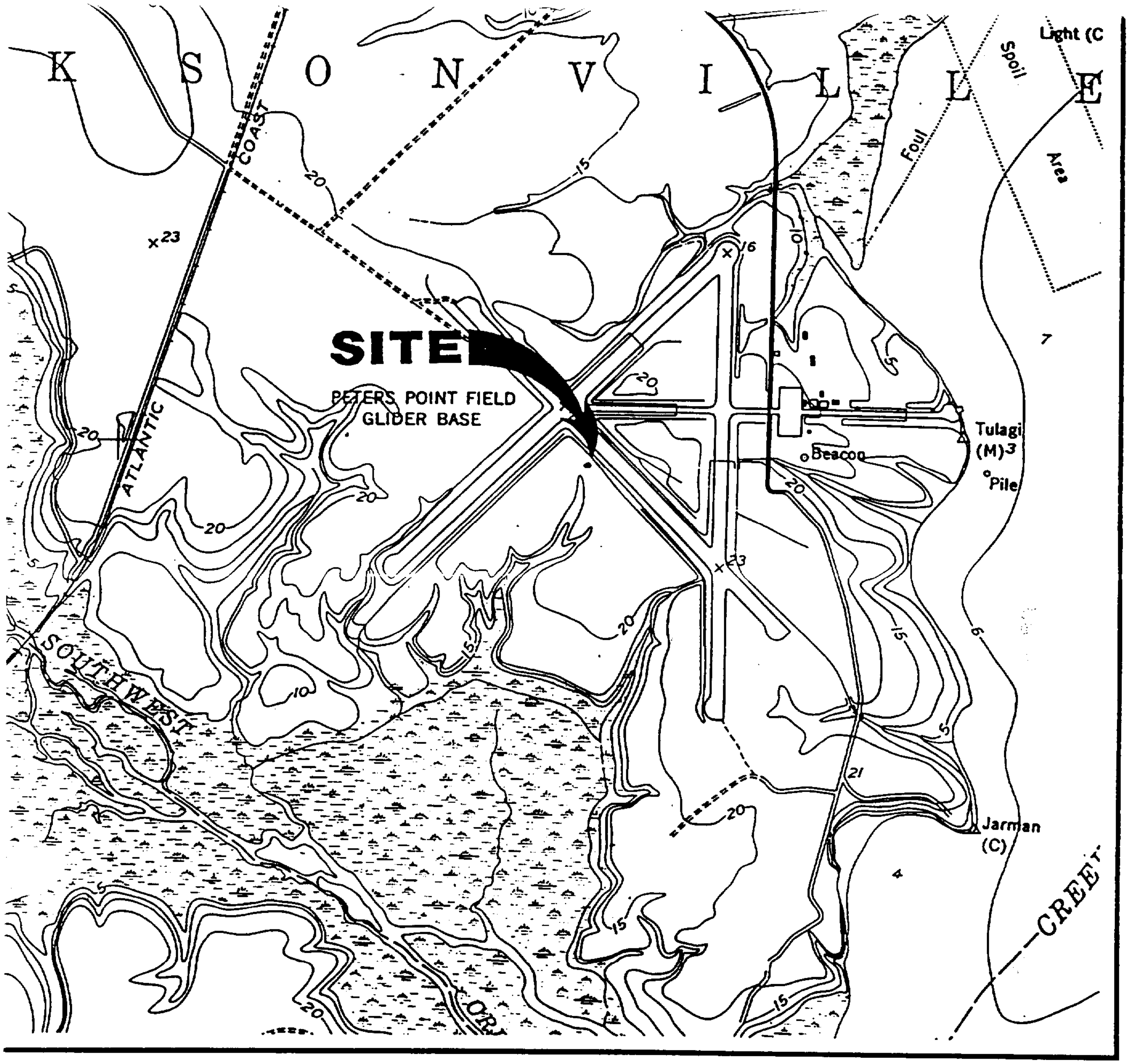
located in the central region of the Marine Corps Air Station, New River, North Carolina
site map (Figure 2) illustrates the location of the Building AS-3000, and the location of
o wells. According to past documents, one steel 550-gallon capacity underground storage
used to store diesel fuel was excavated and removed from the site on October 13, 1992.
ter Technology Government Services could not identify any information documenting the age
n of the UST when removed. According to the Tank Removal Report prepared for the site by
ntal and Regulatory Consultants, Inc. on October 29, 1992, soil samples were collected from
of the excavation and screened with a flame ionization detector (FID). Volatile organic vapor
ions in the soil samples screened with a FID ranged from 0 parts per million (ppm) to 37.0
soil samples were subsequently collected from the bottom of the excavation and analyzed for
ce of total petroleum hydrocarbons (TPH)-as-gasoline and TPH-as-diesel by U.S.
ntal Protection Agency (EPA) Methods 5030 and 3550, respectively. Analytical results from
emoval Report indicate that the soil sample collected at 2-feet below the north end of the UST
285 ppm TPH-as-gasoline and 3,400 ppm TPH-as-diesel. Adsorbed-phase hydrocarbon
tions in the soil sample collected at the same depth at the south end of the UST were below
tory's 10.0 ppm detection limit.

and Water Use

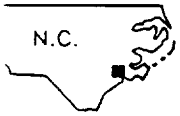
S-3000 is located approximately 3,500 feet west of the New River at the air field. The area
ly adjacent Building AS-3000 is comprised of aircraft taxiways and grassy fields. The site is
an area dominated by relatively flat topography. The nearest body of surface water is the
. Potable water for the base is supplied by wells located approximately 2 miles to the
that tap the Castle Hayne aquifer.

nal Geology

al plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits
e to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie
f Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the Camp
rea (Harned et al., 1989). The geologic units in the area are divided into six formations: the
ormation of the Eocene Series; the River Bend Formation of the Oligocene Series; the



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE
JACKSONVILLE SOUTH, N.C.
7.5 MINUTE SERIES
N3437.5–W7722.5/7.5
1971



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SCALE FEET

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ROUNDWATER
NOLOGY

CUTIVE BLVD.
VA. 23320
6–7881

DESIGNED:
BH

DETAILED:
PJC

CHECKED:

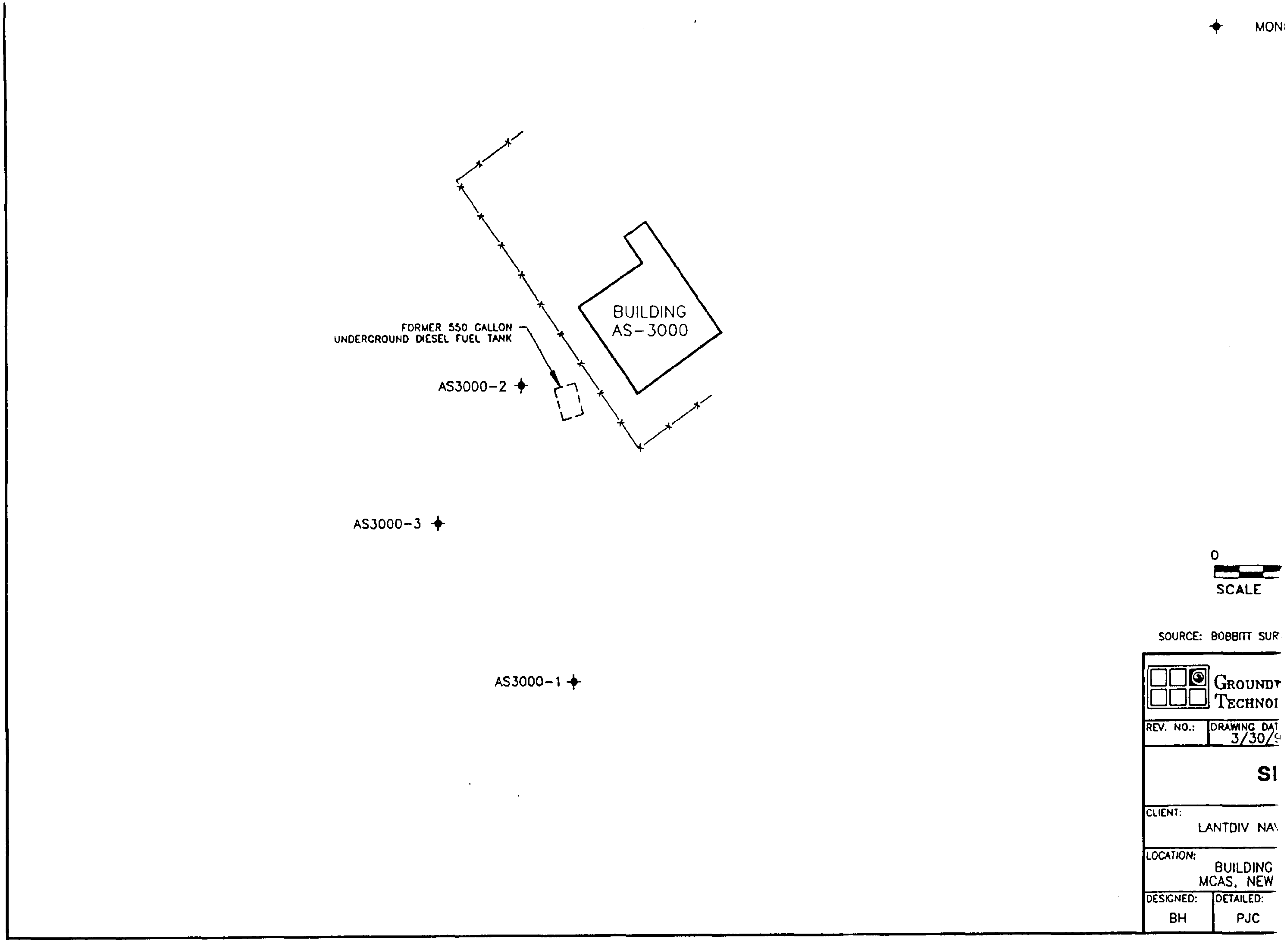
SITE LOCATION

CLIENT:
LANTDIV NAVFACENGCOM

DRAWING DATE:
3/11/93

LOCATION:
BUILDING AS–3000
MCAS, NEW RIVER, N.C.

FIGURE:
1



SOURCE: BOBBITT SUR

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REV. NO.:

DRAWING DAT
3/30/

SI

CLIENT:
LANTDIV NA

LOCATION:
BUILDING
MCAS, NEW

DESIGNED:
BH

DETAILED:
PJC

- Metals using the toxicity characteristic leaching procedure (TCLP) by EPA Methods 6010 and 7470;
- Extractable Organic Halides by EPA Method 9020; and
- Percentage Moisture by EPA CLP Method.

disposed of accordingly, in compliance with contract, state, federal and local regulations. On 1993, the drums were transported with a waste manifest to a remediation facility located in ville, North Carolina for treatment and disposal. A copy of the application for the treatment of m-contaminated soil and waste manifest are presented in Appendix E. Prior to transport, a ed material characterization form and copy of the composite soil sample analytical results was d to the remediation contractor for acceptance of the soils.

he treatment facility, the soils are emptied from the drums upon a thick low-permeability soil floor e, enclosed building. An inoculum of known hydrocarbon-digesting microbes is added to the and the pH is adjusted to approximately 7 to 8. A bulking agent such as chicken manure may d and the materials are agitated. Following a period of approximately 30 days of adation, one composite soil sample is collected from each 50 tons of treated material to assess tment conducted and ensure proper clean-up levels are achieved and cleanup levels are . Once cleanup levels are attained, the material is then used for road base, asphalt mixes, fill d other appropriate uses. Upon completion of remediation, a certificate, with complete data will be forwarded to the generator to remove this portion of responsibility.

monitoring well development and groundwater sample collection, purge water was stored in three n drums on site. The purge water will be treated using a portable carbon adsorption unit and ged on site. Final disposal of the water is pending.

hnical Summary

water Technology GSI has completed a three well site check for Building AS-3000 located at the Corps Air Station, New River, North Carolina. The site check was designed to comply with C contractual requirements.

orbed-phase hydrocarbon concentrations in all of the soil samples collected from the soil borings are than the laboratory's reported method detection limits.

ed on liquid-level measurements, the depth to groundwater is at approximately two feet. The raulic gradient across the site on March 23, 1993, was 0.014 feet per foot towards the east. uid-phase hydrocarbons were not measured or observed in monitoring wells AS3000-1 through 000-3 during the March 23, 1993 well gauging event. Groundwater samples were collected from the nitoring wells and analyzed for aromatic purgeable hydrocarbons by modified EPA Method 602. solved-phase hydrocarbon concentrations were less than the laboratory's reported method detection in all of the groundwater samples collected. Benzene, toluene, ethylbenzene and xylenes centrations in the groundwater samples are less than the State Water Quality Standards established he NCDEHNR.

GOVERNMENT SERVICES

Groundwater Technology Government Services, Inc.
1244 B Executive Boulevard, Suite 106, Chesapeake, VA 23320
Tel: (804) 436-7881 Fax: (804) 436-2312

THREE WELL SITE CHECK REPORT
BUILDING AS-3504
MARINE CORPS AIR STATION, NEW RIVER, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.26

July 23, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

UNDWATER TECHNOLOGY
ERNMENT SERVICES, INC.
ared by:

lliam L. Hughes
m L Hughes
Geologist

Taylor Sword
ylor Sword, C.P.G.
nager/Remediation Specialist

AMERICAN INSTITUTE OF PROFESSIONAL GEOLOGISTS
CERTIFICATE NUMBER 8334
P. TAYLOR SWORD
CERTIFIED PROFESSIONAL GEOLOGIST

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DON SKOMSKY
ENGINEER
37070-R

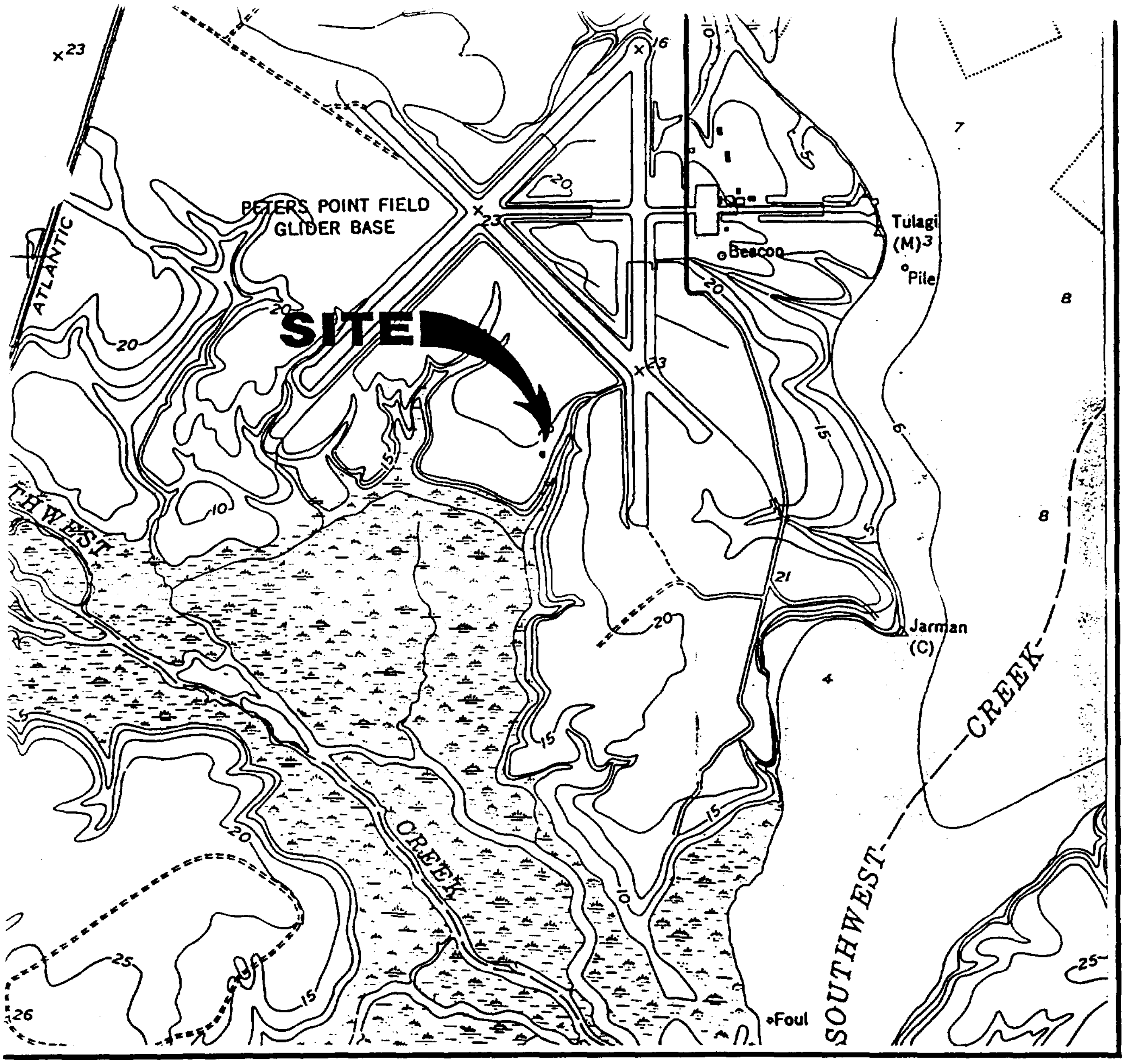
Site Description

site is located in the central region of the New River Marine Corps Air Station (Figure 1). The site p (Figure 2) illustrates the location of the Building AS-3504, and the location of the installed wells. el 2,000-gallon capacity underground storage tank (UST) used to store diesel fuel, located nediately to the east of Building AS-3504 was excavated and removed on August 19, 1992. litionally, during excavation activities at the site, one 550-gallon capacity UST, located at the theast corner of a tin storage building east of Building AS-3504, two 2,500-gallon capacity USTs, ated toward the west of Building AS-3504, and a second 550-gallon capacity UST, located to the east Building AS-3538, all used to store diesel fuel, were excavated and removed. GSI could not identify information documenting the age or condition of the USTs when removed. This scope of work is to orm a site check only at the 2,000-gallon capacity UST excavation area located to the east of ding AS-3504.

ording to the Tank Removal Closure Report prepared for the site by Environmental and Regulatory isultants, Inc. on September 29, 1992, two soil samples were collected from the excavation located iediately to the east of Building AS-3504 for laboratory analysis during excavation activities. The iples were analyzed for the presence of total petroleum hydrocarbons (TPH)-as-diesel and TPH-as-oline by U.S. Environmental Protection Agency (EPA) Methods 3550 and 5030, respectively. al results from the Tank Removal Closure Report indicate that TPH-as-gasoline concentrations e less than the laboratory's reported 10 parts per million (ppm) detection limit. The TPH-as-diesel centrations were 206 ppm and 32.5 ppm. There is no information on the soil sample locations.

Land and Water Use

ding AS-3504 is located approximately 3,400 feet west of the New River at the air field. The area ediately adjacent Building AS-3504 is comprised of buildings that house the support facilities for the eld and plane taxiways. The site is situated in an area dominated by relatively flat topography. The est body of surface water is the New River. Potable water for the base is supplied by wells located oximately two miles towards the northwest that tap the Castle Hayne aquifer.



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE
JACKSONVILLE SOUTH, N.C.
7.5 MINUTE SERIES
N3437.5-W7722.5/7.5
1971

SCALE 1:24,000

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SCALE FEET

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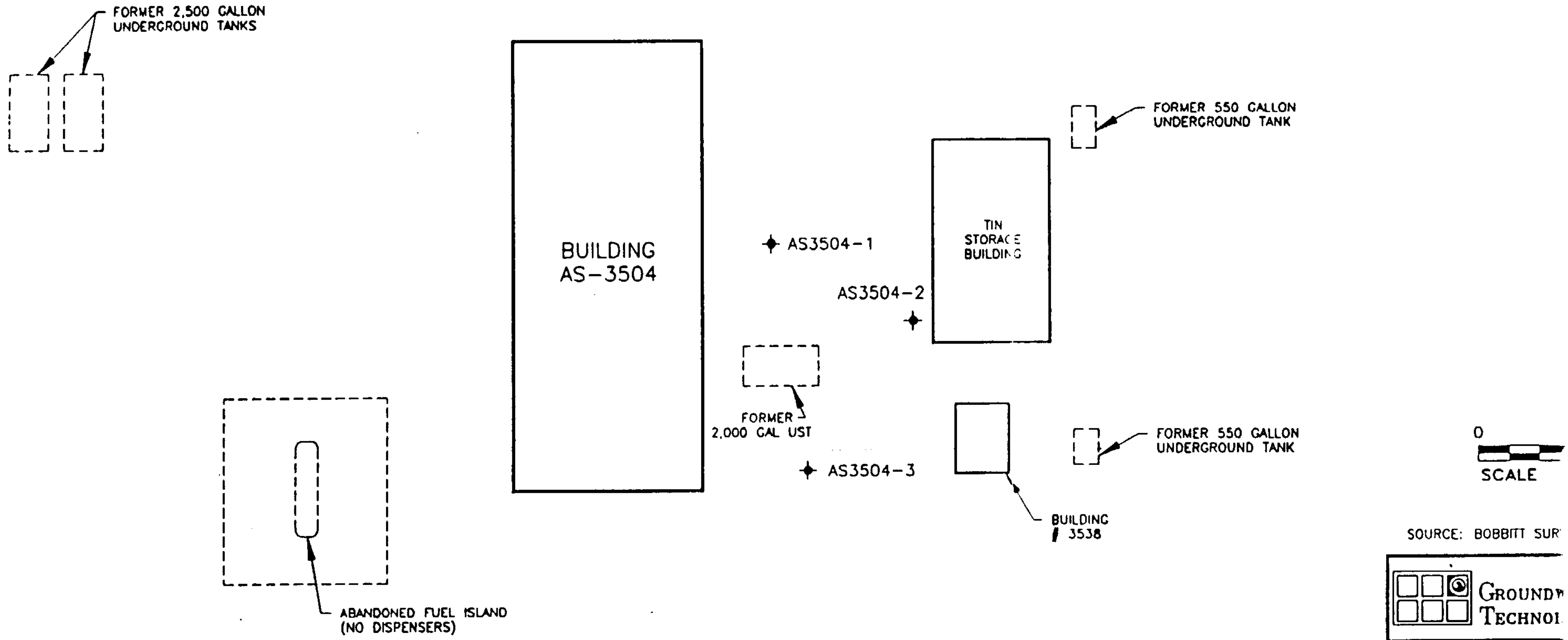
OUNDWATER NOLOGY UTIVE BLVD. VA. 23320 6-7881	DESIGNED: BH	**SITE LOCATION**	
	DETAILED: PJC	CLIENT: LANTDIV NAVFACENGCOM	DRAWING DATE: 3/15/93
	CHECKED:	LOCATION: BUILDING AS-3504 MCAS, NEW RIVER, N.C.	FIGURE: **1**



SOURCE: BOBBITT SUR

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REV. NO.:	DRAWING DAT
	3/30/9

SI

CLIENT:
LANTDIV NAV

LOCATION:
BUILDING
MCAS, NEW

DESIGNED:	DETAILED:
BH	PJC

ater Technology GSI has completed a three well site check for Building AS-3504 located at the orps Air Station, New River, North Carolina. The site check was designed to comply with contractual requirements.

il borings/monitoring wells were drilled and installed at the site on March 23 and 24, 1993. he area are characterized as clay and fine-grained sand. Analytical results indicate that d-phase hydrocarbon concentrations in all of the soil samples collected from the soil borings are the laboratory's reported method detection limits.

n liquid-level measurements, the depth to groundwater is at approximately 4 to 5 feet. The gradient across the site on March 24, 1993, was 0.001 feet per foot towards the south- t. Liquid-phase hydrocarbons were not measured or observed in monitoring wells AS3504-1 AS3504-3 during the March 24, 1993 well gauging event. Groundwater samples were collected monitoring wells and analyzed for aromatic purgeable hydrocarbons by modified EPA Method solved-phase hydrocarbon concentrations were less than the laboratory's reported method limit in all of the groundwater samples collected, with the exception of the sample collected nitoring well AS3504-1. Benzene, toluene, ethylbenzene and xylenes concentrations in the ater samples are less than the State Water Quality Standards established by the NCDEHR.

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Tel: (804) 436-7881 Fax: (804) 436-2312

THREE WELL SITE CHECK REPORT
BUILDING AS-4158
MARINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.09

May 26, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

OUNDWATER TECHNOLOGY
VERNMENT SERVICES, INC.
epared by:

William L. Hughes
lliam L. Hughes
ad Geologist

Taylor Sword, C.P.G.
oject Manager/Remediation Specialist

3334

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

DON A. SKOMSKY
37070-R

Don Skomsky, P.E.
Operations Manager

Offices throughout the U.S., Canada and Overseas

Description

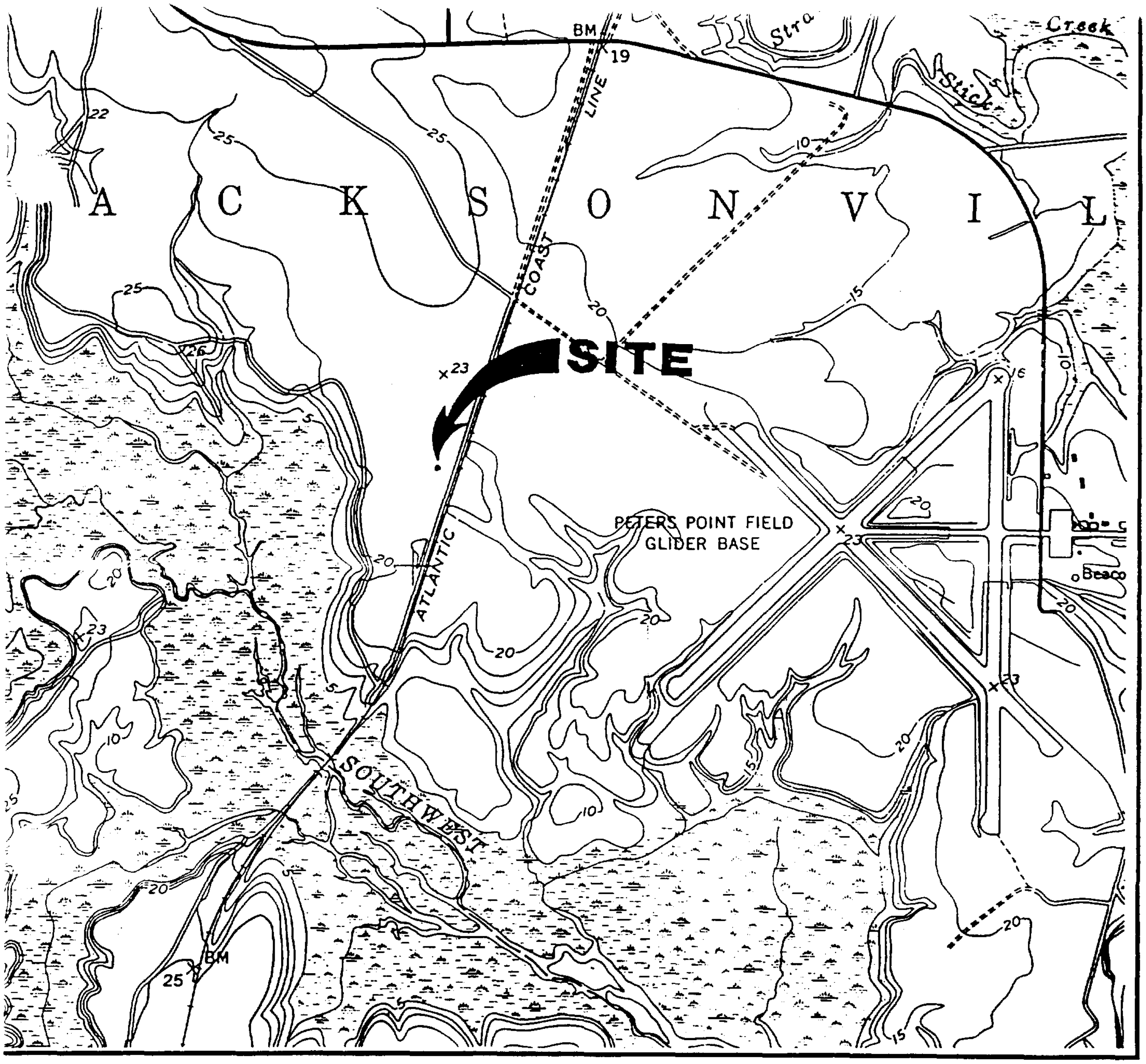
is located in the central region of the Marine Corps Air Station (MCAS), New River, North Figure 1). The site map (Figure 2) illustrates the location of the installed wells near Building 3. According to documents provided, one steel 3,000-gallon capacity gasoline UST and two steel allon capacity diesel underground storage tanks (USTs) were excavated and removed on August 2. GSI could not identify information documenting the age or condition of the USTs when d. Three new 4,000-gallon capacity USTs for the storage of gasoline and diesel fuel were d in the excavation. According to the Closure Report prepared for the site by Environmental & tory Consultants, Inc. (ERC) on September 15, 1992, no soil samples were collected for ory analysis during excavation activities. From the ERC report, soil samples that were collected e bottom of the excavation and screened with a flame ionization detector (FID) did not indicate sence of aromatic petroleum hydrocarbons. A water sample was collected from the water ing into the excavation. According to the ERC report, the water sample was not submitted for s because of the presence of liquid-phase hydrocarbons on the surface of the sample.

nd and Water Use

S-4158 is located approximately 800 feet towards the east of the Southwest Creek on the west f the MCAS air field. The area immediately adjacent Building AS-4158 is comprised of buildings ouse the maintenance and other support facilities for the Base. The site is situated in an area ated by relatively flat topography. The nearest body of surface water is the New River located et towards the west. Potable water for the base is supplied by a well field that tap the Castle e aquifer located approximately one mile north of this location.

egional Geology

oastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits ocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie ock of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the MCAS area ed et al., 1989). The geologic units in the area are divided into six formations: the Castle Hayne ation of the Eocene Series; the River Bend Formation of the Oligocene Series; the



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE
JACKSONVILLE SOUTH, N.C.
7.5 MINUTE SERIES
N3437.5–W7722.5/7.5
1971

SCALE 1:24,000

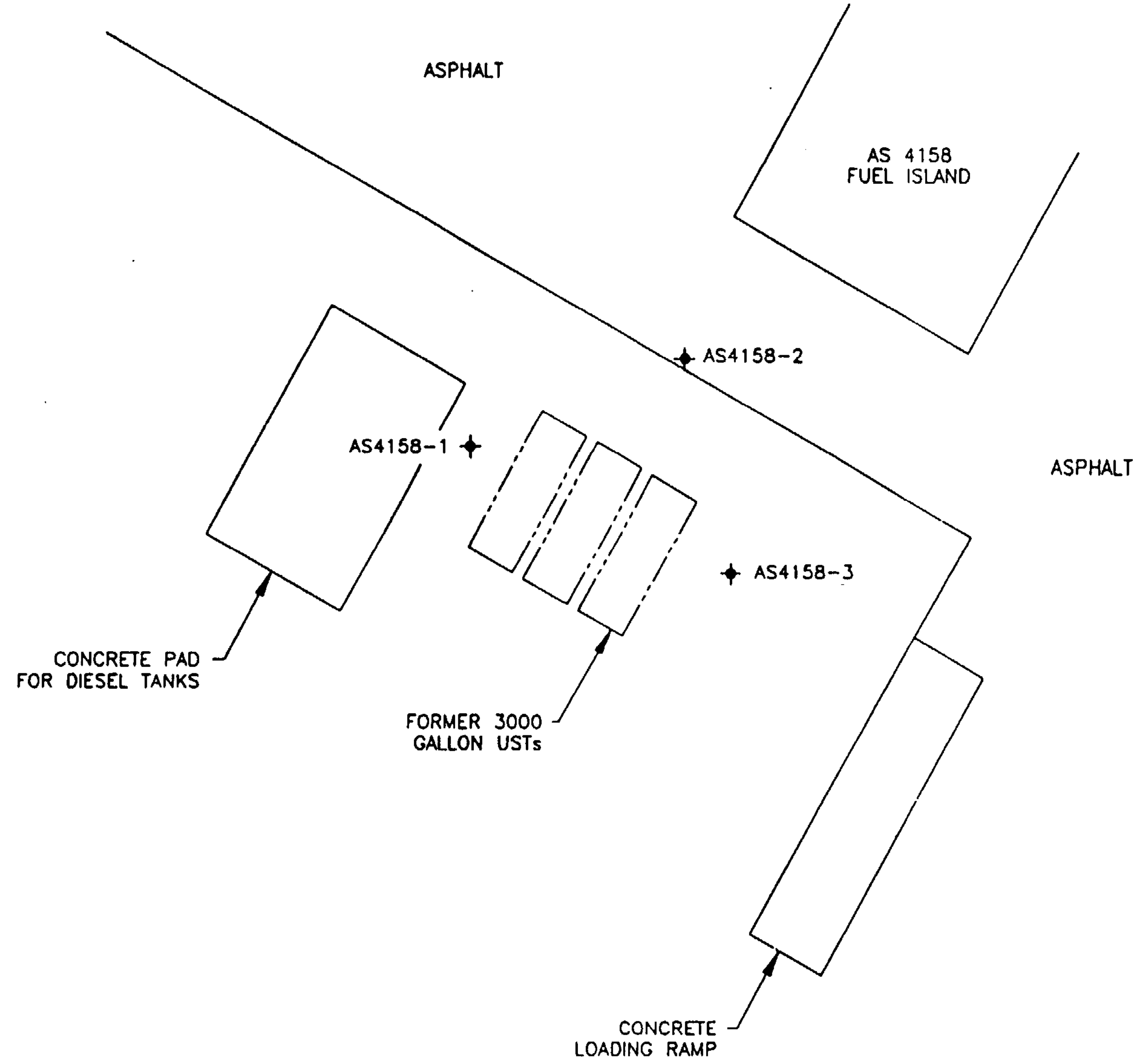
0 2,000 4,000

SCALE FEET

GROUNDWATER
TECHNOLOGY

EXECUTIVE BLVD.
EAKE, VA. 23320
4) 436-7881

DESIGNED: BH	**SITE LOCATION**
DETAILED: PJC	CLIENT: LANTDIV NAVFACENGCOM
	DRAWING DATE: 3/11/93
CHECKED:	LOCATION: BUILDING AS–4158
	FIGURE: 1



SOURCE: BOB

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LOCATION:
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MCAS

DESIGNED: DET
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58 located at the Marine Corps Air Station, New River, North Carolina. The site check was ned to comply with NAVFAC contractual requirements.

borings/monitoring wells were drilled and installed at the site on March 23, 24 and 29, 1993. in the area are characterized as silty fine-grained sand. Analytical results indicate that adsorbed-e hydrocarbon concentrations in all of the soil samples collected from the soil borings are less than boratory's reported method detection limits with the exception of 88 ppm TPH-as-diesel detected in oil sample collected at 3.5 to 5 feet in monitoring well AS4158-2.

d on liquid-level measurements, the depth to groundwater is at approximately 4 to 7 feet. The ulic gradient across the site on March 29, 1993, was 0.037 feet per foot towards the east-northeast. d-phase hydrocarbons were not measured or observed in monitoring wells AS4158-1 through 58-3 during the March 29, 1993 well gauging event. Groundwater samples were collected from the toring wells and analyzed for aromatic purgeable hydrocarbons by EPA Method 602. Dissolved-e hydrocarbon concentrations were detected in all of the groundwater samples collected. Benzene entrations in the groundwater samples are greater than the State Water Quality Standards lished by the NCDEHR. The ethylbenzene concentration in the groundwater sample collected from toring well AS4158-2 was greater than the State Water Quality Standards.

GOVERNMENT SERVICES

Groundwater Technology Government Services, Inc.
1244 B Executive Boulevard, Suite 106, Chesapeake, VA 23320
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THREE WELL SITE CHECK REPORT
BUILDING BB-71
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB No. 830011088.27

September 23, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6299

UNDWATER TECHNOLOGY
ERNMENT SERVICES, INC.
ared by:

illiam L. Hughes
m L. Hughes
Geologist

illiam L. Hughes for
ylor Sword, C.P.G.
nager/Remediation Specialist

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

SKOMSKY

Don Skomsky, P.E.
Operations Manager

scription

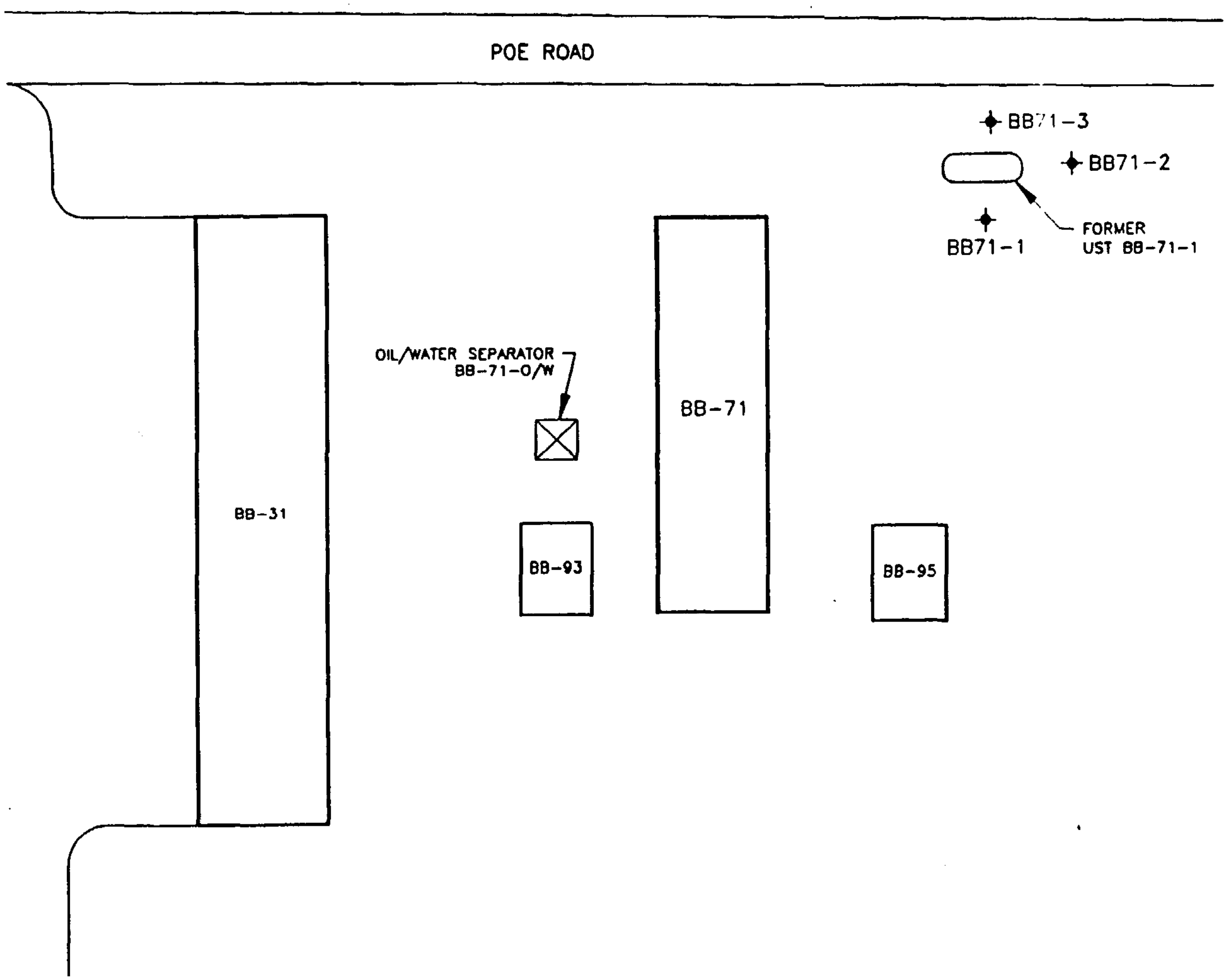
located in the southern region of the Marine Corps Base, Camp Lejeune, North Carolina site map (Figure 2) illustrates the location of the installed wells near Building BB-71. B-71 serves as an equipment storage facility at the base. According to past documents, one allon capacity underground storage tank (UST) used to store waste oil adjacent to the as excavated and removed in December 1992. GSI could not identify any information ng the age or condition of the UST when removed. According to the Site Check Request pleted by the Point-of-Contact for the site on January 14, 1993, one soil sample was collected avation activities and was analyzed for the presence of oil and grease by soxhlet extraction. results indicated that the sample contained 1,696 parts per million (ppm) oil and grease.

and Water Use

B-71 is located in the Courthouse Bay area of the Marine Corps Base. The area immediately Building BB-71 *is comprised of buildings that house maintenance and other support facilities for* . The site is situated in an area dominated by relatively flat topography. The nearest body of ater is the New River located approximately 2,000 feet towards the south. Potable water for pplied by wells located approximately 1,000 feet towards the west-northwest that tap the yne aquifer.

nal Geology

tal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits ne to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie of Pre-Cretaceous age, thicken and dip eastward with thicknesses ranging from 1,500 feet in the ,000 feet in the east. The geologic units in the area are divided into six formations: the Castle ormation of the Eocene series; the River Bend Formation of the Oligocene Series; the Pungo he Miocene Series; the Yorktown Formation of the Pliocene series; and the James City and Beach Formations of the Pleistocene series. The Castle Hayne Formation is composed es and marls. The Castle Hayne Formation is overlain by the River Bend Formation. The Pungo rmation is composed of interbedded phosphatic sands silts and clays, diatomaceous clays,



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REV. NO.:	DRAWING DATE 3/23/9

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CLIENT:
LANTDIV NAV

LOCATION:
UST-BB
CAMP LEJEUNE MARIN

DESIGNED: BH	DETAILED: PJC

water Technology Government Services, Inc. has completed a three-well site check at Building located at the Marine Corps Base, Camp Lejeune, North Carolina. The site check was designed ply with NAVFAC contractual requirements.

orings/monitoring wells were drilled and installed at the site on April 6, 1993. Soils in the e characterized as fine-grained sand and silt. Analytical results indicate that adsorbed-phase arbon concentrations by GC/FID in all of the soil samples collected from the soil borings are less e laboratory's reported method detection limits. The soil sample collected at 3.5 to 5 feet below in monitoring well BB71-2 contained 100 ppm total oil and grease.

on liquid-level measurements, the depth to groundwater ranges between approximately 3 feet. Liquid-phase hydrocarbons were not measured or observed in monitoring wells 1 through BB71-3 during the April 7, 1993 well gauging event. The hydraulic gradient across the April 7, 1993, was 0.009 feet per foot towards the southwest. Groundwater samples were ed from the monitoring wells and analyzed for purgeable aromatic hydrocarbons by modified EPA d 602. Dissolved-phase hydrocarbon concentrations in all of the groundwater samples collected ss than the laboratory's reported method detection limit.

GOVERNMENT SERVICES

Groundwater Technology Government Services
1244 B Executive Boulevard, Suite 106, Chesapeake, VA 2
Tel: (804) 436-7881 Fax: (804) 436-

THREE WELL SITE CHECK REPORT
BUILDING BB-177
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB No. 830011088.41

October 14, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6299

GROUNDWATER TECHNOLOGY GOVERNMENT SERVICES, INC.
Prepared by:

William L. Hughes

William L. Hughes
Lead Geologist

P. Taylor Sword, C.P.G.
Project Manager/Remediation Specialist

AMERICAN INSTITUTE OF PROFESSIONAL GEOLOGISTS
CERTIFICATE NUMBER 8334

GROUNDWATER TECHNOLOGY GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

Site Description

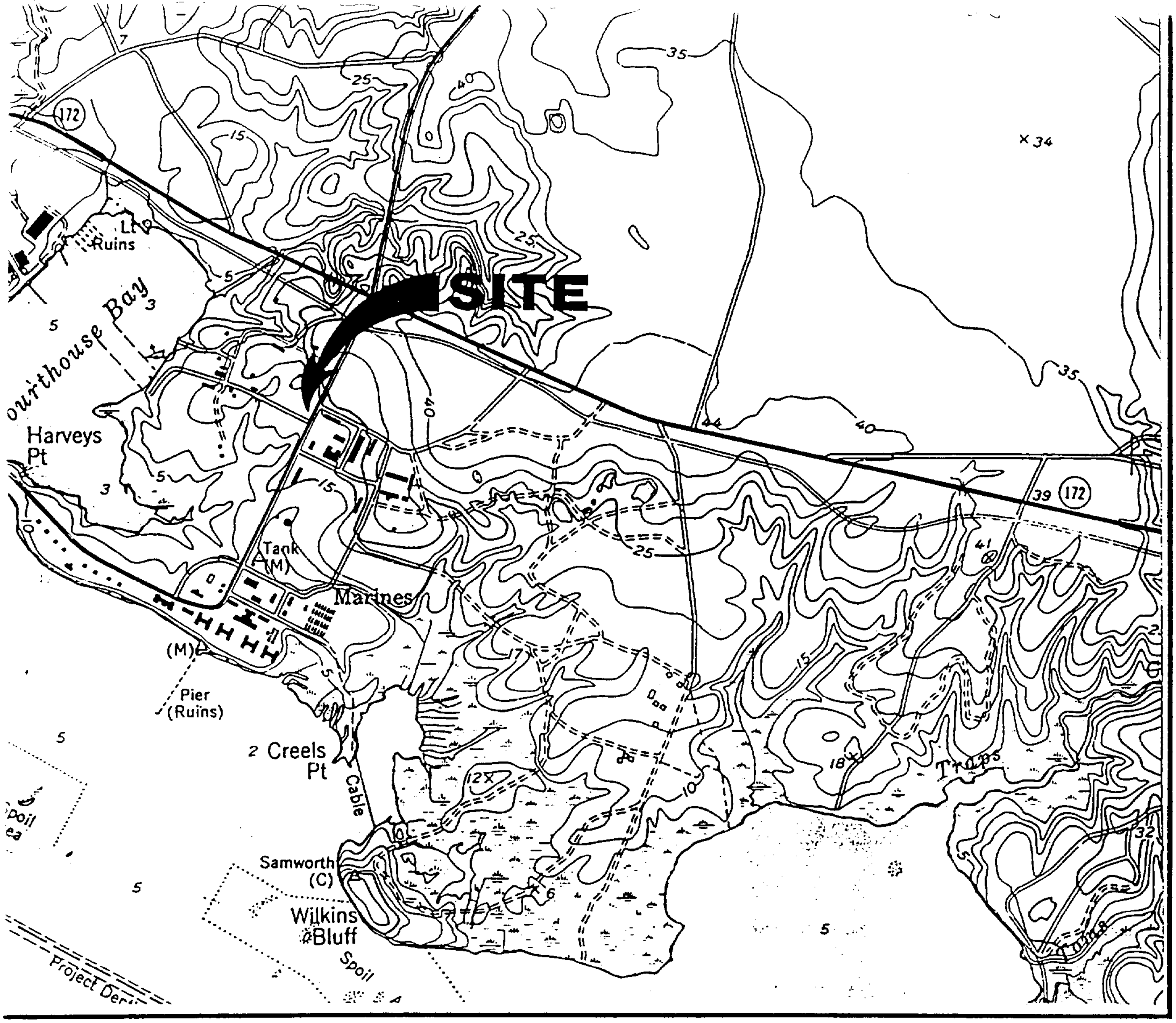
site is located in the southern region of the Marine Corps Base, Camp Lejeune, North Carolina ure 1). The site map (Figure 2) illustrates the location of the installed wells near Building 1 Building BB-177 serves as a retail fueling station at the base. According to past documents, in y 1993 three steel 6,000-gallon capacity underground storage tanks (USTs) used to store gasoline, ted adjacent to the building, were excavated and removed. According to a memorandum dated ruary 23, 1993 from the Resident Officer in Charge of Construction to the Assistant Chief of Staff of Environmental Management Division, a film of fuel was observed on the surface of residual water in the excavation after the tanks were removed. Groundwater Technology Government Services, was not provided any information documenting the age or condition of the USTs when removed.

Land and Water Use

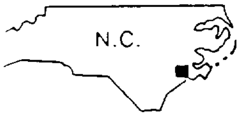
ding BB-177 is located in the Courthouse Bay area of the Marine Corps Base. The area immediately cent Building BB-177 is comprised of Marine Corps barracks and other support facilities for the e. The site is situated in an area dominated by relatively flat topography. The nearest body of ace water is the New River located approximately 2,000 feet towards the south. Potable water for base is supplied by wells located approximately 1,000 feet towards the west-northwest that tap the the Hayne aquifer.

Regional Geology

coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits iocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie rock of Pre-Cretaceous age, thicken and dip eastward with thicknesses ranging from 1,500 feet in the t to 6,000 feet in the east. The geologic units in the area are divided into six formations: the Castle ne Formation of the Eocene series; the River Bend Formation of the Oligocene Series; the Pungo er of the Miocene Series; the Yorktown Formation of the Pliocene series; and the James City and ner Beach Formations of the Pleistocene series. The Castle Hayne Formation is composed stones and marls. The Castle Hayne Formation is overlain by the River Bend Formation. The Pungo er Formation is composed of interbedded phosphatic sands silts and clays, diatomaceous clays,



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE
NEW RIVER INLET, N.C.
7.5 MINUTE SERIES
34077–E3–TF–024
1971



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GROUNDWATER
TECHNOLOGY

EXECUTIVE BLVD.
EAKE, VA. 23320
) 436-7881

DESIGNED:
BH

DETAILED:
PJC

CHECKED:

SITE LOCATION

CLIENT:
LANTDIV NAVFACENGCOM

DRAWING DATE:
6/23/93

LOCATION:
BUILDING BB–177
MARINE CORPS BASE, CAMP LEJEUNE, N.C.

FIGURE:
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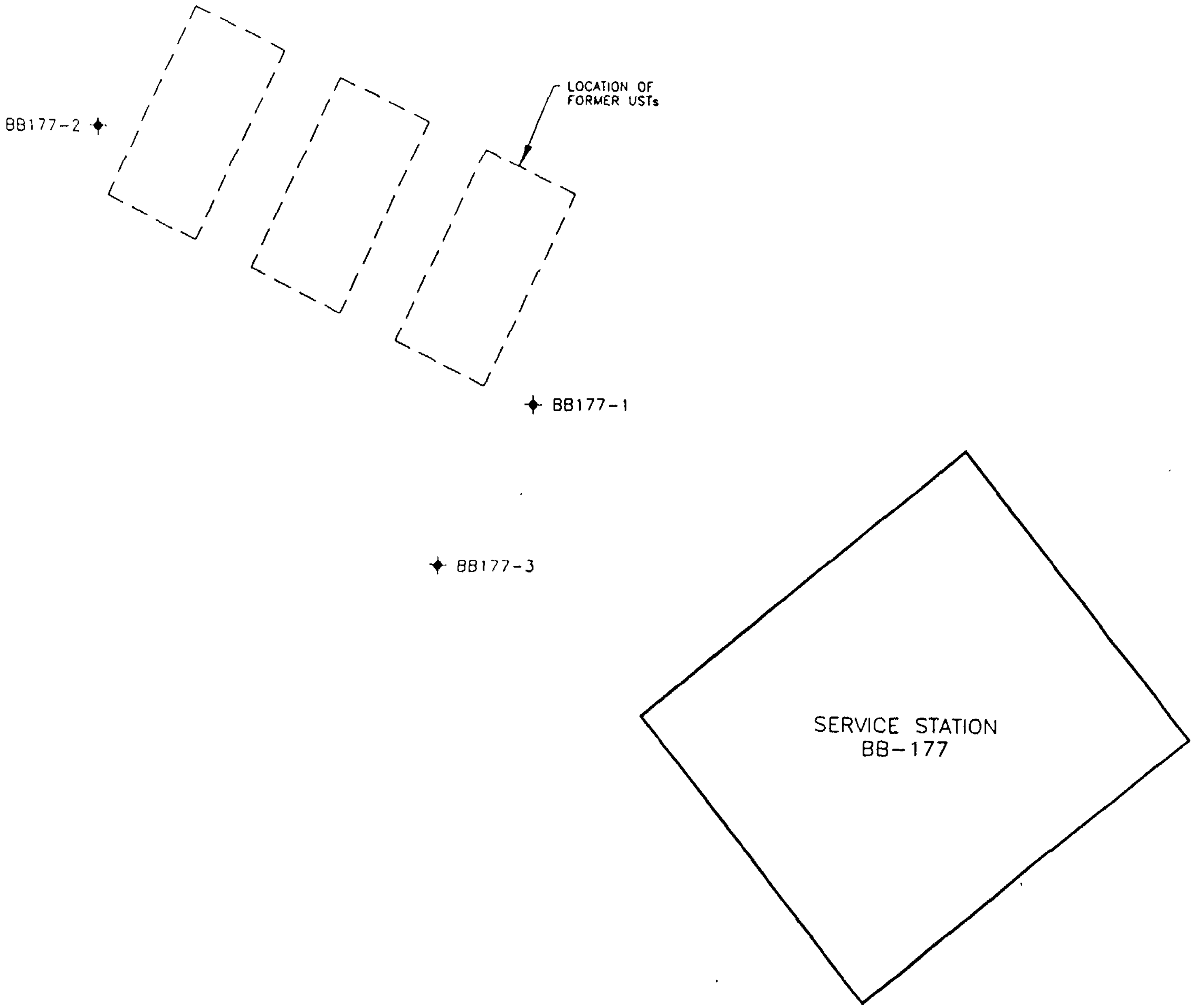

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SOURCE: BOBBITT SURVEY

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LANTDIV NAVFA

LOCATION:
BUILDING B
MARINE CORPS BASE, C

DESIGNED:	DETAILED
BH	PJC

um-grain quartz sand (Murray and Keoughan, 1989). The basal unit consists of contiguous clays. James City Formation unconformably overlies the Yorktown Formation. The James City Formation ists primarily of unconsolidated calcareous sandy clays and argillaceous sands (Hoffman and Ward, e Flanner Beach Formation, which immediately underlies the site, overlies the James City ation. The Flanner Beach Formation is composed of fine, well-sorted sand to silty sand.

egional Hydrogeology

e eastern part of the North Carolina coastal plain, groundwater is obtained from an unconfined ial aquifer and the confined Yorktown and Castle Hayne aquifers. The depth to groundwater ally ranges from three to twelve feet below the surface.

urficial unconfined aquifer consists of sediments of the Flanner Beach Formation. The surficial er is underlain by a confining unit of the James City Formation. The Yorktown aquifer underlies this ning layer at approximately 50-feet below mean sea level (Murray and Keoughan, 1989). A ning layer is created by the upper clay and sandy silt beds of the Pungo River Formation separates orktown and underlying Castle Hayne aquifer. The general groundwater flow is in the direction of hydraulic head to discharge areas like the New River and its tributaries or the ocean. The regional ater flow direction is typically towards the south.

ased on the results of this site check, Groundwater Technology Government Services, Inc. suggests e following actions be considered at Building BB-177.

- Perform a review of the available documentation to determine if the soil excavated during the UST removal activities was removed from the site and disposed or used as backfill in the excavation.
- Perform an environmental site assessment to evaluate the horizontal and vertical distribution of adsorbed- and dissolved-phase hydrocarbons at the site.

GOVERNMENT SERVICES

Groundwater Technology Government Services, Inc.
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Tel: (804) 436-7881 Fax: (804) 436-2312

THREE WELL SITE CHECK REPORT
BUILDING FC-102
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.10

July 16, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

ROUNDWATER TECHNOLOGY
OVERNMENT SERVICES, INC.
epared by:

William L. Hughes
illiam L. Hughes
ad Geologist

Taylor Sword, C.P.G.
oject Manager/Remediation Specialist

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

DON A. SKOMSKY
37070-R

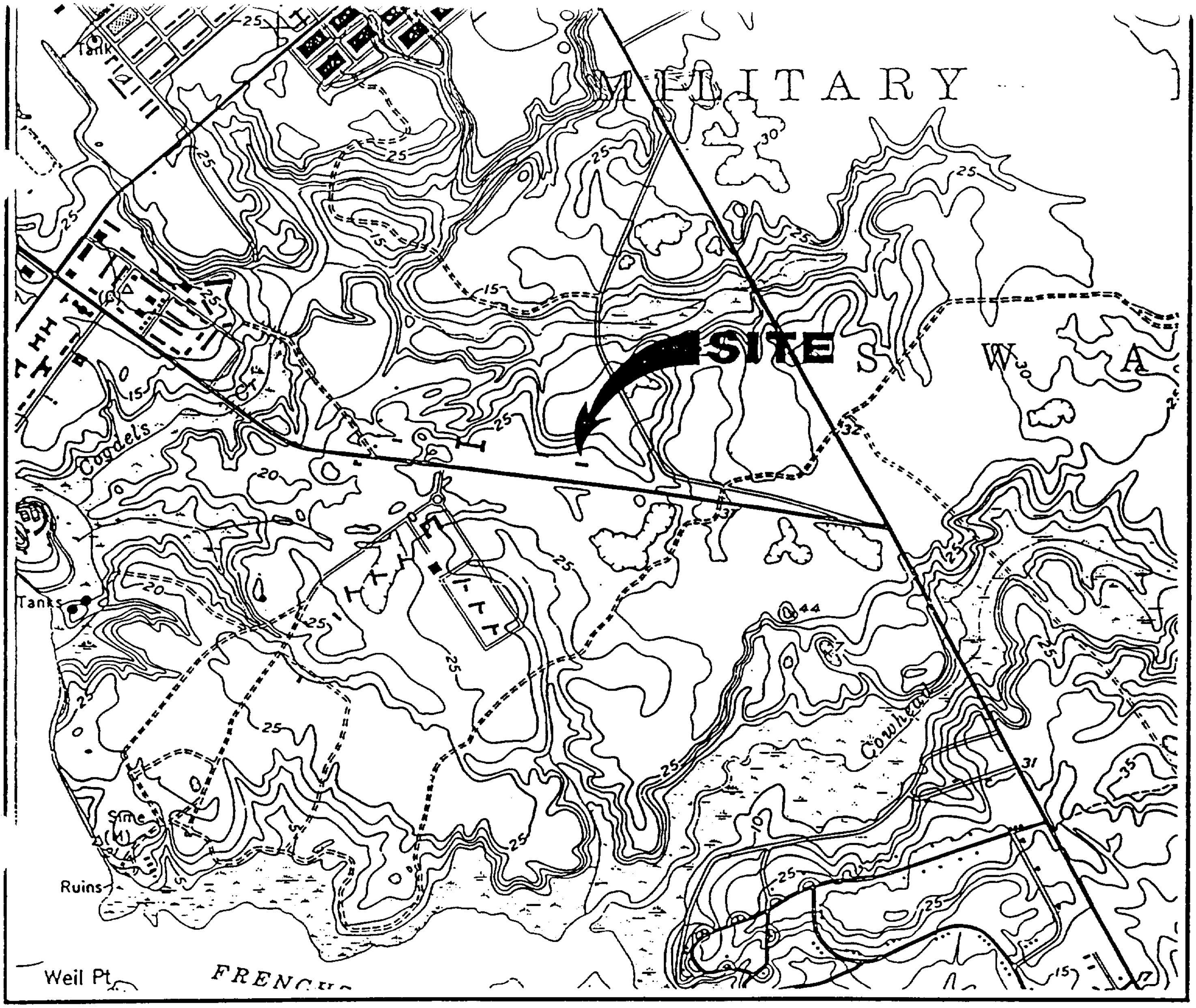
site is located in the southern region of the Marine Corps Base, Camp Lejeune, North Carolina
re 1). The site map (Figure 2) illustrates the location of the installed wells near Building FC-102.
to past documents, one steel 1,000-gallon capacity underground storage tank (UST) used to
waste oil was excavated and removed on June 29, 1992. There is no information documenting the
or condition of the UST when it was removed. According to the Closure Report prepared for the
y Environmental Regulatory Consultants, Inc. on September 15, 1992, two soil samples were
cted for laboratory analysis during excavation activities. The samples were analyzed for the
ence of total petroleum hydrocarbons (TPH)-as-fuel oil and TPH-as-oil and grease by U.S.
onmental Protection Agency (EPA) Method 3550 and Method 9071, respectively. Analytical results
the Closure Report indicate that TPH-as-fuel oil concentrations were less than the laboratory's 10
per million (ppm) method detection limit. The soil sample collected from the south end of the
vation contained 374.0 ppm TPH-as-oil and grease. The TPH-as-oil and grease concentration in
oil sample collected from the north end of the excavation was less than the laboratory's 10.0 ppm
od detection limit.

and and Water Use

C-102 is located approximately 6,000 feet east of the New River near the Force Troops
plex. The area immediately adjacent Building FC-102 is comprised of woodlands. The site is
ted in an area dominated by relatively flat topography. The nearest body of surface water is the
River. Potable water for the base is supplied by wells located approximately three miles towards
orth that tap the Castle Hayne aquifer.

egional Geology

coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits
iocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie
ock of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the Camp
ne area (Harned et al., 1989). The geologic units in the area are divided into six formations: the
le Hayne Formation of the Eocene Series; the River Bend Formation of the Oligocene Series; the
rade, Pungo River, and Eastover Formations of the Miocene Series; the Yorktown Formation of the



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE
CAMP LEJEUNE, N.C.
7.5 MINUTE SERIES
34077-F3-TF-024
1971

SCALE 1:24,000

0 2,000 4,000

SCALE FEET

N

GROUNDWATER TECHNOLOGY

44-B EXECUTIVE BLVD.
CHESAPEAKE, VA 23320
(804) 436-7881

DESIGNED: BH

DETAILED: PJC

CHECKED:

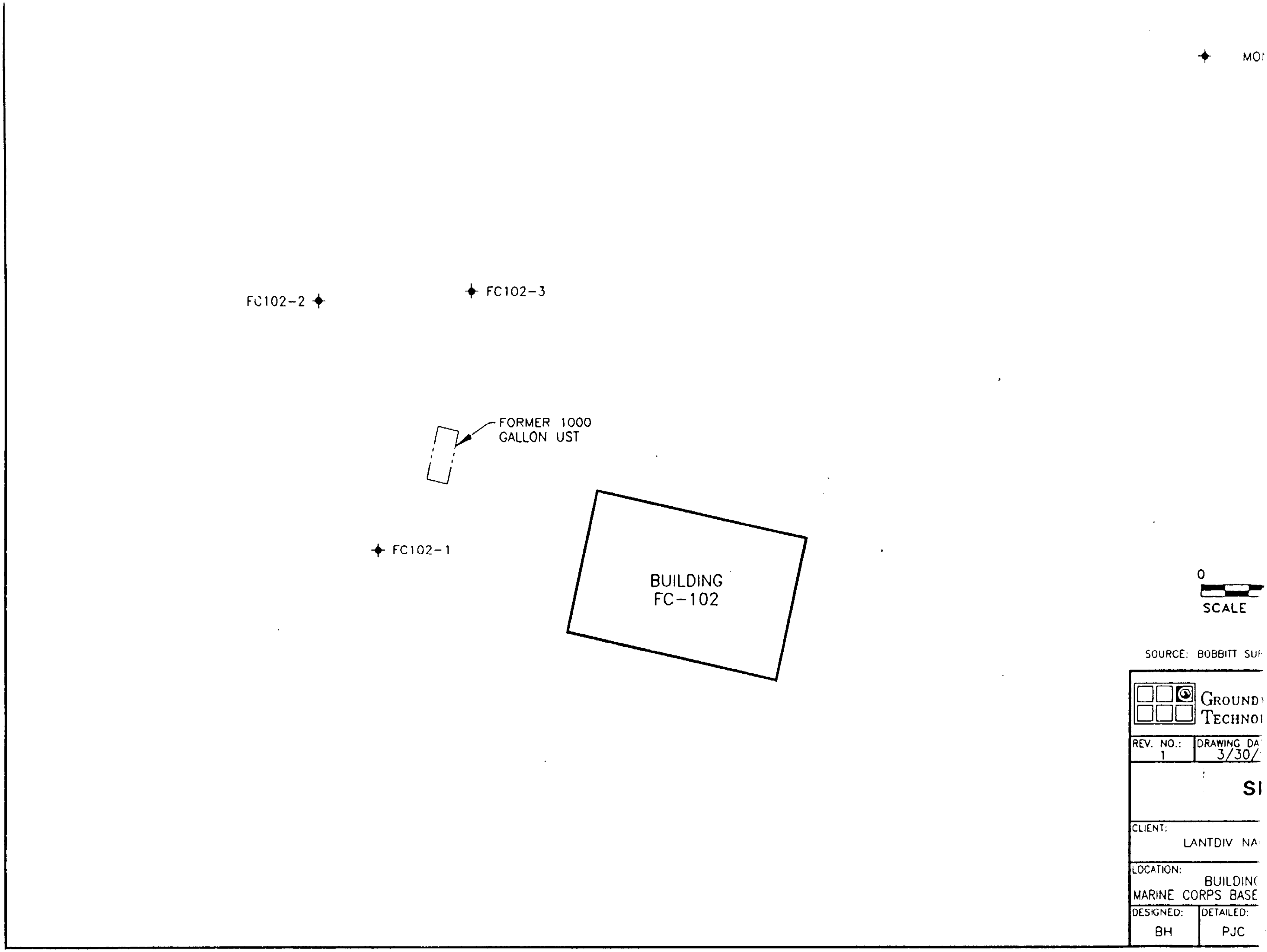
SITE LOCATION

CLIENT: LANTDIV NAVFACENGCOM

DRAWING DA 3/15/9

LOCATION: BUILDING FC-120
MARINE CORPS BASE, CAMP LEJEUNE, N.C.

FIGURE: 1



SOURCE: BOBBITT SU

GROUND
TECHNO

REV. NO.: 1

DRAWING DA 3/30/

SI

CLIENT:
LANTDIV NA

LOCATION:
BUILDIN
MARINE CORPS BASE

DESIGNED: BH

DETAILED: PJC

and clays, diatomaceous clays, phosphatic and nonphosphatic limestones and silty claystones ffman and Ward, 1989). The Yorktown Formation is defined as a medium- to coarse-grained, poorly ted, shelly sand (Blackwelder and Ward, 1980). In the Camp Lejeune area, the Yorktown Formation acterized by fine- to medium-grain quartz sand (Murray and Keoughan, 1989). The basal unit nsists of contiguous clays. The James City Formation unconformably overlies the Yorktown mation. The James City Formation consists primarily of unconsolidated calcareous sandy clays and illaceous sands (Hoffman and Ward, 1982). The undifferentiated units, which immediately underlies site, are composed of fine, well-sorted sand to silty sand.

Regional Hydrogeology

he eastern part of the North Carolina coastal plain, groundwater is obtained from an unconfined ficial aquifer and the confined Yorktown and Castle Hayne aquifers. The depth to groundwater ically ranges from 3 to 12 feet below the surface.

surficial unconfined aquifer extends to depths ranging from 50 to 100 feet. This unit is not used as ource of water on the base. The Castle Hayne aquifer, the principle source of water for the base, nsists of a series of sand and limestone beds (Harned et al., 1989), is 150 to 350 feet thick and is n 50 and 300 feet below the surface. Aquifers below the Castle Hayne consist of a thick sand d clay sequence and contain saltwater in the Camp Lejeune area. The general groundwater flow is in direction of lower hydraulic head to discharge areas like the New River and its tributaries or the ean.

ed on the results of this site check, Groundwater Technology GSI suggests the following additional actions at site:

- Review the UST removal documentation to determine if the excavated soil was removed from the site and disposed or used as backfill in the excavation. If the excavated soils were used as backfill material, the soils that had originally surrounded the UST would have the greatest potential for containing adsorbed-phase hydrocarbons. It is suggested that one shallow soil boring be installed within the former UST excavation to evaluate the soil. Two soil samples should be collected and analyzed for the presence of TPH by EPA Method 413.1 and lead, barium, arsenic, cadmium, chromium, silver, mercury and selenium by Standard Method 3030C. This data could be used to determine if any potentially released hydrocarbon concentrations present are greater than the clean-up levels established by the NCDEHNR.

- Install two additional monitoring wells to the northwest of the site. Collect one soil sample from each boring during drilling activities and analyze for the presence of petroleum hydrocarbons by EPA Method 413.1.

- Collect groundwater samples from all of the monitoring wells and analyze for the presence of dissolved-phase hydrocarbons by EPA Method 625. This would confirm that dissolved-phase hydrocarbon concentrations are less than State Water Quality Standards.

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THREE WELL SITE CHECK REPORT
BUILDING BB-9
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB No. 830011088.11

August 25, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

JNDWATER TECHNOLOGY
ERNMENT SERVICES, INC.
red by:

William L. Hughes
m L. Hughes
Geologist

ylor Sword, C.P.G.
ct Manager/Remediation Specialist

8334
P. TAYLOR SWORD

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

DON A. SKOMSKY

Offices throughout the U.S., Canada and Overseas

Description

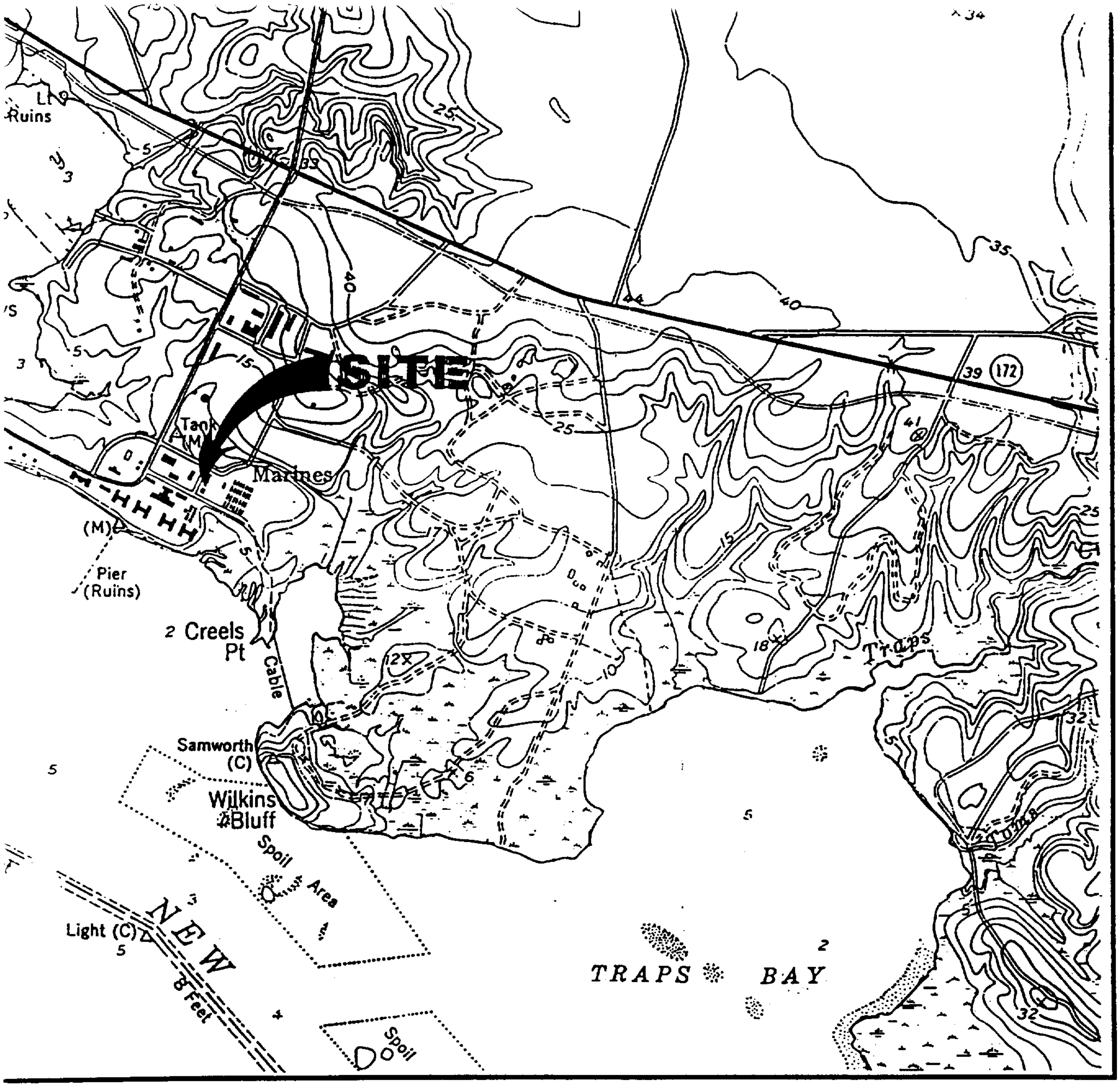
s located in the southern region of the Marine Corps Base, Camp Lejeune, North Carolina The site map (Figure 2) illustrates the location of the installed wells near Building BB-9. serves as a heating plant. According to past documents, three steel 1,000-gallon capacity und storage tanks (UST) used to store heating oil adjacent to the building were excavated and in February, 1993. GSI could not identify any information documenting the age or condition of when removed. According to a memo to NAVFACENGCOM from the Commanding General at orps Base, Camp Lejeune, dated October 1, 1992, volumetric tests performed on USTs BB-9-1 -2 in 1990 were inconclusive. A volumetric test was never performed on UST BB-9-3. e contamination was noted during tank removal activities; however, there is no information ting the collection of soil or groundwater samples.

and Water Use

BB-9 is located in the Courthouse Bay area of the Marine Corps Base. The area immediately Building BB-9 is comprised of buildings that house military personnel. The site is situated in an inated by relatively flat topography. The nearest body of surface water is the New River ximately 1,000 feet towards the south. Potable water for the base is supplied by wells proximately 1,200 feet towards the north-northwest that tap the Castle Hayne Aquifer.

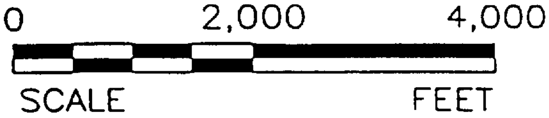
nal Geology

al plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits e to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie f Pre-Cretaceous age, thicken and dip eastward with thicknesses ranging from 1,500 feet in the 000 feet in the east. The geologic units in the area are divided into six formations: the Castle rmation of the Eocene series; the River Bend Formation of the Oligocene Series; the Pungo e Miocene Series; the Yorktown Formation of the Pliocene series; and the James City and each Formations of the Pleistocene series.



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE
NEW RIVER INLET, N.C.
7.5 MINUTE SERIES
34077-E3-TF-024
1988

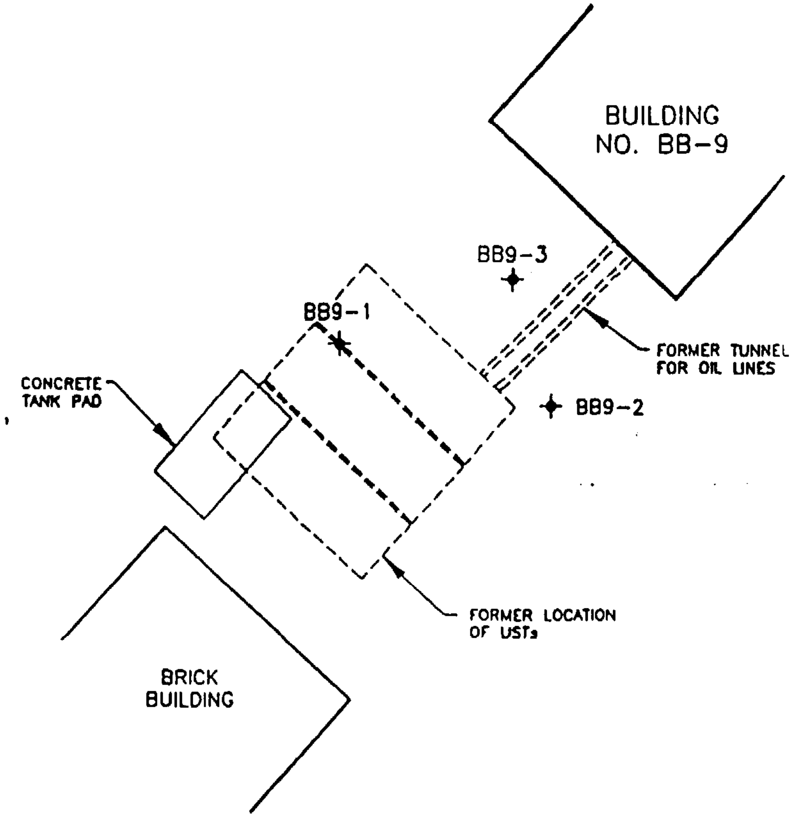
SCALE 1:24,000



UNDWATER
OLOGY

TIVE BLVD.
VA. 23320
-7881

DESIGNED: BH	**SITE LOCATION**		
DETAILED: PJC	CLIENT: LANTDIV NAVFACENGCOM		DRAWING DATE: 3/25/93
CHECKED:	LOCATION: BUILDING BB-9 MARINE CORPS BASE, CAMP LEJUENE, N.C.		FIGURE: 1



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SOURCE: BOBB

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TE

REV. NO.:	DRAW 5

CLIENT:
LANTD

LOCATION:
B
MARINE CORPS

DESIGNED:	DET
BH	

at the Marine Corps Base, Camp Lejeune, [illegible]
NAVFAC contractual requirements.

[illegible]s/monitoring wells were drilled and installed at the site on April 7, 1993. Soils in the racterized as fine-grained sand and silt. Analytical results indicate that total oil and grease, el and TPH-as-lubricating oil were detected in all of the soil samples collected from the soil

quid-level measurements, the depth to groundwater ranges between approximately 4 and 7 -phase hydrocarbons were not measured or observed in monitoring wells BB9-1 through g the April 8, 1993 well gauging event. The hydraulic gradient across the site on April 8, .142 feet per foot towards the south. Groundwater samples were collected from the wells and analyzed for purgeable aromatic hydrocarbons by modified EPA Method 602. hase hydrocarbon concentrations in all of the groundwater samples collected from wells BB9-1 and BB9-2 were less than the laboratory's reported method detection limit. The oncentration in the groundwater sample collected from monitoring well BB9-3 was greater ate Water Quality Standards.

GOVERNMENT SERVICES

Groundwater Technology Government Services, Inc.
1244 B Executive Boulevard, Suite 106, Chesapeake, VA 23320
Tel: (804) 436-7881 Fax: (804) 436-2312

THREE WELL SITE CHECK REPORT
BUILDING BB-51
MARINE CORPS AIR BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB No. 830011088.28

September 23, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6299

UNDWATER TECHNOLOGY
ERNMENT SERVICES, INC.
ared by:

William L. Hughes
im L. Hughes
Geologist

Taylor Sword
ylor Sword, C.P.G.
ect Manager/Remediation Specialist

8334
P. TAYLOR SWORD

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

DON A. SKOMSKY
37070-R

te Description

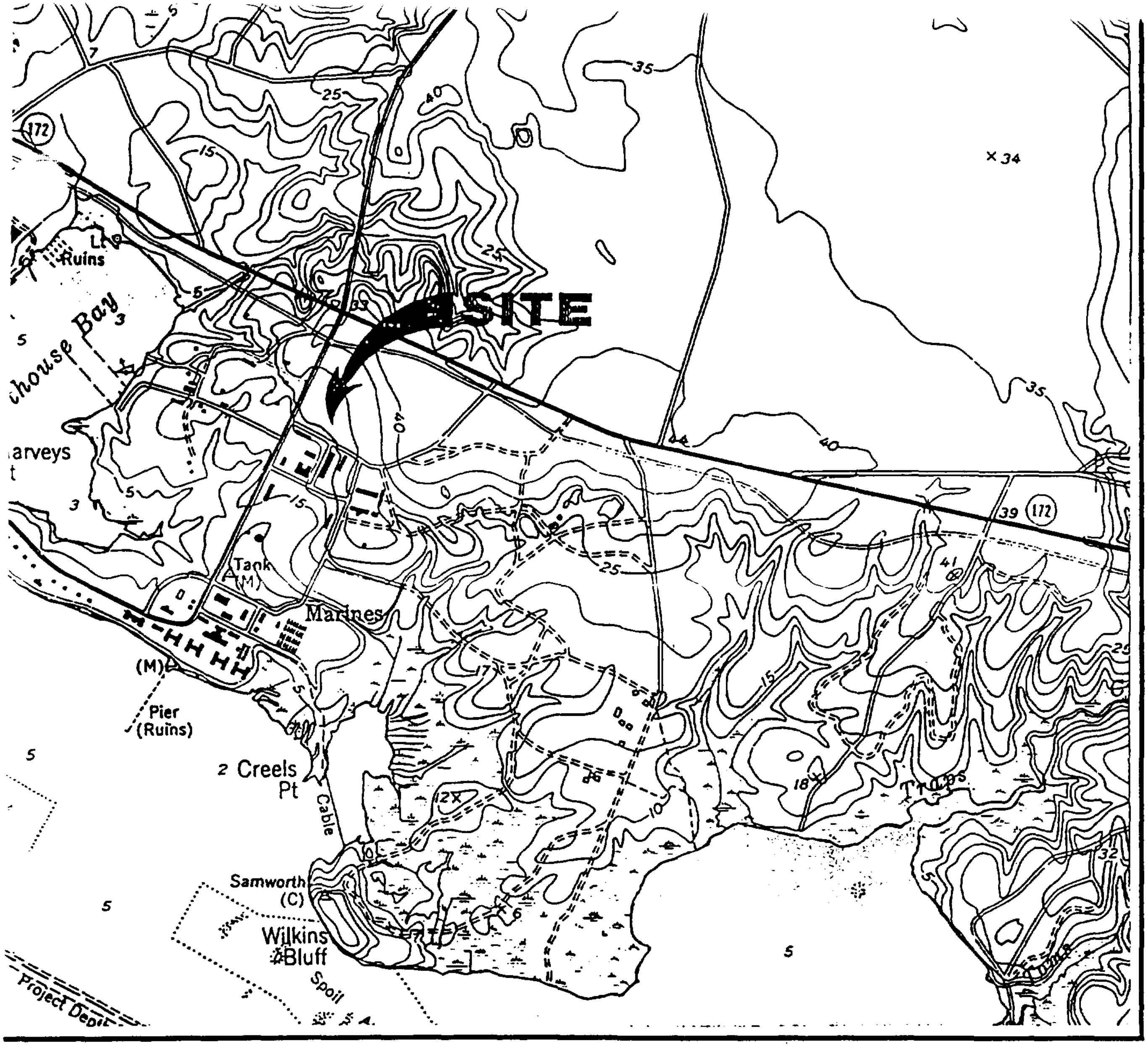
te is located in the central region of the Marine Corps Base, Camp Lejeune, North Carolina (Figure ir te map (Figure 2) illustrates the location of the installed wells near Building BB-51. Building serves as an instruction building at the Marine Corps Engineering School at the Base. According t documents, two steel 300-gallon capacity underground storage tanks (UST) used to store waste ır the building were excavated and removed on August 18, 1992. GSI could not identify any ation documenting the age or condition of the UST when removed. According to the Site Check st form prepared by the point of contact at the Base on January 14, 1993, two soil samples were ted during excavation activities. The soil samples were analyzed for the presence of oil and grease soxhlet extraction method. Analytical results indicated that the samples contained 3,366 parts per (ppm) and 1,096 ppm oil and grease.

ınd and Water Use

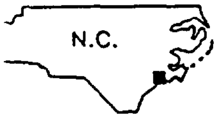
ıg BB-51 is located within the Courthouse Bay area of the Marine Corps Base. The area diately adjacent Building BB-51 is comprised of buildings that house instructional facilities at the The site is situated in an area dominated by relatively flat topography. The nearest body of ter is the New River located approximately 3,000 feet towards the south. Potable water for ıse is supplied by wells located approximately 1,000 feet towards the west-northwest that tap the Hayne aquifer.

egional Geology

oastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits ocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie ck of Precambrian age, thicken and dip eastward with thicknesses ranging from 1,500 feet in the o 6,000 feet in the east. The geologic units in the area are divided into six formations: the Castle e Formation of the Eocene series; the River Bend Formation of the Oligocene Series; the Pungo of the Miocene Series; the Yorktown Formation of the Pliocene series; and the James City and er Beach Formations of the Pleistocene series. The Castle Hayne Formation is composed



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE
NEW RIVER INLET, N.C.
7.5 MINUTE SERIES
34077-E3-TF-024
1988



SCALE 1:24,000

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SCALE FEET

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GROUNDWATER TECHNOLOGY

XECUTIVE BLVD.
KE, VA. 23320
436-7881

DESIGNED: BH

DETAILED: PJC

CHECKED:

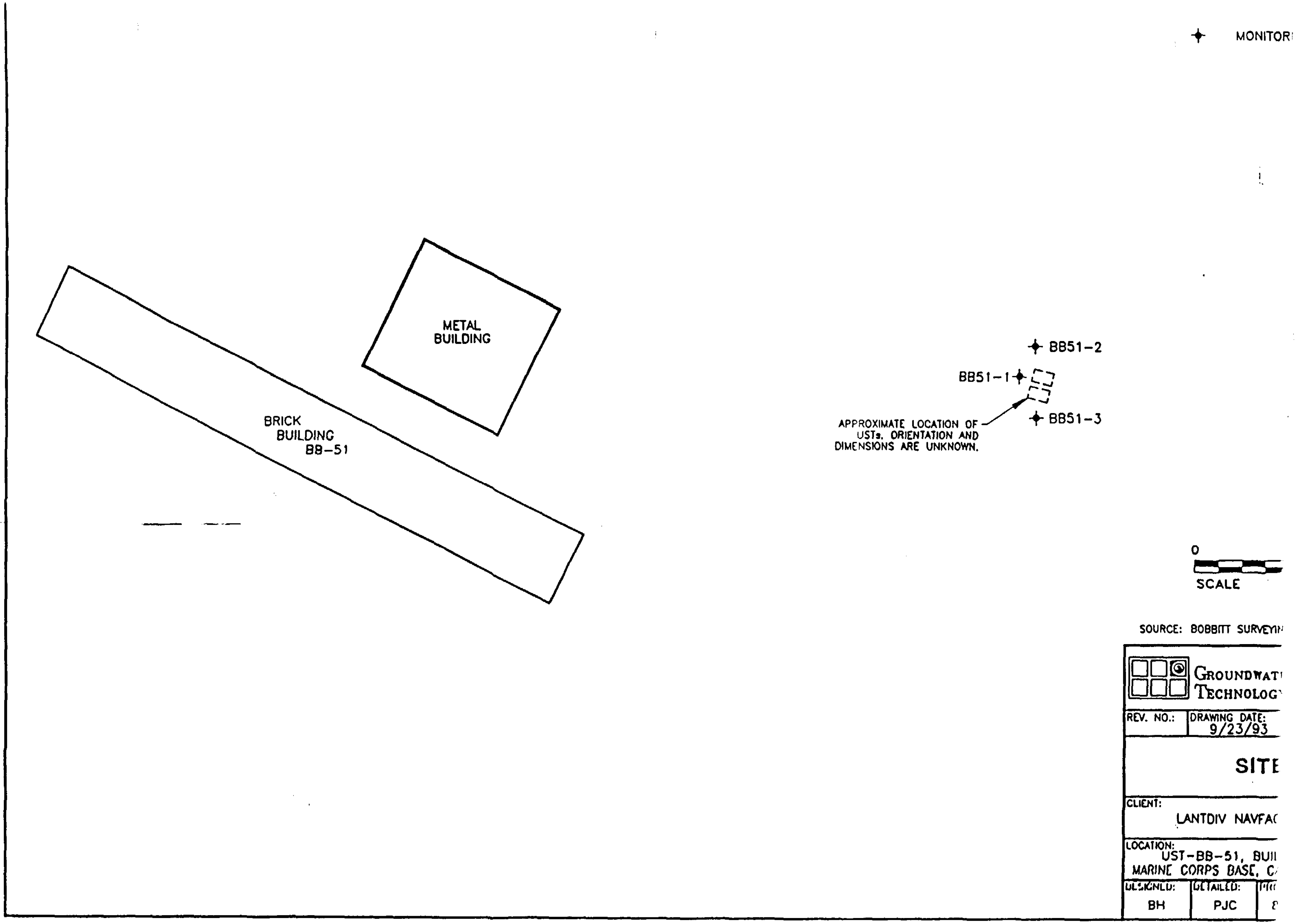
SITE LOCATION

CLIENT: LANTDIV NAVFACENGCOM

DRAWING DATE: 3/19/93

LOCATION: UST-BB-51, BUILDING BB-51
MARINE CORPS BASE, CAMP LEJEUNE, N.C.

FIGURE: 1



SOURCE: BOBBITT SURVEYI

GROUNDWAT
TECHNOLOG

REV. NO.:	DRAWING DATE: 9/23/93

SITE

CLIENT:
LANTDIV NAVFA

LOCATION:
UST-BB-51, BUI
MARINE CORPS BASE, C

DESIGNED:	DETAILED:	PR
BH	PJC	8

ıe 9, 1993, the soils were disposed of accordingly, in compliance with contract, state, federal and ·gulations. The drums were transported with a waste manifest to a remediation facility located in ɜ , North Carolina for treatment and disposal. Prior to transport, a completed material terization form and copy of the composite soil sample analytical results was provided to the :ation contractor for acceptance of the soils.

the treatment facility, the soils are emptied from the drums upon a thick low-permeability soil floor ·ge, enclosed building. An inoculum of known hydrocarbon-digesting microbes is added to the al and the pH is adjusted to approximately 7 to 8. A bulking agent such as chicken manure may ded and the materials are agitated. Following a period of approximately 30 days of gradation, one composite soil sample is collected from each 50 tons of treated material to assess ·atment conducted and insure proper clean-up levels are achieved. Once cleanup levels are ·d, the material is then used for road base, asphalt mixes, fill material, and other appropriate uses. completion of remediation, a certificate, with complete analytical data will be forwarded to the ator to remove this portion of responsibility.

ȷ monitoring well development and groundwater sample collection, purge water was stored in one .l. drum onsite. The purge water was treated using a portable carbon adsorption unit and arged on site.

echnical Summary

ıdwater Technology Government Services, Inc. has completed a three well site check at Building ı located at the Marine Corps Base, Camp Lejeune, North Carolina. The site check was designed mply with NAVFAC contractual requirements.

ɜ soil borings/monitoring wells were drilled and installed at the site on April 7, 1993. Soils in the are characterized as fine-grained sand and silt. Analytical results indicate that adsorbed-phase ɔcarbon concentrations by GC-FID in all of the soil samples collected from the soil borings are less l on liquid-level measurements, the depth to groundwater ranges between approximately 9 and 11 Liquid-phase hydrocarbons were not measured or observed in monitoring wells BB51-1 through 3 during the April 9, 1993 well gauging event. The hydraulic gradient across the site on April 9, was 0.071 feet per foot towards the southeast. Groundwater samples were collected from the oring wells and analyzed for purgeable aromatic hydrocarbons by modified EPA Method 602. ved-phase hydrocarbon concentrations in all of the groundwater samples collected were less than boratory's reported method detection limit with the exception of 0.5 ppb toluene in monitoring well 2.

Groundwater Technology Government Services, Inc.
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Tel: (804) 436-7881 Fax: (804) 436-2312

THREE WELL SITE CHECK REPORT
BUILDING FC-120
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.23

July 9, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

DWATER TECHNOLOGY
NMENT SERVICES, INC.
d by:

liam L. Hughes
Hughes
ologist

aylor Swor
Sword, C.P.G.
anager/Remediation Specialist

AMERICAN INSTITUTE OF PROFESSIONAL GEOLOGISTS
CERTIFICATE NUMBER 8334
AIPG
P. TAYLOR SWORD
CERTIFIED PROFESSIONAL GEOLOGIST

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DON A. SKOMSKY
ENGINEER
37070-R

Offices throughout the U.S., Canada and Overseas

cription

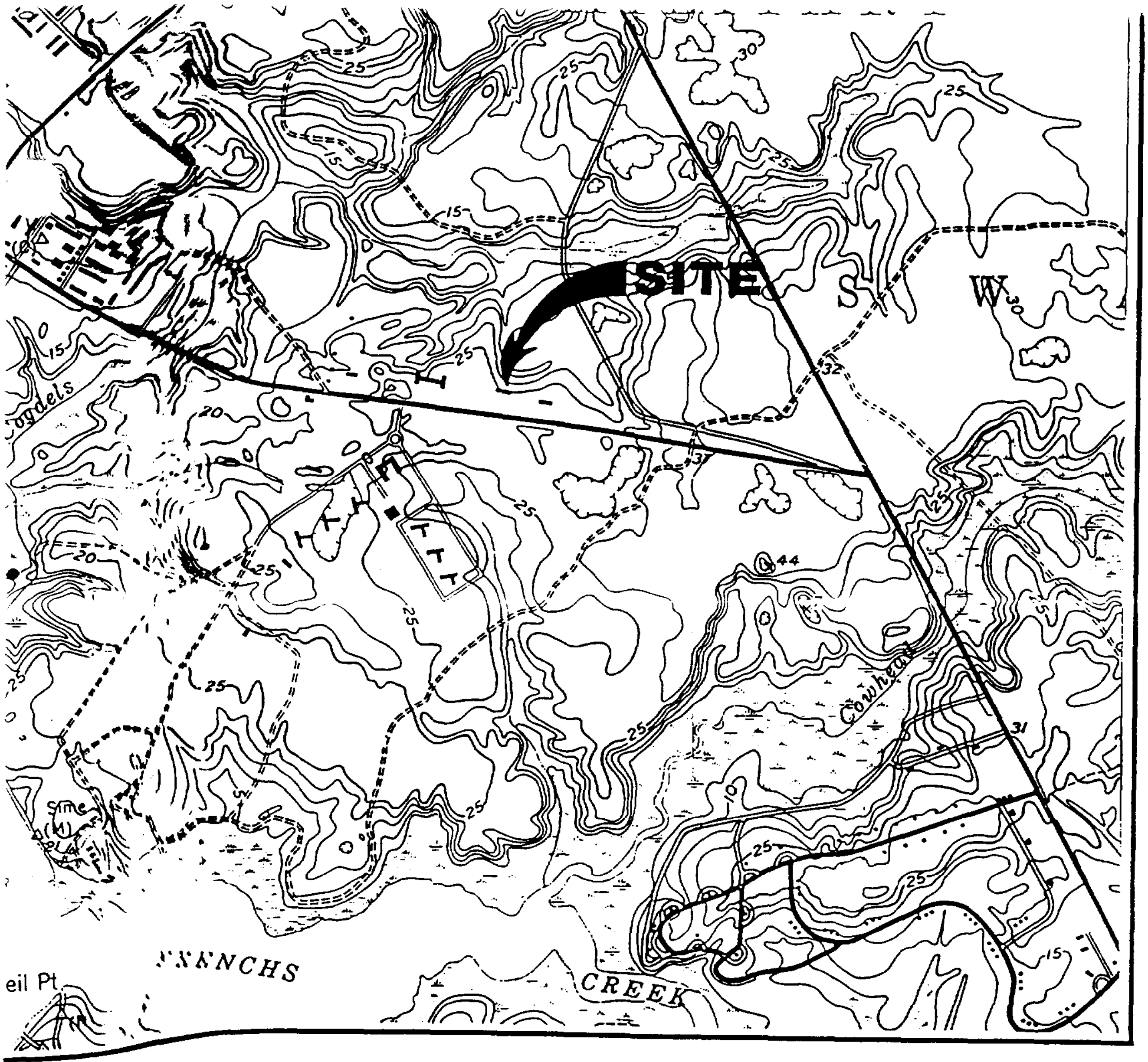
cated at Marine Corps Base, Camp Lejeune, North Carolina (Figure 1). The site map r `es the location of the Building FC-120, and the location of the installed wells. past documents, one steel 1,000-gallon capacity underground storage tank (UST) used to oil adjacent to the building was excavated and removed on September 7, 1992. Technology GSI could not identify any information documenting the age or condition of the moved. According to the Tank Removal Report prepared for the site by Environmental and onsultants, Inc. on September 28, 1992, two soil samples were collected for laboratory ng excavation activities. The samples were analyzed for the presence of total recoverable e by Method 9071. Analytical results from the Tank Removal Report indicate that the total e concentrations were 3,220 parts per million (ppm) and 13,600 ppm. There is no locumenting the soil sample locations.

d Water Use

120 is located approximately 5,500 feet east of the New River near the Force Troops ne area immediately adjacent Building FC-120 is comprised of woodlands. The site is a dominated by relatively flat topography. The nearest body of surface water is the Potable water for the base is supplied by wells located approximately three miles towards t tap the Castle Hayne aquifer.

l Geology

olain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits o Holocene age. These deposits and formations of Lower Cretaceous age, which overlie recambrian age, thicken and dip eastward with a thickness of 1,500 feet in the Camp (Harned et al., 1989). The geologic units in the area are divided into six formations: the



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE
CAMP LEJEUNE, N.C.
7.5 MINUTE SERIES
34077-F3-TF-024
1971

SCALE 1:24,000

0 2,000 4,000

SCALE FEET

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DESIGNED:
BH

DETAILED:
PJC

CHECKED:

SITE LOCATION

CLIENT:
LANTDIV NAVFACENGCOM

DRAWING DATE:
3/15/93

LOCATION:
UST-FC-120-3, BUILDING FC-120
MARINE CORPS BASE, CAMP LEJEUNE, N.C.

FIGURE:
1

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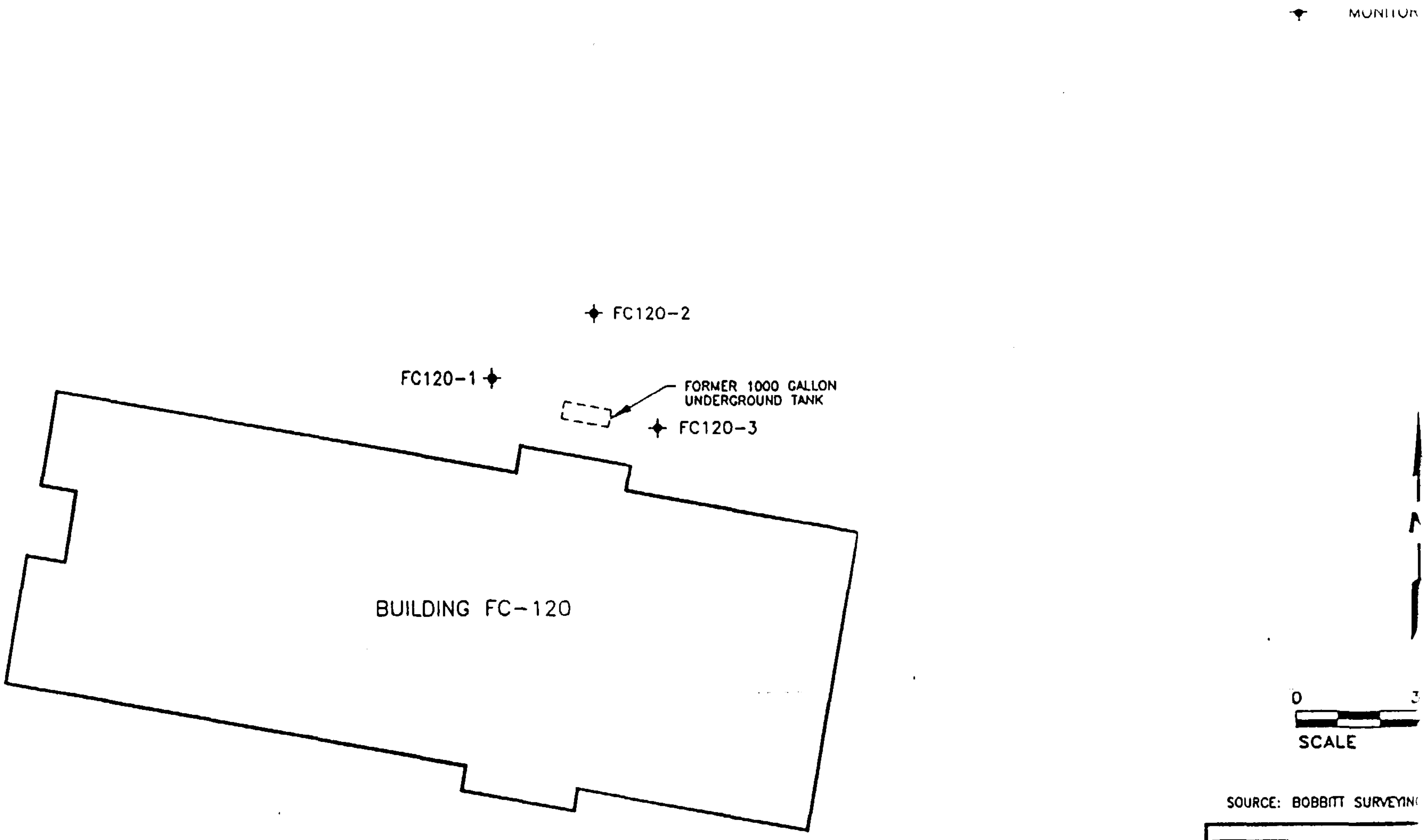

SOURCE: BOBBITT SURVEYIN

GROUNDWATE
TECHNOLOGY

REV. NO.:	DRAWING DATE: 3/30/93

SITE

CLIENT:
LANTDIV NAVFAC

LOCATION:
UST-FC-120-3, BUIL
MARINE CORPS BASE, CAM

DESIGNED:	DETAILED:	PRO.
BH	PJC	8

- Metals using the toxicity characteristic leaching procedure (TCLP) by EPA Methods 6010 and 7470;
- Extractable Organic Halides by EPA Method 600-4-84-008; and
- Percentage Moisture by EPA CLP Method.

, 1993, the drums of soil cuttings were removed from the site and transported to the remediation or treatment. Soils were disposed of accordingly, in compliance with contract, state, federal and local ons. A copy of the application for treatment of petroleum-contaminated soil and waste manifest are ed in Appendix E. The drums were transported with a waste manifest to a remediation facility located in ille, North Carolina for treatment and disposal. Prior to transport, a completed material characterization d copy of the composite soil sample analytical results was provided to the remediation contractor for nce of the soils.

he treatment facility, the soils are emptied from the drums upon a thick low-permeability soil floor in a nclosed building. An inoculum of known hydrocarbon-digesting microbes is added to the material and s adjusted to approximately 7 to 8. A bulking agent such as chicken manure may be added and the s are agitated. Following a period of approximately 30 days of biodegradation, one composite soil is collected from each 50 tons of treated material to assess the treatment conducted and insure proper levels are achieved. Once cleanup levels are attained, the material is then used for road base, asphalt il aterial, and other appropriate uses. Upon completion of remediation, a certificate with complete a data will be forwarded to the generator to remove this portion of responsibility.

monitoring well development and groundwater sample collection, purge water was stored in 55-gallon n site. The purge water was treated using a portable carbon adsorption unit and discharged on site.

hnical Summary

water Technology GSI has completed a three well site check for Building FC-120 located at Marine Corps amp Lejeune, North Carolina. The site check was designed to comply with NAVFAC contractual nents.

mples collected from the soil borings are less than the laboratory's reported method detection

easurements, the depth to groundwater is at approximately 16 feet. The hydraulic
e on March 25, 1993, was 0.002 feet per foot towards the west. Liquid-phase
not measured or observed in monitoring wells FC120-1 through FC120-3 during the
ll gauging event. Groundwater samples were collected from the monitoring wells and
atic purgeable hydrocarbons by modified EPA Method 602. Dissolved-phase hydrocarbon
e less than the laboratory's reported method detection limit in all of the groundwater samples
, toluene, ethylbenzene and xylenes concentrations in all of the groundwater samples are
Water Quality Standards established by the NCDEHR.

GOVERNMENT SERVICES

Groundwater Technology Government Services, Inc.
1244 B Executive Boulevard, Suite 106, Chesapeake, VA 23320
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THREE WELL SITE CHECK REPORT
BUILDING FC-201, EAST SIDE
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.16

July 23, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

UNDWATER TECHNOLOGY
ERNMENT SERVICES, INC.
ared by:

illiam L. Hughes
m L. Hughes
Geologist

ylor Sword, C.P.G.
ct Manager/Remediation Specialist

AMERICAN INSTITUTE OF PROFESSIONAL GEOLOGISTS
CERTIFICATE NUMBER 8334
AIPG
P. TAYLOR SWORD
CERTIFIED PROFESSIONAL GEOLOGIST

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DON E. SKOMSKY
ENGINEER
37070-R

te Description

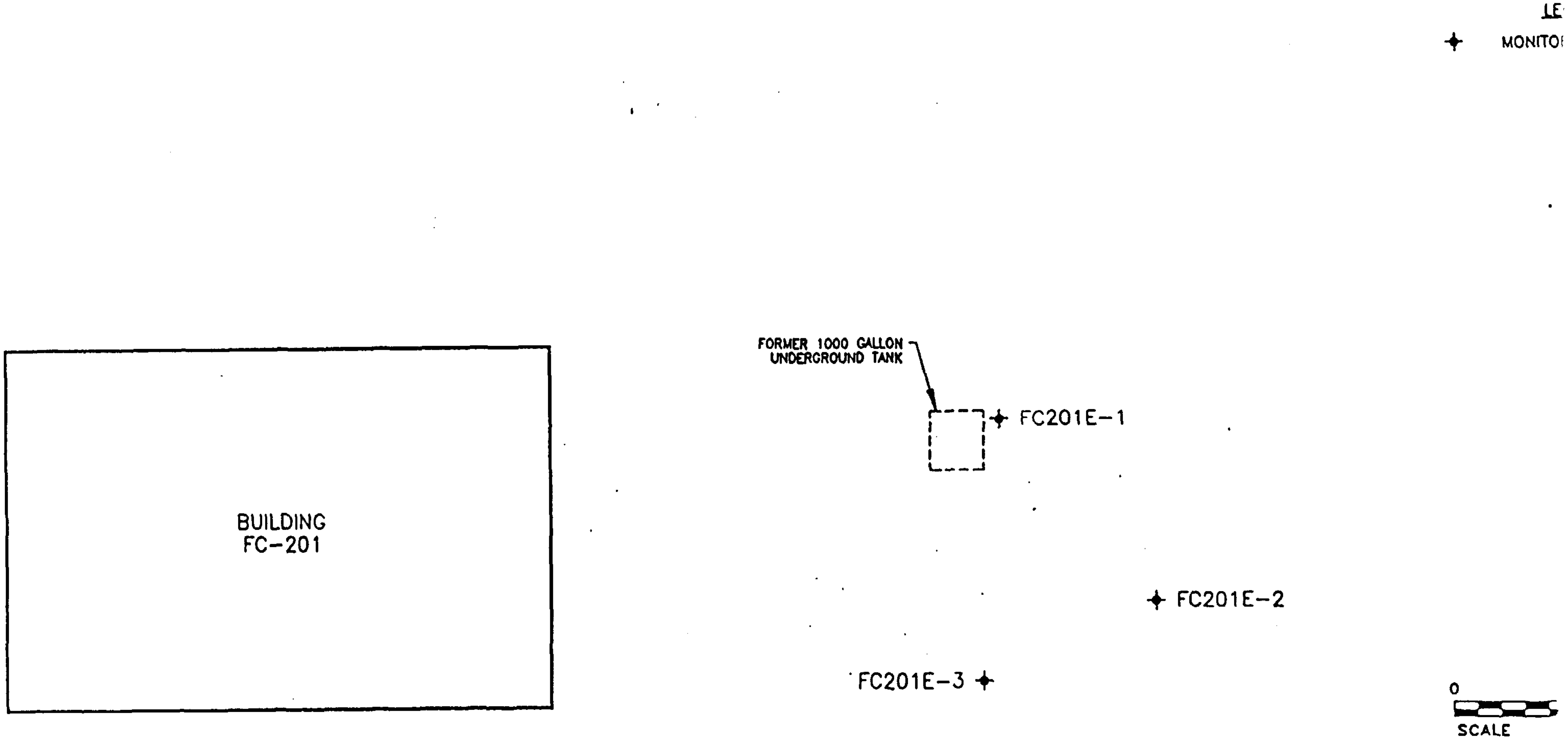
ite is located in the southern region of the Marine Corps Base, Camp Lejeune, North Carolina The site map (Figure 2) illustrates the location of the installed wells near Building FC-201. ding to past documents, one steel 1,000-gallon capacity underground storage tank (UST) used to waste oil was excavated and removed on July 1, 1993. Groundwater Technology GSI could not fy any information documenting the age or condition of the UST when removed. According to the re Report prepared for the site by Environmental and Regulatory Consultants, Inc. on September 92, two soil samples were collected for laboratory analysis during excavation activities. The les were analyzed for the presence of total petroleum hydrocarbons (TPH)-as-fuel oil and TPH-as-d grease by Method 9071. Analytical results from the Closure Report indicate that the soil sample ted at 7 feet below grade from the north end of the excavation contained 1,800 ppm TPH-as-oil rease. The soil sample collected at the same depth from the south end of the excavation ined 25,000 ppm TPH-as-oil and grease. The soil samples collected from the excavation, which screened using a flame-ionization detector (FID), indicated the presence of aromatic petroleum carbon concentrations ranging from 60 parts per million (ppm) to 200 ppm.

and and Water Use

ing FC-201 is located approximately 4,700 feet east of the New River The area immediately ent Building FC-201 is comprised of buildings for base support facilities. The site is situated in an dominated by relatively flat topography. The nearest body of surface water is the New River. le water for the base is supplied by wells located approximately three miles towards the north that e Castle Hayne aquifer.

egional Geology

oastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits iocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie ock of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the Camp ne area (Harned et al., 1989). The geologic units in the area are divided into six formations: the le Hayne Formation of the Eocene Series; the River Bend Formation of the Oligocene Series; the



SOURCE: BOBBITT SURVEY

GROUNDWAT
TECHNOLOG

REV. NO.:	DRAWING DATE: 4/9/93

SIT

CLIENT:
LANTDIV NAVFA

LOCATION:
BUILDING FC-201
MARINE CORPS BASE, C

DESIGNED:	DETAILED:	PI
BH	PJC	

al and the pH is adjusted to approximately 7 to 8. A bulking agent such as chicken manure may ded and the materials are agitated. Following a period of approximately 30 days of gradation, one composite soil sample is collected from each 50 tons of treated material to assess ent conducted and ensure proper cleanup levels are achieved. Once cleanup levels are ed, the material is then used for road base, asphalt mixes, fill material, and other appropriate uses. completion of remediation, a certificate with complete analytical data will be forwarded to the ator.

ay 20, 1993, the drums of soil cuttings were removed from the site and transported to the diation facility for treatment. Copies of the application for treatment of petroleum-contaminated soil vaste manifest are presented in Appendix E.

g monitoring well development and groundwater sample collection, purge water was stored in two llon drums on site. The purge water was treated using a portable carbon adsorption unit and arged on site.

echnical Summary

r ater Technology GSI has completed a three well site check for the east side of Building FC-201 ea at the Marine Corps Base, Camp Lejeune, North Carolina. The site check was designed to ply with NAVFAC contractual requirements.

e soil borings/monitoring wells were drilled and installed at the site on March 25 and 30, 1993. in the area are characterized as fine-grained sand. Analytical results indicate that the soil sample cted at 3.5 to 5 feet below grade from monitoring well FC201E-1 contained 51 ppm TPH-as-cating oil. The soil sample collected at 3.5 to 5 feet from monitoring well FC201E-3 contained 370 TPH-as-diesel. Total oil and grease concentrations ranged from less than 39 ppm in the soil ple collected from monitoring well FC201E-2 to 4,800 ppm in monitoring well FC201E-1.

ed on liquid-level measurements, the depth to groundwater is at approximately 4 to 5 feet. The raulic gradient across the site on March 30, 1993, was 0.006 feet per foot towards the northwest. uid-phase hydrocarbons were not measured or observed in the monitoring wells during the March 30, tions were less than the laboratory's reported method detection limit in the groundwater llected from monitoring well FC201E-1 and FC201E-3. Benzene, toluene, ethylbenzene, and oncentrations in the groundwater samples collected from all the monitoring wells are less than r Quality Standards established by the NCDEHNR.

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THREE WELL SITE CHECK REPORT
BUILDING FC-201, WEST SIDE
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.18

July 6, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

JNDWATER TECHNOLOGY
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ired by:

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aylor Sword, C.P.G.
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GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

DON K. SKOMSKY
37070-R

Offices throughout the U.S., Canada and Overseas

e Description

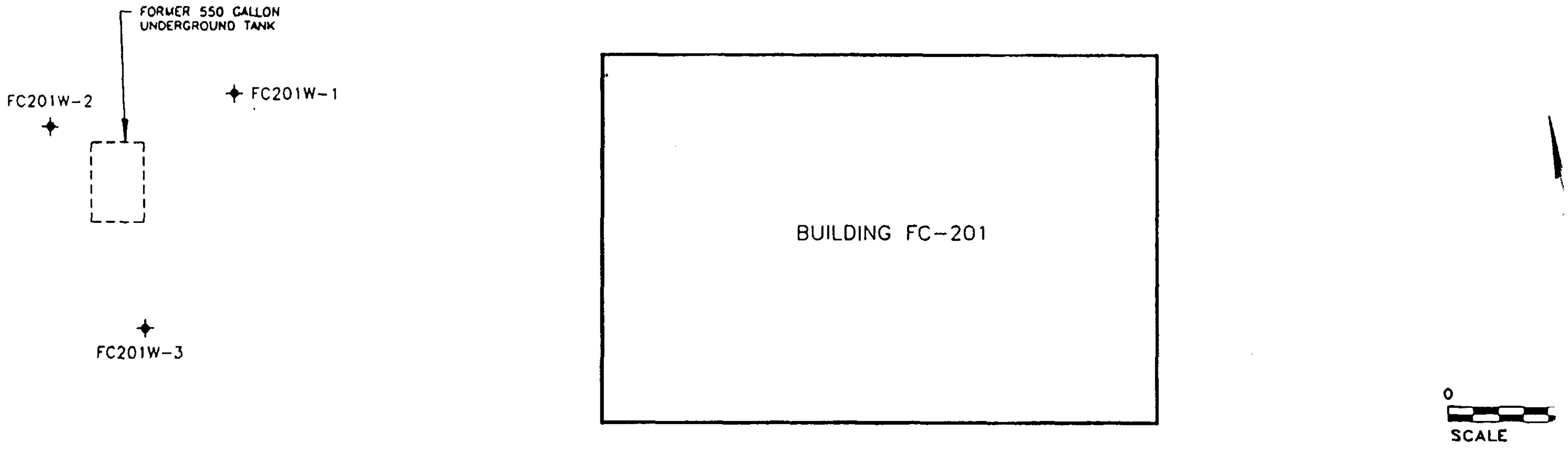
e is located in the southern region of the Marine Corps Base, Camp Lejeune, North Carolina The site map (Figure 2) illustrates the location of the installed wells near Building FC-201. ing to past documents, one steel 550-gallon capacity underground storage tank (UST) used to aste oil was excavated and removed on July 1, 1993. Groundwater Technology GSI could not any information documenting the age or condition of the UST when removed. According to the e Report prepared for the site by Environmental and Regulatory Consultants, Inc. on September 2, two soil samples were collected for laboratory analysis during excavation activities. The s were analyzed for the presence of total petroleum hydrocarbons (TPH)-as-oil and grease by d 9071. Analytical results from the Closure Report indicate that TPH-as-oil and grease trations were 760 parts per million (ppm) in the soil sample collected at 2 feet below the north the excavation and 390 ppm in the sample collected from the same depth at the south end.

nd and Water Use

g FC-201 is located approximately 4,700 feet east of the New River The area immediately nt Building FC-201 is comprised of buildings that house support facilities for the Base. The site is an area dominated by relatively flat topography. The nearest body of surface water is the iver. Potable water for the base is supplied by wells located approximately three miles towards rth that tap the Castle Hayne aquifer.

gional Geology

astal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits cene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie ck of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the Camp e area (Harned et al., 1989). The geologic units in the area are divided into six formations: the Hayne Formation of the Eocene Series; the River Bend Formation of the Oligocene Series; the de, Pungo River, and Eastover Formations of the Miocene Series; the Yorktown Formation of the



SOURCE: BOBBITT SURVEY

GROUNDWAT
TECHNOLO

REV. NO.: 1
DRAWING DATE: 4/13/93

SIT

CLIENT:
LANTDIV NAVF

LOCATION:
BUILDING FC-201
MARINE CORPS BASE, C

DESIGNED: BH
DETAILED: PJC

- Metals using the toxicity characteristic leaching procedure (TCLP) by EPA Methods 6010 and 7470;
- Extractable Organic Halides by EPA Method 600-4-84-008; and
- Percentage Moisture by EPA CLP Method.

isposed of accordingly in compliance with contract, state, federal and local regulations. The drums nsported with a waste manifest to a remediation facility located in Fayetteville, North Carolina for nt and disposal. Prior to transport, a completed material characterization form (Appendix E) and copy of posite soil sample analytical results was provided to the remediation contractor for acceptance of the

he treatment facility, the soils are emptied from the drums upon a thick low-permeability soil floor in a nclosed building. An inoculum of known hydrocarbon-digesting microbes is added to the material and is adjusted to approximately 7 to 8. A bulking agent such as chicken manure may be added and the ls are agitated. Following a period of approximately 30 days of biodegradation, one composite soil is collected from each 50 tons of treated material to assess the treatment conducted and ensure proper levels are achieved. Once cleanup levels are attained, the material is then used for road base, asphalt fill material, and other appropriate uses. Upon completion of remediation, a certificate with complete al data, will be forwarded to the generator to remove this portion of responsibility.

, 1993, the drums of soil cuttings were removed from the site and transported to the remediation for treatment. Copies of the application for treatment of petroleum-contaminated soil and waste manifest sented in Appendix E.

monitoring well development and groundwater sample collection, purge water was stored in two 55- drums on site. The purge water was treated using a portable carbon adsorption unit and discharged on

chnical Summary

water Technology GSI has completed a three well site check for the east side of Building FC-201 located Marine Corps Base, Camp Lejeune, North Carolina. The site check was designed to comply with NAVFAC ctual requirements.

entrations in all of the soil samples collected from the soil borings are less than the laboratory's reported od detection limits with the exception of 220 ppm total oil and grease at 3.5 to 5 feet in monitoring well 1W-2 and 53 ppm total oil and grease at 3.5 to 5 feet in monitoring well FC201W-1.

liquid-level measurements, the depth to groundwater is at approximately 6 to 8 feet. The hydraulic ient across the site on April 1, 1993, was 0.003 feet per foot towards the south. Liquid-phase hydrocarbons not measured or observed in the monitoring wells during the April 1, 1993 well gauging event. ndwater samples were collected from the monitoring wells and analyzed for aromatic purgeable ocarbons by modified EPA Method 602. Dissolved-phase hydrocarbon concentrations were less than the ratory's reported method detection limit in the groundwater sample collected from monitoring well FC201W-1 FC201W-3. Benzene, toluene, ethylbenzene, and xylenes concentrations in the groundwater samples cted from all of the monitoring wells are less than the State Water Quality Standards established by the EHNR.

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THREE WELL SITE CHECK REPORT
BUILDING H-30
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB No. 830011088.12

August 25, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6299

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NMENT SERVICES, INC.
d by:

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r Sword, C.P.G
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GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

DON A. SKOMSKY

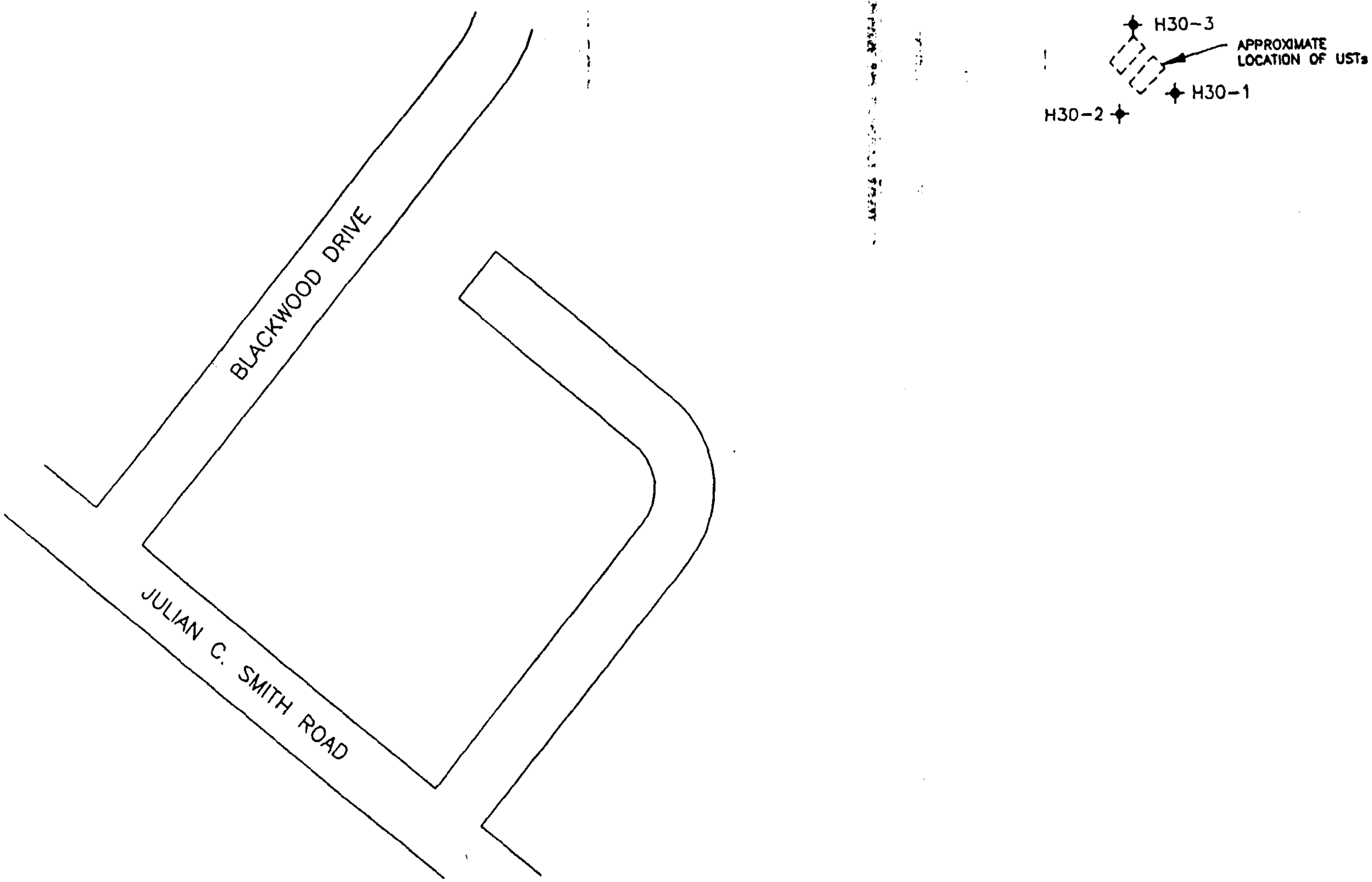
is located in the central region of the Marine Corps Base, Camp Lejeune, North Carolina 1). The site map (Figure 2) illustrates the location of the installed wells near the streets where H-30 was located. Building H-30 was used as a Naval Hospital and has been demolished. ng to past documents, two steel 560-gallon capacity underground storage tanks (USTs) used to ɜating oil adjacent to the building were excavated and removed in July 1992. GSI was not d any additional information documenting the condition of the USTs when removed. According ite Check Request Form completed for the site by the Point of Contact (POC) on December 9, oil samples were collected during excavation activities and were analyzed for the presence of troleum hydrocarbons (TPH)-as-gasoline and TPH by EPA Methods 5030/8015 and 3550/8015, ively. Analytical results provided by the POC indicated that TPH-as-gasoline concentrations in samples ranged from less than the laboratory's 6.0 parts per million (ppm) reported method on limit in a soil sample collected at the product lines to 600 ppm in the soil sample collected ıe southwest corner of the excavation. The soil sample depths were not documented.

nd and Water Use

ıg H-30 is located near the Marine Division Headquarters at Hadnot Point. The area immediately uilding H-30 is comprised of buildings that house personnel for the base. The site is situated area dominated by relatively flat topography. The nearest body of surface water is the New River d approximately 50 feet towards the north. Potable water for the base is supplied by wells located ximately 3 miles towards the northeast that tap the Castle Hayne aquifer.

egional Geology

oastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits ocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie ock of Pre-Cretaceous age, thicken and dip eastward with thicknesses ranging from 1,500 feet in the to 6,000 feet in the east. The geologic units in the area are divided into six formations: the Castle ıe Formation of the Eocene Series; the River Bend Formation of the Oligocene Series; the Pungo of the Miocene Series; the Yorktown Formation of the



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SCALE

SOURCE: BOBBITT SU

GROUN
TECHN

REV. NO.:	DRAWING 5/25

S

CLIENT:
LANTDIV

LOCATION:
BUIL
MARINE CORPS BA

DESIGNED: BH	DETAILE PJC

› Corps Base, Camp Lejeune, North Carolina. The site check was designed to comply with ›ontractual requirements.

ngs/monitoring wells were drilled and installed at the site on April 8, 1993. Soils in the haracterized as fine-grained sand, silt and clay. A clay layer that may act as a confining layer ıntered in all of the monitoring wells. Drilling activities were terminated at 10 feet below grade the possible migration of petroleum hydrocarbons below this clay interval. Analytical results at adsorbed-phase hydrocarbon concentrations in all of the soil samples collected from the s are less than the laboratory's reported method detection limits.

liquid-level measurements, the depth to groundwater ranges between approximately 2 and 6 d-phase hydrocarbons were not measured or observed in monitoring wells H30-1 through ng the April 9, 1993 well gauging event. The hydraulic gradient across the site on April 9, 0.014 feet per foot towards the northeast. Groundwater samples were collected from the wells and analyzed for purgeable aromatic hydrocarbons by modified EPA Method 602. ›hase hydrocarbon concentrations in all of the groundwater samples collected were less than ory's reported method detection limit with the exception of monitoring well H30-1. The ›d ethylbenzene concentrations in the water sample collected from monitoring well H30-1 ›an the State Water Quality Standards.

GOVERNMENT SERVICES

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THREE WELL SITE CHECK REPORT
BUILDING LCH-4022
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.13

July 9, 1993

Prepared for:
Commander
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Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

ROUNDWATER TECHNOLOGY
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AMERICAN INSTITUTE OF PROFESSIONAL GEOLOGISTS
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GROUNDWATER TECHNOLOGY
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Approved by:

Don Skomsky, P.E.
Operations Manager

COMMONWEALTH OF PENNSYLVANIA
DON A. SKOMSKY
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Site Description

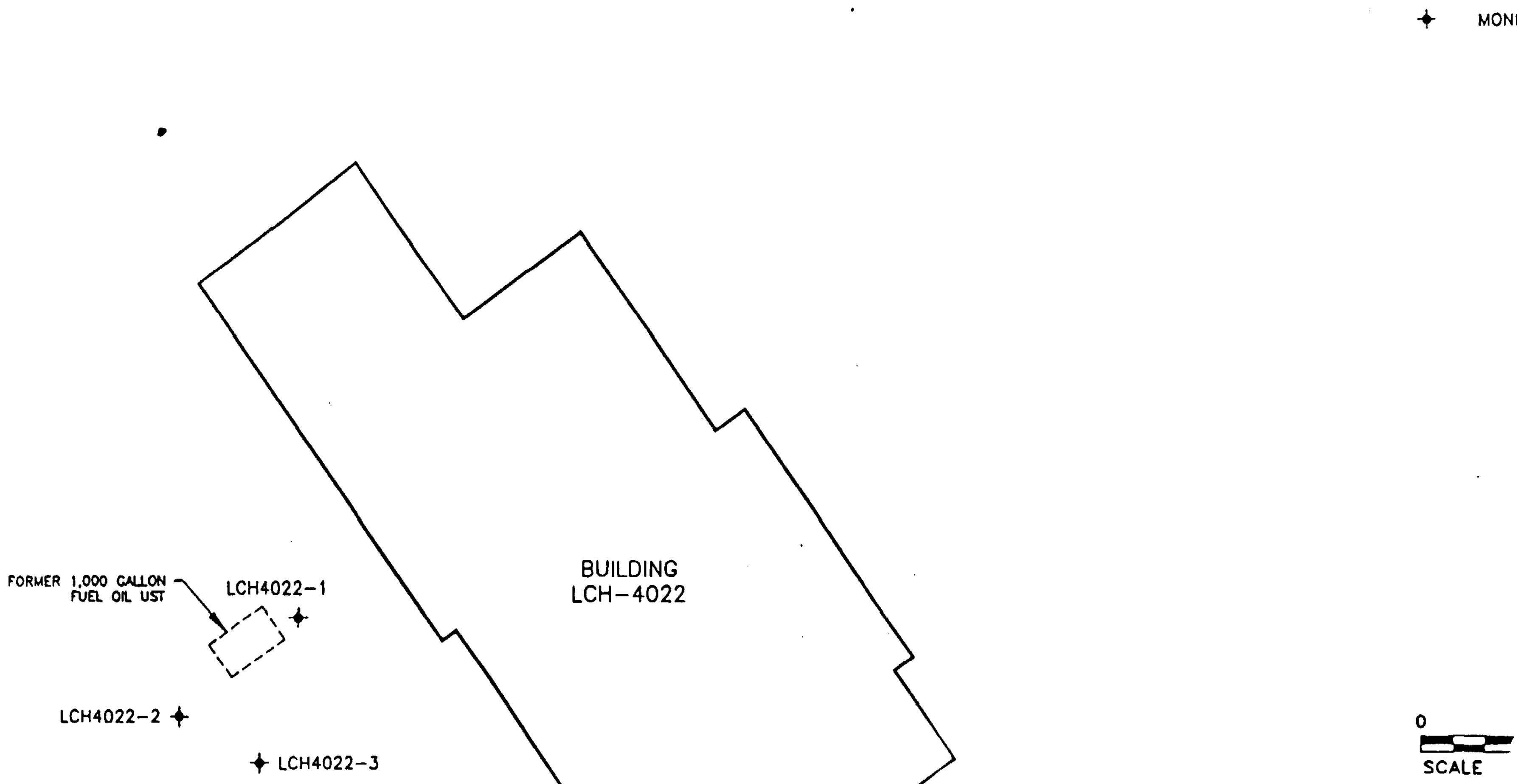
e site is located on the north side of Marine Corps Base, Camp Lejeune, North Carolina (Figure 1). map (Figure 2) illustrates the location of the Building LCH-4022, and the location of the installed ls. According to past documents, one steel 1,000-gallon capacity underground storage tank (UST) d to store fuel oil was excavated and removed on June 28, 1992. GSI could not identify any rmation documenting the age or condition of the UST when removed. According to the Tank moval Report prepared for the site by Environmental and Regulatory Consultants, Inc. on tember 17, 1992, two soil samples were collected for laboratory analysis during excavation activities. e samples were analyzed for the presence of total petroleum hydrocarbons (TPH)-as-diesel and H-as-gasoline by U.S. Environmental Protection Agency (EPA) Methods 3550 and 5030, respectively. lytical results from the Tank Removal Report indicate that the soil sample collected at 2 feet below north end of the UST contained 599 parts per million (ppm) TPH-as-gasoline and 4,300 ppm TPH-as-sel. The soil sample collected at the same depth from the south end of the excavation contained 699 n TPH-as-gasoline and 14,900 ppm TPH-as-diesel.

Land and Water Use

LCH-4022 is located approximately 2,500 feet south of Mott Creek. The area immediately acent Building LCH-4022 is comprised of buildings that house the Base personnel. The site is ated in an area dominated by relatively flat topography. The nearest body of surface water is Mott ek to the north. Potable water for the base is supplied by wells located approximately 1.5 miles ards the west that tap the Castle Hayne aquifer.

Regional Geology

coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits Miocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie rock of Pre-Cretaceous age, thicken and dip eastward with a thickness of 1,500 feet in the Camp eune area (Harned et al., 1989). The geologic units in the area are divided into six formations: the



SOURCE: BOBBITT SURV

GROUNDW
TECHNOL

REV. NO.:	DRAWING DAT 4/13/9

SI

CLIENT:
LANTDIV NAV

LOCATION:
BUILDING L
MARINE CORPS BASE,

DESIGNED: BH	DETAILED: PJC

ıdwater Technology Government Services, Inc. has completed a three well site check for building
ł022 located at Marine Corps Base, Camp Lejeune, North Carolina. The site check was designed
nply with NAVFAC contractual requirements.

soil borings/monitoring wells were drilled and installed at the site on March 26, 1993. Soils in the
are characterized as clayey fine-grained sand. Analytical results indicate that adsorbed-phase
carbon concentrations in the soil samples collected from monitoring well LCH4022-2 was less than
boratory's reported method detection limits. The soil samples collected from monitoring wells
022-1 and LCH4022-3 contains 1,100 ppm and 4,900 ppm TPH-as-diesel, respectively.

d on liquid-level measurements, the depth to groundwater is at approximately 3 feet. The hydraulic
ent across the site on March 29, 1993, was 0.040 feet per foot towards the southeast. Liquid-phase
carbons were detected in monitoring well LCH4022-1 during the March 29, 1993 well gauging
. On June 16, 1993, liquid-phase hydrocarbons were detected in monitoring wells LCH4022-2 and
022-3. Groundwater samples were collected from all of the monitoring wells and analyzed for
atic purgeable hydrocarbons by modified EPA Method 602. Dissolved-phase hydrocarbon
entrations were greater than the laboratory's reported method detection limit in all of the
dwater samples collected. Benzene and ethylbenzene concentrations in the groundwater samples
r than the State Water Quality Standards established by the North Carolina Department of
onment, Health and Natural Resources (NCDEHNR).

GROUNDWATER
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THREE WELL SITE CHECK REPORT
BUILDING STT-39A
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.21

July 30, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-2699

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Prepared by:

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GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

DON A. SKOMSKY
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2.0 BACKGROUND

2.1 Site Description

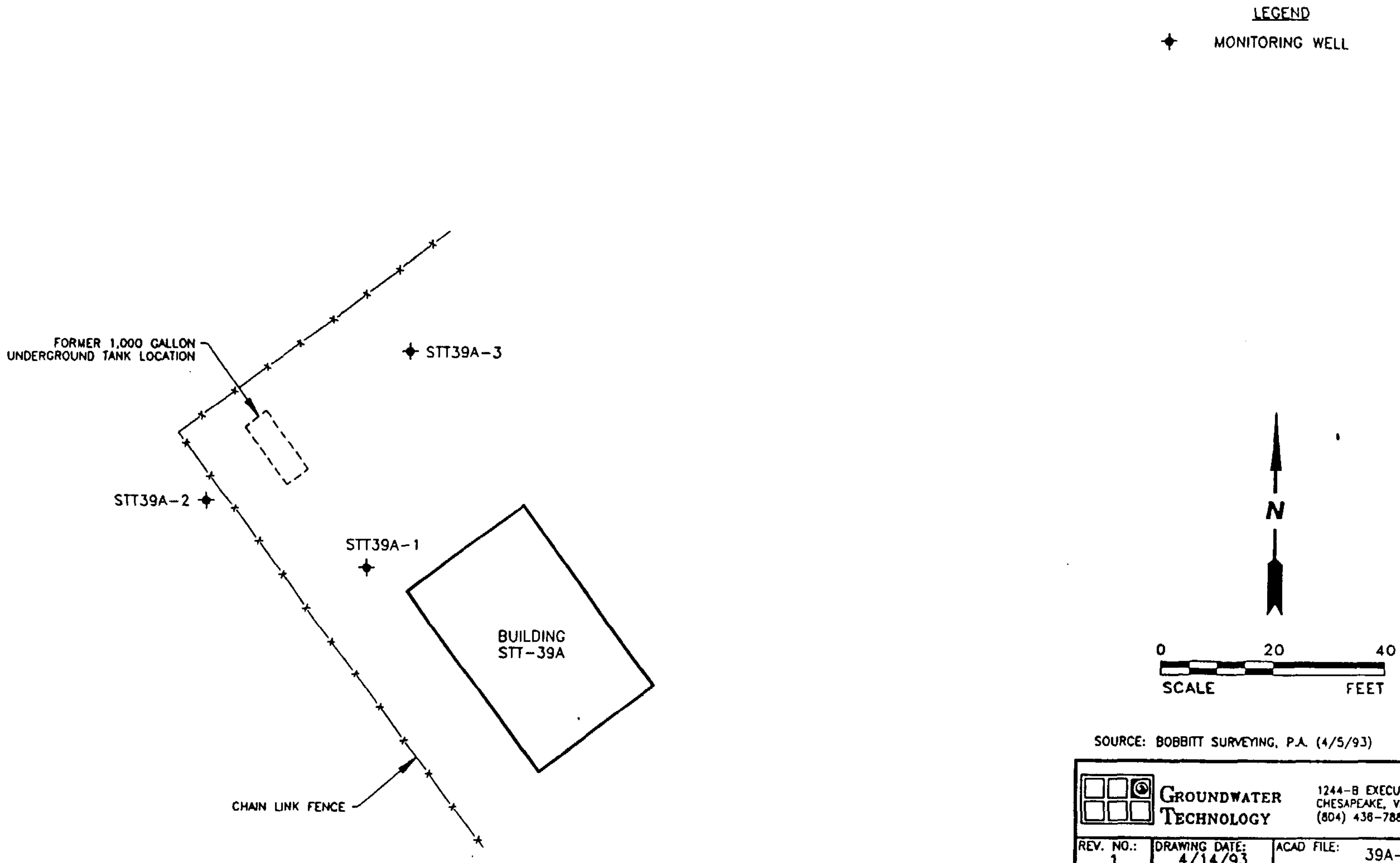
The site is located on the north side of Marine Corps Base, Camp Lejeune, North Carolina (Figure 1). The site map (Figure 2) illustrates Building STT39-A and the location of the installed wells. According to past documents, one steel 1,000-gallon capacity underground storage tank (UST) used to store fuel oil adjacent to the building was excavated and removed on June 8, 1992. GSI could not identify any information documenting the age or condition of the UST when recovered. According to the Tank Removal Report prepared for the site by Environmental and Regulatory Consultants, Inc. on October 5, 1992, two soil samples were collected for laboratory analysis during excavation activities. The samples were analyzed for the presence of total petroleum hydrocarbons (TPH)-as-fuel oil and TPH-as-gasoline by U.S. Environmental Protection Agency (EPA) Methods 3550 and 5030, respectively. Analytical results indicate that the TPH-as-gasoline concentration in all of the samples collected was less than the laboratory's 10 parts per million (ppm) method detection limit. The TPH concentration as fuel oil was 129.0 ppm in the sample collected two feet below the north end of the UST and 530.0 ppm in the sample collected at the same depth from the south end.

2.2 Land and Water Use

Building STT-39A is located approximately 1,800 feet west of the Northeast Creek. The area immediately adjacent Building STT-39A is comprised of buildings that house military personnel at the Base. The site is situated in an area dominated by relatively flat topography. The nearest body of surface water is the New River. Potable water for the base is supplied by wells located approximately 500 feet towards the north of the site that tap the Castle Hayne aquifer.

2.3 Regional Geology

The coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits of Miocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie bedrock of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the Camp Lejeune area (Harned et al., 1989). The geologic units in the area are divided into six formations: the Castle Hayne Formation of the Eocene Series; the River Bend Formation of the Oligocene Series; the Belgrade, Pungo River, and Eastover Formations of the Miocene Series; the Yorktown Formation of the



SOURCE: BOBBITT SURVEYING, P.A. (4/5/93)

GROUNDWATER TECHNOLOGY

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CHESAPEAKE, VA. 23320
(804) 436-7881

REV. NO.: 1
DRAWING DATE: 4/14/93
ACAD FILE: 39A-STE

SITE MAP

CLIENT: LANTDIV NAVFACENGCOM

PM:

LOCATION:
BUILDING STT-39A
MARINE CORPS BASE, CAMP LEJEUNE, N.C.

PE/RG:

DESIGNED: BH
DETAILED: PJC
PROJECT NO.: 830011088.2101
FIGURE: 2

4.5 Technical Summary

Groundwater Technology GSI has completed a three well site check for Building STT39-A located at Marine Corps Base, Camp Lejeune, North Carolina. The site check was designed to comply with NAVFAC contractual requirements.

Three soil borings/monitoring wells were drilled and installed at the site on April 1, 1993. Soils in the area are characterized as clayey fine-grained sand. Analytical results indicate that adsorbed-phase hydrocarbon concentrations in all of the soil samples collected from the soil borings are less than the laboratory's reported method detection limits.

Based on liquid-level measurements, the depth to groundwater is at approximately 8 to 9 feet. The hydraulic gradient across the site on April 1, 1993, was 0.012 feet per foot towards the south. Liquid-phase hydrocarbons were not measured or observed in monitoring wells STT39A-1 through STT39A-3 during the April 1, 1993 well gauging event. Groundwater samples were collected from the monitoring wells and analyzed for aromatic purgeable hydrocarbons by modified EPA Method 602. Dissolved-phase hydrocarbon concentrations were less than the laboratory's reported method detection limit in the groundwater samples collected from monitoring well STT39A-2. Benzene, toluene, ethylbenzene and xylenes concentrations in all of the groundwater samples collected from monitoring well STT39A-1 are greater than the State Water Quality Standards established by the NCDEHNR. Dissolved-phase hydrocarbon concentrations are less than the State Water Quality Standards in samples collected from monitoring wells STT39A-2 and STT39A-3.

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THREE WELL SITE CHECK REPORT
BUILDING STT-69
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.22

July 30, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-2699

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Prepared by:

William L. Hughes
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Lead Geologist

P. Taylor Sword
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Project Manager/Remediation Specialist

American Institute of Professional Geologists
Certificate Number
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P. Taylor Sword
Certified Professional Geologist

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

Commonwealth of Pennsylvania
Registered Professional
Don A. Skomsky
Engineer
37070-R

Offices throughout the U.S., Canada and Overseas

2.0 BACKGROUND

2.1 Site Description

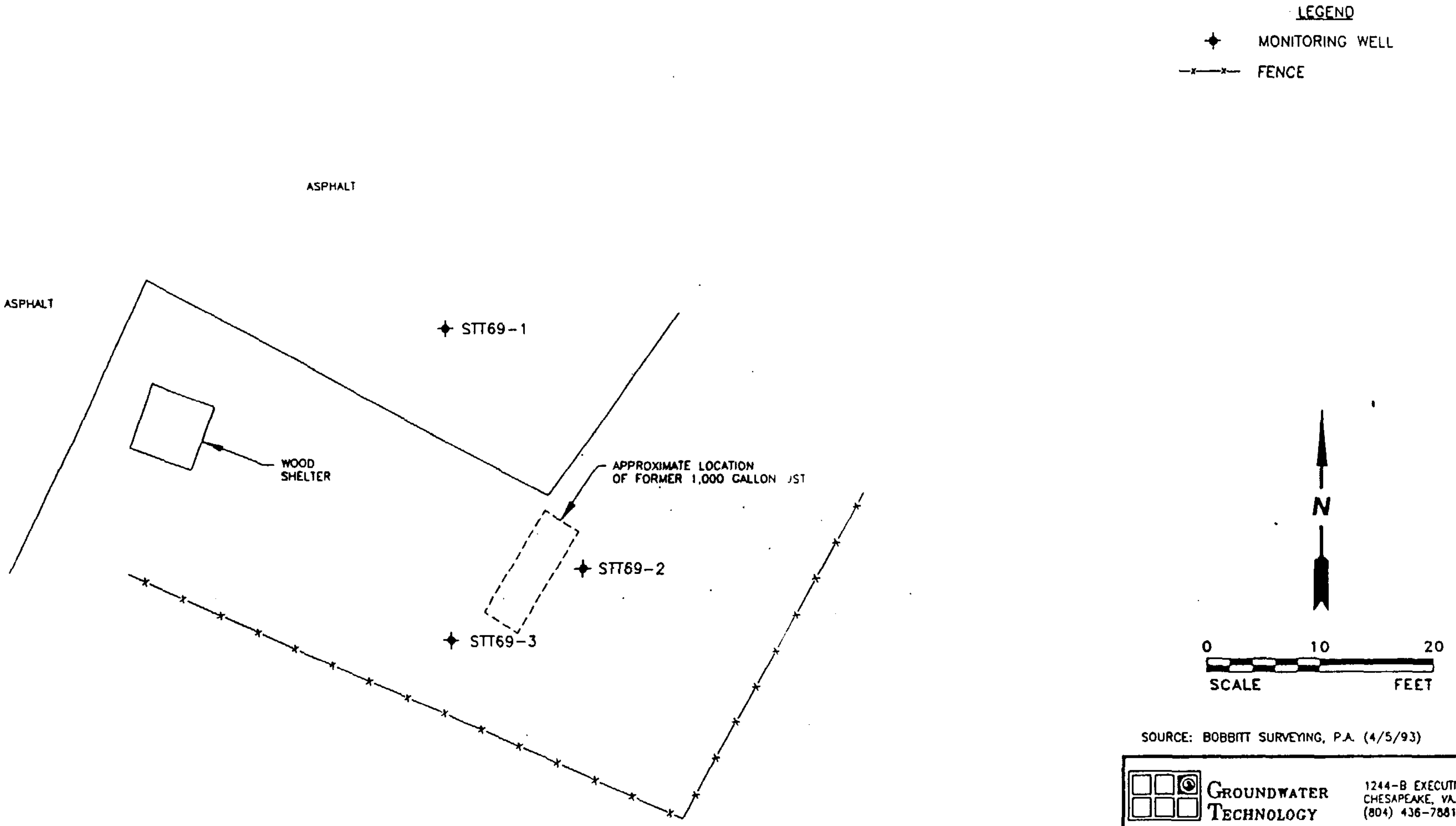
The site is located on the north side of Marine Corps Base, Camp Lejeune, North Carolina (Figure 1). The site map (Figure 2) illustrates Building STT-69 and the location of the installed wells. According to past documents, one steel 1,000-gallon capacity underground storage tank (UST) used to store gasoline was excavated and removed on June 24, 1992. GSI could not identify any information documenting the age or condition of the UST when recovered. According to the Tank Removal Report prepared for the site by Environmental and Regulatory Consultants, Inc. on September 10, 1992, two soil samples were collected for laboratory analysis during excavation activities. The samples were analyzed for the presence of total petroleum hydrocarbons (TPH)-as-gasoline by U.S. Environmental Protection Agency (EPA) Method 5030. Analytical results indicate that the TPH-as-gasoline concentration in all of the sample collected was 560 parts per million (ppm). The soil sample collected from the excavated soils contained 135 ppm TPH-as gasoline.

2.2 Land and Water Use

Building STT-69 is located approximately 2,000 feet west of the Northeast Creek. The area immediately adjacent Building STT-69 is comprised of buildings that house military personnel at the Base. The site is situated in an area dominated by relatively flat topography. The nearest body of surface water is the Northeast Creek. Potable water for the base is supplied by wells located approximately 1,500 feet towards the south of the site that tap the Castle Hayne aquifer.

2.3 Regional Geology

The coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits of Miocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie bedrock of Pre-Cretaceous age, thicken and dip eastward with a thickness of 1,500 feet in the Camp Lejeune area (Harned et al., 1989). The geologic units in the area are divided into six formations: the Castle Hayne Formation of the Eocene Series; the River Bend Formation of the Oligocene Series; the Belgrade, Pungo River, and Eastover Formations of the Miocene Series; the Yorktown Formation of the Pliocene Series; and undifferentiated units of the Quaternary Series. The Castle Hayne Formation is composed of limestones and marls. The Castle Hayne Formation is overlain by the River Bend



SOURCE: BOBBITT SURVEYING, P.A. (4/5/93)

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(804) 436-7881

REV. NO.:	DRAWING DATE: 4/13/93	ACAD FILE: STT69STE

SITE MAP

CLIENT: LANTDIV NAVFACENGCOM

PM:

LOCATION: BUILDING STT-69
MARINE CORPS BASE, CAMP LEJEUNE, N.C.

PE/RG:

DESIGNED:	DETAILED:	PROJECT NO.:	FIGURE:
BH	PJC	830011088.2201	2

4.5 Technical Summary

Groundwater Technology Government Services, Inc. has completed a three well site check for Building STT-69 located at Marine Corps Base, Camp Lejeune, North Carolina. The site check was designed to comply with NAVFAC contractual requirements.

Three soil borings/monitoring wells were drilled and installed at the site on March 29, 1993. Soils in the area are characterized as clayey fine-grained sand. Analytical results indicate that adsorbed-phase hydrocarbon concentrations in all of the soil samples collected from the soil borings are less than the laboratory's reported method detection limits.

Based on liquid-level measurements, the depth to groundwater is at approximately 6 to 7 feet. The hydraulic gradient across the site on March 29, 1993, was 0.012 feet per foot towards the south. Liquid-phase hydrocarbons were not measured or observed in monitoring wells STT69-1 through STT69-3 during the March 29, 1993 well gauging event. Groundwater samples were collected from the monitoring wells and analyzed for aromatic purgeable hydrocarbons by modified EPA Method 602. Dissolved-phase hydrocarbon concentrations were less than the laboratory's reported method detection limit in the groundwater samples collected from monitoring well STT69-2. Groundwater samples collected from monitoring well STT69-1 contained dissolved-phase hydrocarbon concentrations less than State Water Quality Standards. Benzene, ethylbenzene and xylenes concentrations in all of the groundwater samples collected from monitoring well STT69-3 are greater than the State Water Quality Standards established by the NCDEHNR.

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THREE WELL SITE CHECK REPORT
BUILDING TT-2455
MARINE CORPS BASE, CAMP LEJEUNE, NC
A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.07

July 6, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
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P. TAYLOR SWORD

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky
Operations Manager

DON SKOMSKY
37070-R

Offices throughout the U.S., Canada and Overseas

2.0 BACKGROUND

2.1 Site Description

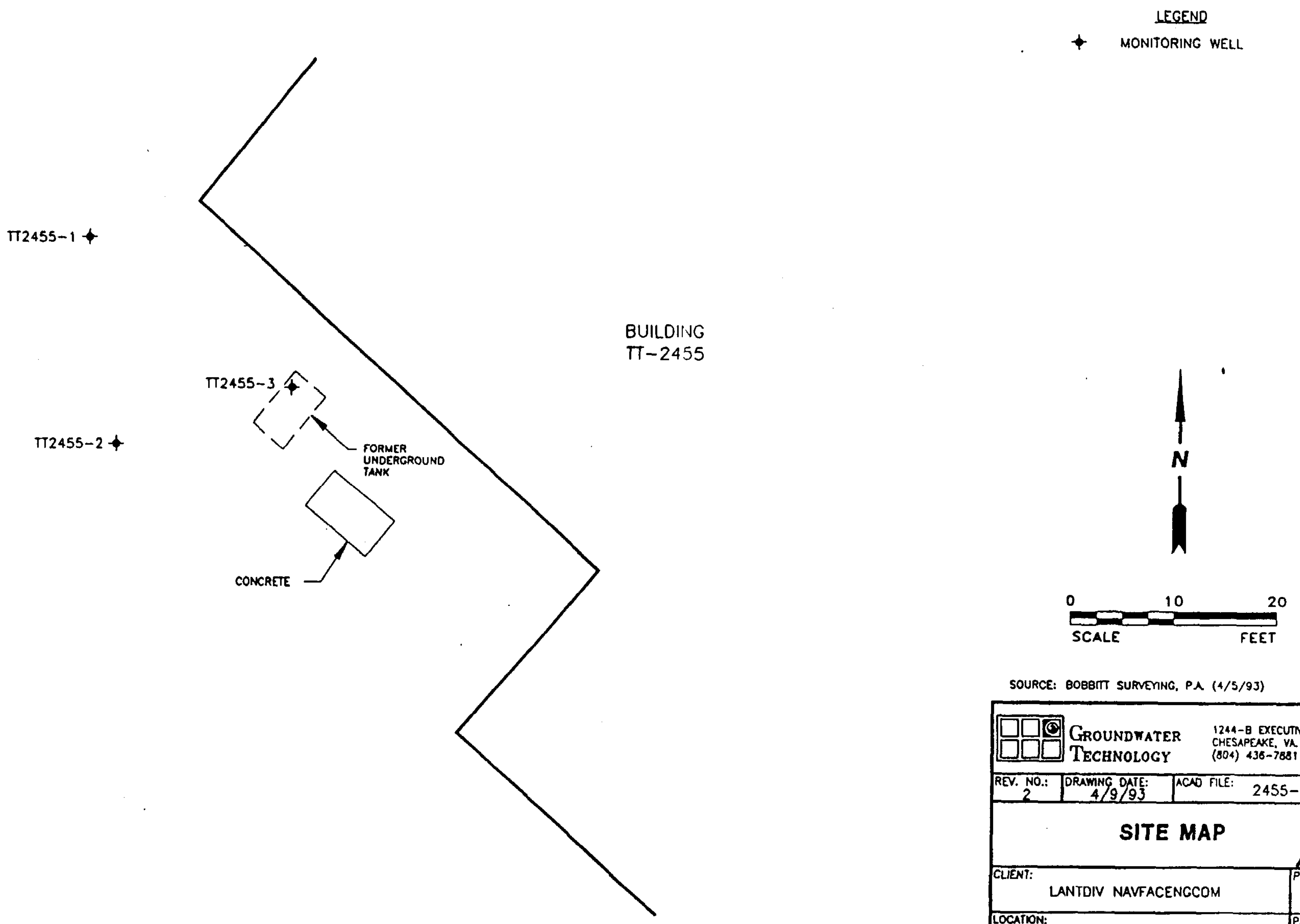
The site is located at Marine Corps Base, Camp Lejeune, North Carolina (Figure 1). The site map (Figure 2) illustrates the location of the Building TT-2455, and the location of the installed wells. According to past documents, one steel 1,000-gallon capacity underground storage tank (UST) used to store fuel adjacent to the building was excavated and removed on June 24, 1992. Groundwater Technology GSI could not identify any information documenting the age or condition of the UST when removed. According to the Closure Report prepared for the site by Environmental and Regulatory Consultants, Inc. on September 15, 1992, two discrete soil samples and one composite soil sample were collected for laboratory analysis during excavation activities. The samples were analyzed for the presence of total petroleum hydrocarbons (TPH)-as-fuel oil and TPH-as-gasoline by U.S. Environmental Protection Agency (EPA) Methods 3550 and 5030, respectively. Analytical results from the Closure Report indicate that the TPH-as-gasoline concentration in all of the samples collected was less than the laboratory's 10 parts per million (ppm) method detection limit. The TPH-as-fuel oil concentration ranged from 106 ppm in the sample collected 2 feet below the north end of the UST to 2,750 ppm in the sample collected at the same depth from the south end. The composite soil sample collected from the stockpile of excavated soil contained 2,130 ppm TPH-as-fuel oil.

2.2 Land and Water Use

Building TT-2455 is located approximately 1,000 feet north of the New River at the Base. The area immediately adjacent Building TT-2455 is comprised of buildings that house military personnel. The site is situated in an area dominated by relatively flat topography. The nearest body of surface water is the New River. Potable water for the base is supplied by wells located approximately 1.5 miles towards the southeast that tap the Castle Hayne aquifer.

2.3 Regional Geology

The coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits of Miocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie bedrock of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the Camp Lejeune area (Harned et al., 1989). The geologic units in the area are divided into six formations: the



SOURCE: BOBBITT SURVEYING, P.A. (4/5/93)

GROUNDWATER TECHNOLOGY

1244-B EXECUTIVE BLVD.
CHESAPEAKE, VA. 23320
(804) 436-7881

REV. NO.: 2	DRAWING DATE: 4/9/93	ACAD FILE: 2455-STE

SITE MAP

CLIENT: LANTDIV NAVFACENGCOM	PM: PTS
LOCATION: BUILDING TT-2455 MARINE CORPS BASE, CAMP LEJEUNE, N.C.	PE/RG: DS

DESIGNED: BH	DETAILED: PJC	PROJECT NO.: 830011088.0701	FIGURE: 2

4.5 Technical Summary

Groundwater Technology GSI has completed a three well site check for Building TT-2455 located at Marine Corps Base, Camp Lejeune, North Carolina. The site check was designed to comply with NAVFAC contractual requirements.

Three soil borings/monitoring wells were drilled and installed at the site on March 30, 1993. Soils in the area are characterized as silty and clayey fine-grained sand. Analytical results indicate that adsorbed-phase hydrocarbon concentrations in all of the soil samples collected from the soil borings are less than the laboratory's reported method detection limits with the exception of 6,800 ppm TPH-as-diesel and 4,300 ppm total oil and grease in monitoring well TT2455-3.

Based on liquid-level measurements, the depth to groundwater is at approximately 13 feet. The hydraulic gradient across the site on March 31, 1993, was 4 x 10^{-4} feet per foot towards the south-southwest. Liquid-phase hydrocarbons were not measured or observed in monitoring wells TT2455-1 through TT2455-3 during the March 31, 1993 well gauging event. Groundwater samples were collected from the monitoring wells and analyzed for aromatic purgeable hydrocarbons by modified EPA Method 602. Dissolved-phase hydrocarbon concentrations were less than the laboratory's reported method detection limit in all of the groundwater samples collected, with the exception of the sample collected from monitoring well TT2455-3. Benzene, toluene, ethylbenzene and xylenes concentrations in all of the groundwater samples are less than the State Water Quality Standards established by the NCDEHR.

GROUNDWATER
TECHNOLOGY
GOVERNMENT SERVICES

Groundwater Technology Government Services, Inc.
1244 B Executive Boulevard, Suite 106, Chesapeake, VA 23320
Tel: (804) 436-7881 Fax: (804) 436-2312

THREE WELL SITE CHECK REPORT
FORMER UST 2477-3, BUILDING TT-2477
MARINE CORPS BASE, CAMP LEJEUNE, NC

A&E CONTRACT NO: N62470-91-D-6652
JOB NO. 830011088.48

October 14, 1993

Prepared for:
Commander
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6299

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Prepared by:

William L. Hughes
William L. Hughes
Lead Geologist

P. Taylor Sword, C.P.G.
Project Manager/Remediation Specialist

AMERICAN INSTITUTE OF PROFESSIONAL GEOLOGISTS
CERTIFICATE NUMBER 8334
AIPG
P. TAYLOR SWORD
CERTIFIED PROFESSIONAL GEOLOGIST

GROUNDWATER TECHNOLOGY
GOVERNMENT SERVICES, INC.
Approved by:

Don Skomsky, P.E.
Operations Manager

2.0 BACKGROUND

2.1 Site Description

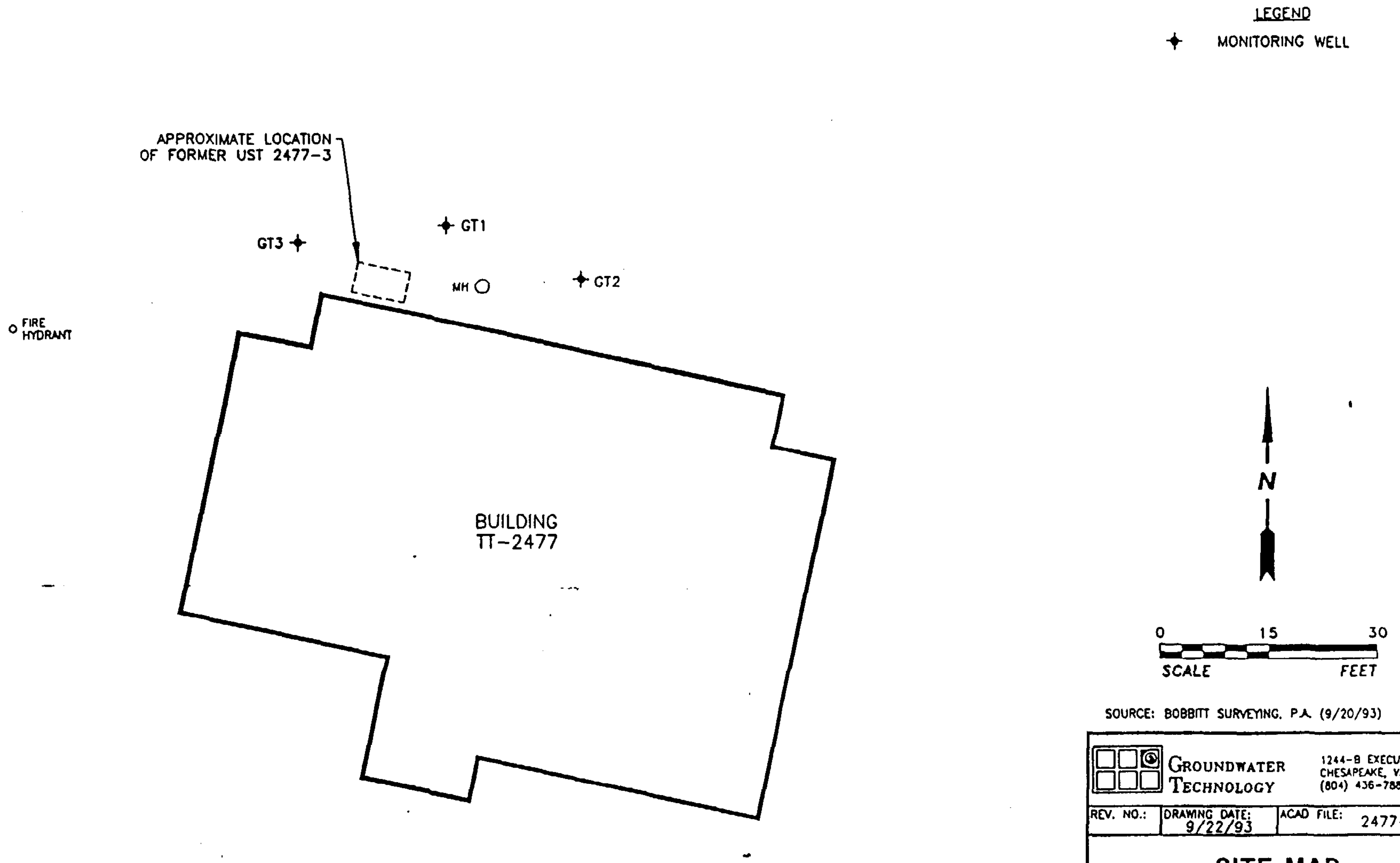
The site is located at Marine Corps Base, Camp Lejeune, North Carolina (Figure 1). The site map (Figure 2) illustrates the location of the Building T-2477, and the location of the installed wells. According to documents supplied to GSI, one steel 550-gallon UST used to store hydraulic fluid adjacent to the building was excavated and removed on December 12, 1993. According to the Tank Removal/Abandonment Report prepared by Environmental and Regulatory Consultants, Inc. on March 17, 1993, soil samples were collected from the bottom of the excavation and screened using a flame-ionization detector (FID). Vapor levels in the soil samples ranged from 20.0 to 90.0 parts per million (ppm). Two of the soil samples collected were submitted to a laboratory for analysis. The samples were analyzed for the presence of oil and grease by Method 9071. Analytical results from the Tank Removal Report indicate the soil samples contain total oil and grease concentrations of 650 ppm and 850 ppm.

2.2 Land and Water Use

Building T-2477 is located approximately 2,000 feet north of the New River at the Base. The area immediately adjacent Building T-2477 is comprised of buildings that house military personnel. The site is situated in an area dominated by relatively flat topography. The nearest body of surface water is the New River. Potable water for the base is supplied by wells located approximately 1.5 miles towards the southeast that tap the Castle Hayne aquifer.

2.3 Regional Geology

The coastal plain consists of a layered sequence of unconsolidated sand, gravel, silt, and clay deposits of Miocene to Holocene age. These deposits and formations of Lower Cretaceous age, which overlie bedrock of Precambrian age, thicken and dip eastward with a thickness of 1,500 feet in the Camp Lejeune area (Harned et al., 1989). The geologic units in the area are divided into six formations: the Castle Hayne Formation of the Eocene Series; the River Bend Formation of the Oligocene Series; the Belgrade, Pungo River, and Eastover Formations of the Miocene Series; the Yorktown Formation of the Pliocene Series; and undifferentiated units of the Quaternary Series. The Castle Hayne of the Pliocene Series; and undifferentiated units of the Quaternary Series. The Formation is composed of limestones and marls. The Castle Hayne Formation is overlain by the River Bend Formation. The Belgrade, Pungo



SOURCE: BOBBITT SURVEYING, P.A. (9/20/93)

GROUNDWATER TECHNOLOGY

1244-B EXECUTIVE BLVD.
CHESAPEAKE, VA 23320
(804) 436-7881

REV. NO.:	DRAWING DATE: 9/22/93	ACAD FILE: 2477-SVY

SITE MAP

CLIENT: LANTDIV NAVFACENGCOM

LOCATION: UST 2477-3, BUILDING TT-2477
MARINE CORPS BASE, CAMP LEJEUNE, N.C.

PM:

PE/RG:

DESIGNED:	DETAILED:	PROJECT NO.:	FIGURE:
BH	PJC	830011088.4801	2

The soil cuttings were used in a brick manufacturing process, where the soil is mixed with raw materials, crushed, ground, compacted, and extruded into bricks. The bricks are preheated and then fired in tunnel kilns at temperatures exceeding 1,700 degrees Fahrenheit for a period of approximately 12 hours. This process drives off and/or consumes any petroleum contamination. Any material that is not suitable for brickmaking was segregated by the facility, cleaned, and remediated in a permitted bioremediation facility.

During monitoring well development and groundwater sample collection, purge water was stored in three 55-gallon drums on site. The purge water was treated using a portable carbon adsorption unit and discharged on site.

4.5 Technical Summary

Groundwater Technology GSI has completed a three well site check for Building T-2477 located at Marine Corps Base, Camp Lejeune, North Carolina. The site check was designed to comply with NAVFAC contractual requirements.

Three soil borings/monitoring wells were drilled and installed at the site on July 19, 1993. Soils in the area are characterized as silty and clayey fine-grained sand. Analytical results indicate that adsorbed-phase hydrocarbon concentrations in all of the soil samples collected from the soil borings are less than the laboratory's reported method detection limits with the exception of 330 ppm and 650 ppm total oil and grease in the soil samples collected from monitoring well GT-1 and its duplicate sample, respectively.

Based on liquid-level measurements, the depth to groundwater is at approximately 13 feet. The hydraulic gradient across the site on July 20, 1993, was 0.007 feet per foot towards the north-northeast. Liquid-phase hydrocarbons were not measured or observed in any of the monitoring wells during the July 20, 1993 well gauging event. Groundwater samples were collected from the monitoring wells and analyzed for base/neutrals and acids in water by modified EPA Method 625. Dissolved-phase base/neutrals and acids in the groundwater samples were less than the laboratory's reported method detection limit in all of the groundwater samples collected, with the exception of the sample collected from monitoring well GT-3 which showed a 5.3 ppb concentration of diethylphthalate and a 1.3 ppb concentration of *bis*(2-ethylhexyl)phthalate. The method blank contained 1.2 ppb *bis*(2-ethylhexyl)phthalate, suggesting blank contamination occurred during the analysis.

FINAL

SITE ASSESSMENT REPORT

BUILDING 21
WASTEWATER TREATMENT PLANT
UNDERGROUND STORAGE TANK
SYSTEM 21.1

MCB Camp Lejeune, North Carolina
Contract Task Order 110

Prepared For:

Department of the Navy
Atlantic Division
Naval Facilities
Engineering Command
Norfolk, Virginia

Under the

LANTDIV CLEAN Program

Comprehensive Long-Term
Environmental Action Navy

3.0 POTENTIAL RECEPTORS/SITE UTILITIES

3.1 Site Description

UST 21.1 was located east of Building 21, the Auxiliary Pump Station for the Waste Water Treatment Plant. Building 21 is located on a service road off River Road at the MCB, Camp Lejeune, North Carolina. The site consists of a 250-gallon steel UST (UST 21.1) containing regular gasoline and two estimated 500-gallon aboveground storage tanks (ASTs) containing fuel oil (no secondary containment present). Figure 2-1 shows the locations of these structures.

North and east of the site is a wooded area. To the south is the Waste Water Treatment Plant and sludge drying beds, and to the west is a waste water treatment basin, wooded area, and the New River Estuary.

3.2 Off-Site Contamination Sources

Two 1,000 gallon ASTs are located approximately 200 feet west of Building 21. The ASTs are presumed to contain No. 2 fuel oil. Secondary containment is present for both AST.

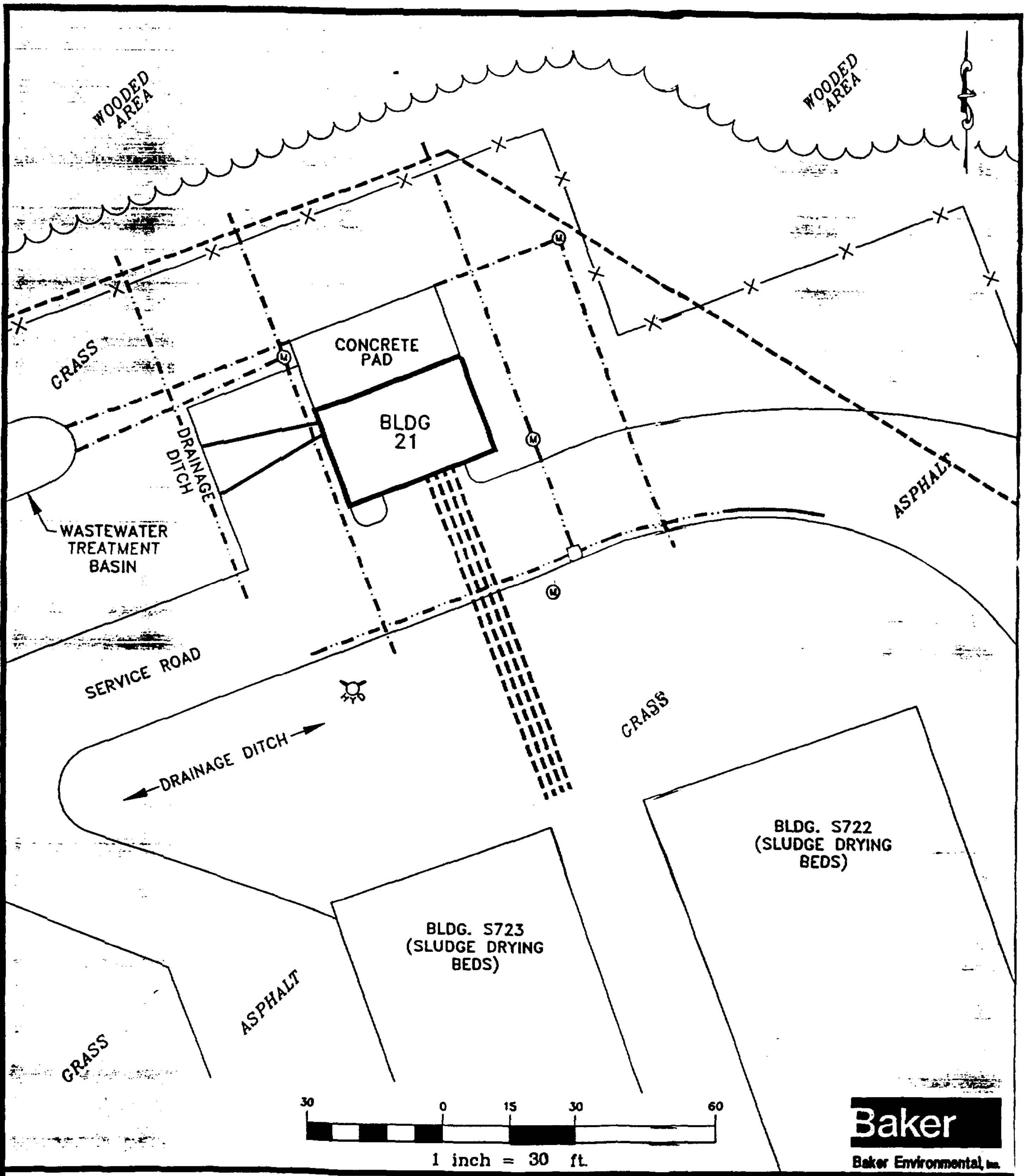
3.3 Potential Receptors/Site Utilities

3.3.1 Local Land Use

Land cover in the subject area is mixed urban. Local land uses are related to base operations and the waste water treatment plant. Undeveloped, wooded land is located to the north and east of the site. Further, there does not appear to be any other structures in the immediate vicinity of the site that may contain USTs.

3.3.2 Inventory of Water Supply Wells

As required by the North Carolina Department of Environment, Health, and Natural Resources (DEHNR), information on water supply and observation wells located within 1,200 foot radius of the site must be identified. This was accomplished by notifying Activity personnel at the MCB, Camp Lejeune. According to information provided by Camp Lejeune personnel, there are no water supply wells within a 1,200 foot radius of UST 21.1 and



LEGEND

- FIRE HYDRANT
- Ⓜ MANHOLE
- — — — APPROXIMATE LOCATION OF WATER LINE
- —·—· APPROXIMATE LOCATION OF SANITARY SEWAGE LINE
- —··— APPROXIMATE LOCATION OF STORM DRAIN LINE
- ——— APPROXIMATE LOCATION OF ELECTRICAL LINE

SOURCE: LANTDIV, OCT. 1991

FIGURE 3-1
LOCATIONS OF UNDERGROUND UTILITIES
BUILDING 21
UST 21.1

MCB CAMP LEJEUNE
CAMP LEJEUNE, NORTH CAROLINA

11.0 CONCLUSIONS

The following conclusions are based on the results of Site Assessment Investigation:

- TPH concentrations detected in site soils ranged from 1.0 mg/kg to 338 mg/kg Samples collected from two soil boring locations exhibited TPH concentrations that exceed the DEHNR action limit of 10 mg/kg, based on the SSE evaluation. Based on the TPH analysis, the contamination present in the soils is most representative of gasoline.

- The Federal MCL for benzene of 5.0 µg/L was exceeded in three groundwater samples. Monitoring wells MW-1, MW-2, and MW-9 exhibited benzene concentrations of 35 µg/L, 2,420 µg/L, and 12 µg/L which exceed Federal limits. The State WQS for benzene of 1.0 µg/L was exceeded in MW-3 (2 µg/L), MW-4 (2 µg/L), and DW-4 (1 µg/L) in addition to the other three samples.

- Concentrations of purgeable halocarbons were not detected in any of the groundwater samples analyzed.

- Concentrations of total lead were not detected in any of the groundwater samples analyzed.

- The direction of groundwater flow in the vicinity of the site appears to be north at a rate of approximately 70 feet/year in the shallow water-bearing zone, and 2,329 feet/year in the deep water-bearing zone.

- The average hydraulic conductivity calculated for the shallow water-bearing zone is 8.8×10^{-2} feet/day; for the deeper water-bearing zone, the average hydraulic conductivity is 3.4 feet/day. These values are based on slug test data.

- The average groundwater gradient for the site is 1.8×10^{-2} based on water level data collected on May 19, 1992.

- Estimated porosity for the site was 0.30 (Fetter 1980).

- The average transmissivity (T) of the shallow water bearing zone is 156 ft^2/day; for the deeper water bearing zone, the average T and storativity (S) are 5,192 ft^2/day and 2.42×10^{-2}, based on the aquifer (drawdown and recovery) tests.

- The average hydraulic conductivity, based on the aquifer tests, for the shallow water-bearing zone is 3.12 feet/day and for the deep water-bearing zone is 104 feet/day.

- It is recommended that additional field work be performed to further identify the lateral limits of both soil and groundwater contamination.

- Remediation of the soils and groundwater in the immediate vicinity of former UST 21.1 is recommended. However, until the suggested additional work is completed, the alternatives for the remediation of this site should not be addressed.

Final

Site Assessment Report

Former Rifle Range
MCX Service Station
Underground Storage Tank RR - 72

MCB Camp Lejeune, North Carolina

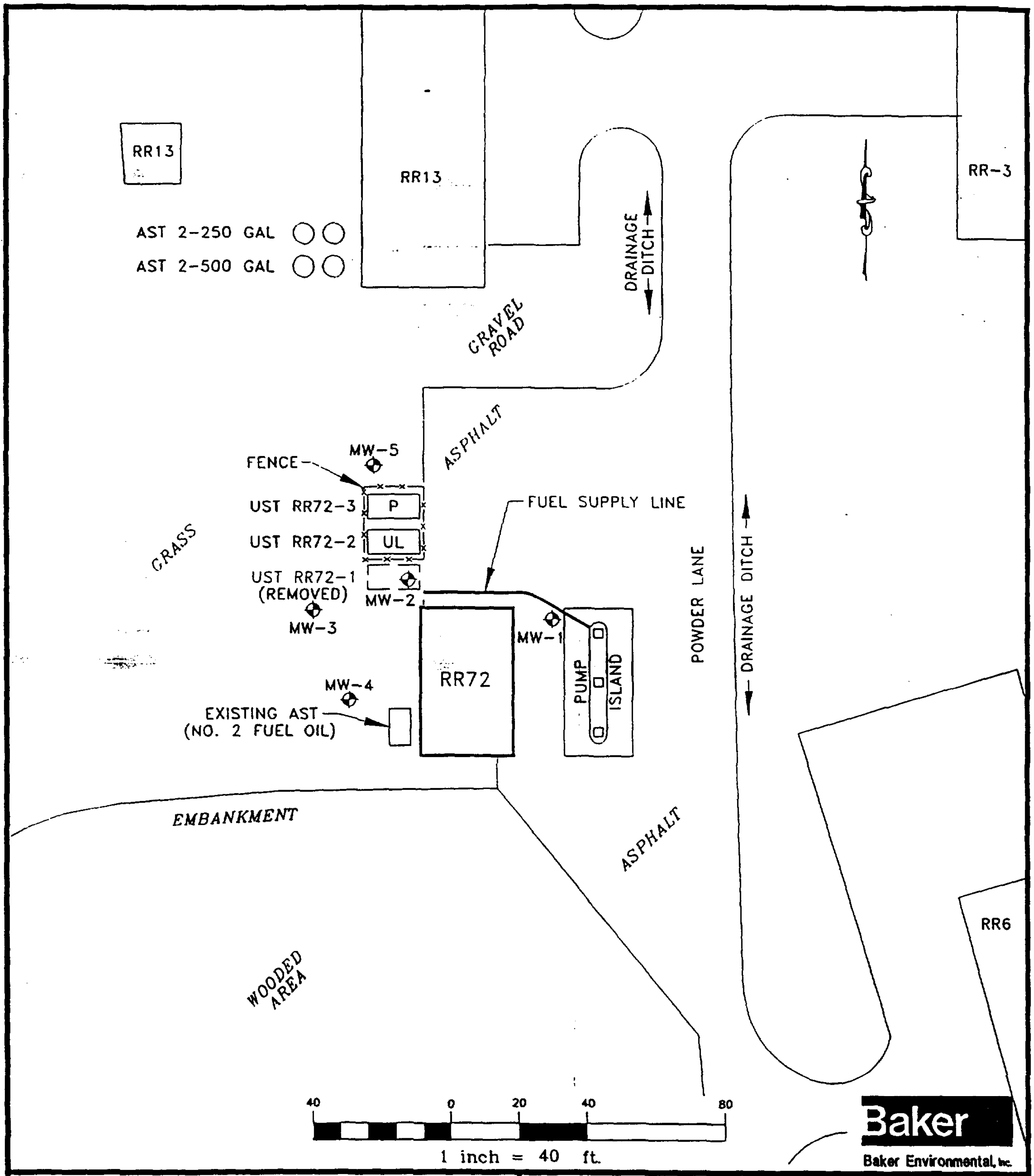
Prepared For:

Department of the Navy
Atlantic Division
Naval Facilities
Engineering Command
Norfolk, Virginia

Under the

LANTDIV CLEAN Program

Comprehensive Long-Term
Environmental Action Navy



LEGEND

MW-1 ⊕ EXISTING GROUNDWATER MONITORING WELL INSTALLED BY ATEC ASSOC., AUGUST 1991

— APPROXIMATE LOCATION OF FUEL DISTRIBUTION SUPPLY LINE

P - PREMIUM GASOLINE UST

UL - UNLEADED GASOLINE UST

SOURCE: LANTDIV, MAY 1992

FIGURE 2-1
SITE PLAN
FORMER MCX SERVICE STATION RR-72
UST SYSTEM RR-72

MCB CAMP LEJEUNE
CAMP LEJEUNE, NORTH CAROLINA

3.0 POTENTIAL RECEPTORS/SITE UTILITIES

3.1 Site Description

Building RR-72, the former MCX Service Station is situated near the intersection of Shellrock Drive and Powder Lane, Rifle Range Area, at the MCB, Camp Lejeune North Carolina. UST System RR-72 is located on the northwest side of Building RR-72. The site consists of a service building (Building RR-72), a pump island with three distribution pumps, two existing USTs (RR-72-2 and RR-72-3), and a 500-gallon aboveground storage tank (AST). The location of the study site is shown on Figure 2-1.

The RR-72 site is primarily covered with asphalt to the east and south and with grass on the north and west. A wooded area, mostly in a ravine, is located to the south of Building RR-72. To the east, is a open field. Operational buildings of the Rifle Range Area are located to the north and west of Building RR-72.

3.2 Off-Site Contamination Sources

Two 500 gallon and two 250 gallon ASTs are located approximately 150 feet to the north of Building RR-72. These ASTs are adjacent to the southwest corner of Building RR-13. The ASTs are presumed to contain either No. 2 fuel oil, diesel, or kerosene. No secondary containment protection was noted for these ASTs. The location of these ASTs is shown on Figure 2-1.

3.3 Potential Receptors/Site Utilities

3.3.1 Local Land Use

Land cover in the subject area is mixed urban. Local land uses along Powder Lane are related to base operations and are primarily light industrial and military. Buildings RR-6 and RR-3, located east of the site across Powder Lane, are the Rifle Range Fire Station and Mess Hall, respectively. Building RR-13 is located to the immediate north of the site and is used for base operations. Undeveloped land is located to the west and south of Building RR-72. Further, there does not appear to be any other structures in the immediate vicinity of the site that may contain USTs.

11.0 CONCLUSIONS

- TPH concentrations in soil were below the state action level of 10 mg/kg.

- Due to the low TPH concentrations in the soil, the "Passive Remediation Alternative" appears to be the most practical approach. It may be necessary, however, to monitor subsurface soils to evaluate future site conditions.

- Based on the site history and the results of groundwater sampling, the site has been impacted by volatile organics, more specifically aromatic hydrocarbons.

- Because the area of impacted groundwater appears to be limited to the immediate vicinity of the three USTs, the air stripping alternative for groundwater remediation is recommended.

- The direction of groundwater flow in the vicinity of the site appears to be southwest at a rate of approximately 190 feet/year.

- The average hydraulic conductivity for tests run on MW-2 and MW-3 was 1.48 feet/day.

- The groundwater gradient for the site (calculated from the hydraulic conductivity tests) was 0.106.

- Estimated porosity for the site was 0.30 (Fetter, 1989).

- Additional field work is recommended at this site. The work will consist of installation of Type III monitoring wells to determine the vertical extent of contamination, installation of hydropunch penetrometers, and an aquifer test to evaluate site hydrogeologic conditions.

- Tanks RR-72-2 and RR-72-3 should be properly closed and removed. Contaminated soil in the immediate vicinity of the excavations should be removed and properly disposed.

FINAL

SITE ASSESSMENT REPORT

UNDERGROUND STORAGE TANK SYSTEM H-28 at BUILDING H-28 HOUSING AREA MCB CAMP LEJEUNE NORTH CAROLINA

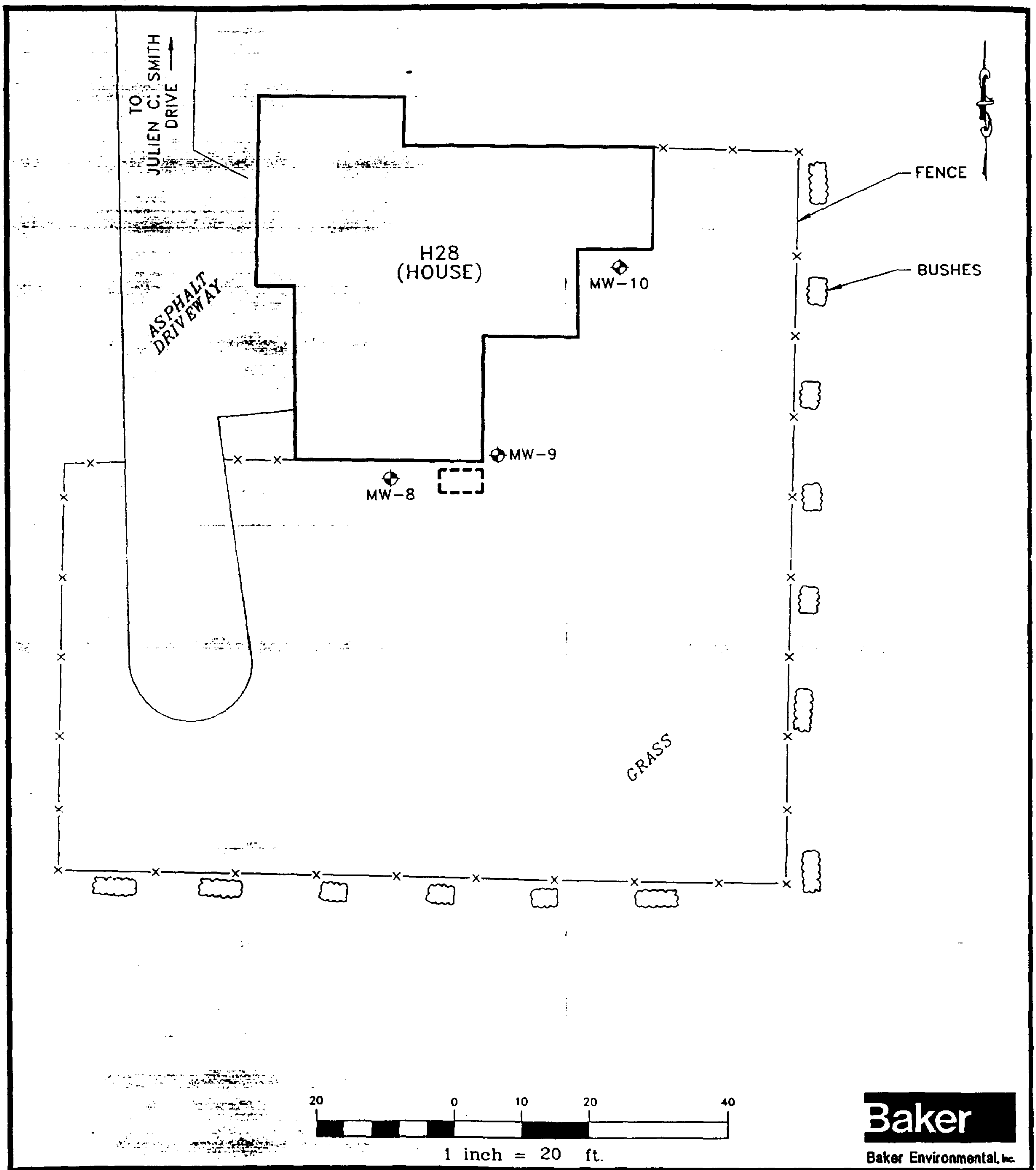
Prepared For:

Department of the Navy
Atlantic Division
Naval Facilities
Engineering Command
Norfolk, Virginia

Under the

LANTDIV CLEAN Program

Comprehensive Long-Term
Environmental Action Navy



LEGEND

⬚ APPROXIMATE LOCATION OF FORMER 550 GALLON UST H-28 CONTAINING NO. 2 FUEL OIL

MW-8 ⊕ EXISTING GROUNDWATER MONITORING WELL INSTALLED BY ATEC ASSOC., AUGUST 1991

SOURCE: LANTDIV, MAY 1992

FIGURE 2-1
SITE PLAN
HOUSING AREA
UST SYSTEM H-28

MCB CAMP LEJEUNE
CAMP LEJEUNE, NORTH CAROLINA

3.0 POTENTIAL RECEPTORS/SITE UTILITIES

3.1 Site Description

UST H-28 was formerly located on the south side of Building H-28. Building H-28 is situated on Hospital Point directly south of Julien C. Smith Drive, approximately 200 feet south of Wallace Creek at MCB, Camp Lejeune, North Carolina. Land use in the immediate vicinity of the site is residential. The location of the study site is shown on Figure 1-1. Figure 2-1 depicts a site plan for Building H-28, showing the former location of the UST H-28 and surrounding structures.

3.2 Off-Site Contamination Sources

No off-site contamination sources have been identified in the immediate vicinity of Building H-28.

3.3 Potential Receptors/Site Utilities

3.3.1 Local Land Use

Land use in the area surrounding Building H-28 is considered to be residential. The site is bordered to the north by Julien C. Smith Drive, residential homes, and Wallace Creek. A fence and grass fields surround the site to the south, east, and west, as well as tennis courts to the east.

3.3.2 Inventory of Water Supply Wells

As required by the North Carolina Department of Environmental Health and Natural Resources (DEHNR), water supply and observation wells within a 1,200 foot radius of a site must be identified. According to information provided by The U.S. Geological Survey and by Camp Lejeune personnel, no supply wells are located within a 1,200 foot radius of Building H-28 (USGS, W-RIR 89-4096).

11.0 CONCLUSIONS

The following conclusions are based on the results of Site Assessment Investigation:

- TPH concentrations detected in site soils ranged from 1.0 mg/kg to 11.0 mg/kg for low to medium boiling points and from 1.0 mg/kg to 348 mg/kg for medium to high boiling points. A sample collected from soil boring SB-1 (6 to 8 feet) exhibited a TPH concentration that exceeded the DEHNR action limit of 35 mg/kg, based on the SSE evaluation. Based on the TPH analysis, the contamination present in the soils is most representative of diesel fuel.

- The State WQS and Federal MCL for benzene of 1.0 µg/L and 5.0 µg/L, respectively, was exceeded in one groundwater sample. Monitoring well MW-6 exhibited a benzene concentration of 8.0 µg/L which slightly exceeds the State and Federal limits.

- Benzene concentrations exceeding the State WQS and Federal MCL were detected at MW-8 and MW-9 (wells installed in 1991 by ATEC Environmental Consultants, Inc.) during the site check. However, benzene was not detected in these wells during the site assessment.

- Concentrations of purgeable halocarbons were not detected in any of the groundwater samples analyzed.

- Detectable concentrations of BNAs were detected in two monitoring wells (MW-4 and MW-6). The concentration of benzo(a)anthracene detected in monitoring well MW-4 (10.9 µg/L) exceeded the Federal MCL of 0.1 µg/L.

- 1,2-dicloroethane was the only constituent detected using the TCLP full scan analysis. This concentration was detected in monitoring well MW-6 at 11.0 µg/L. This concentration is above the State WQS of 0.38 µg/L.

- The direction of groundwater flow in the vicinity of the site appears to be northwest and west at a rate of approximately 1.1 feet/year.

- The average hydraulic conductivity calculated for the site is 7.1 x 10-1 feet/day or 2.5 x 10^{-4} cm/sec based on slug test data.

- The average groundwater gradient for the site is 0.0013 based on water level data collected on May 20, 1992.

- Estimated porosity for the site was 0.30 (Fetter 1980).

- Remediation of the soils in the immediate vicinity of the former UST tank pit and in the direct vicinity of soil boring SB-1 is recommended. It is anticipated that if these soils are remediated, the condition of the shallow aquifer will improve without performing active groundwater remediation. After remediation of the soils is completed, periodic monitoring of monitoring wells should be performed to evaluate groundwater conditions.

added fieldwork ordered

LAW ENGINEERING

DRAFT

LEAKING UNDERGROUND STORAGE TANK SITE ASSESSMENT REPORT

VOLUME I

BUILDING 45
EQUIPMENT AND MAINTENANCE SHOP UST S-941-2
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

Prepared For:

Commander
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia 23511-6287

Prepared By:

Law Engineering, Inc.
3301 Atlantic Avenue
Raleigh, North Carolina 27604

April 2, 1993

Law Engineering Job No. 475-08138-01

DRAFT

ground-water monitoring wells were installed in the vicinity of the subject UST. The locations of these wells, MW-1, MW-2, and MW-3, are exhibited in Drawing 3.1. As indicated in the ATEC Underground Storage Tank Site Check Investigation Report, dated February 18, 1992, the shallow ground water flow direction across the project site was determined to be generally towards the northeast, towards Highway 24, Mott Creek and Northeast Creek.

2.0 SITE DESCRIPTION

2.1 Area of Investigation

The project site is located adjacent to Building 780 near North Carolina Highway 24 at the MCB, Camp Lejeune, Onslow County, North Carolina. The site location is shown in Drawing 1.1. The site is situated entirely within the confines of the MCB and is bounded to the east by cleared land and Highway 24. South of the site is wooded, west of the site is Building 780, and north of the site is Building 45.

2.2 Site History and Operations

Information concerning the history of the tanks at the project site was provided by

Ms. Debra Pickett, a Physical Science Technician with the Installation/Restoration Division of the Environmental Management Department at Camp Lejeune. The UST system at the site consisted of two USTs. Tank S-941-2 was a 550-gallon steel tank installed in 1941 which contained gasoline. Tank S-941-1 was a 6,000-gallon steel tank also installed in 1941 which contained diesel fuel. According to information provided by Ms. Pickett, 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, indicating that the leak was in a line. As mentioned in Section 1.3, ATEC conducted a site check in August 1991 which indicated that the soil and ground water at the site was contaminated by petroleum-fuel-related hydrocarbons. The USTs were removed in October 1992 by Jones and Frank. Closure samples collected below UST S-941-2 confirmed contamination in the soil with total petroleum hydrocarbon (TPH) concentrations ranging from 52.3 parts per million (ppm) to 525 ppm. Due to the presence of free product in the excavation for UST S-941-1 during the closure process, no soil samples were collected.

2.3 Contaminant Source Inventory

Underground storage tanks identified at the project site are listed in Table 2.1 along with the product type, size of tank, installation date and tank status. The location of

CO
BUILDING 4

MCB,

REFERENCE: JAM

LAW ENGINEERING

DRAFT
LEAKING UNDERGROUND STORAGE TANK SITE ASSESSMENT REPORT

VOLUME II
APPENDICES

BUILDING 45
EQUIPMENT AND MAINTENANCE SHOP UST S-941-2
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

Prepared For:

Commander
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia 23511-6287

Prepared By:

Law Engineering, Inc.
3301 Atlantic Avenue
Raleigh, North Carolina 27604

April 2, 1993

Law Engineering Job No. 475-08138-1

1.0 INTRODUCTION

The purpose of this Leaking Underground Storage Tank (LUST) Site Assessment Workplan (Workplan) is to serve as a guidance document and procedural manual for performing tasks to aid in determining the magnitude and extent of soil and groundwater contamination; identifying possible free product accumulation; and assessing potential exposure to possible subsurface contaminants at UST S-941-2 located at Building 45 at Camp Lejeune. The location of the project site within the Marine Corps Base is shown in Drawing 1.1.

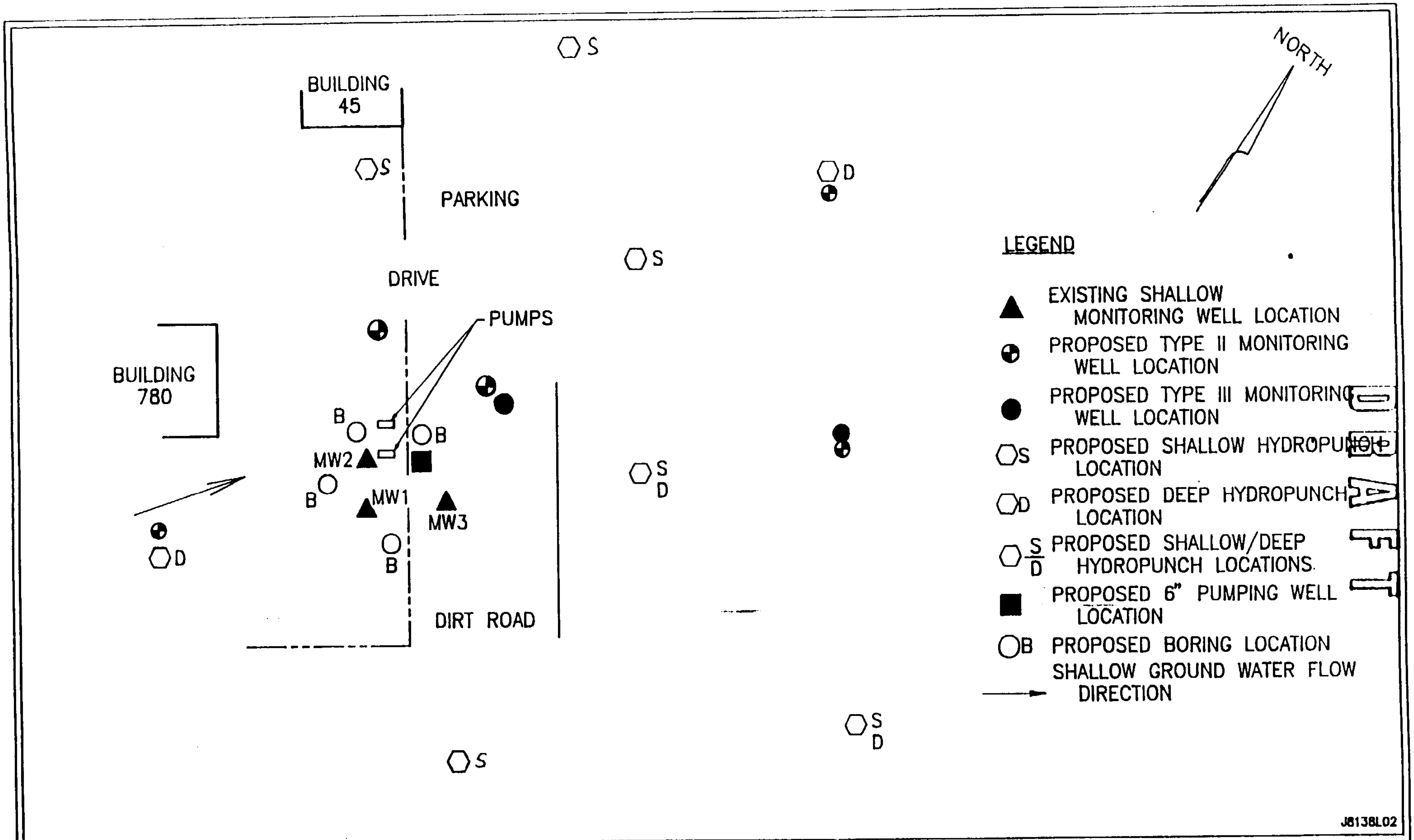
This Workplan was prepared in accordance with the Scope of Work (SOW) developed by the Naval Facilities Engineering Command and requirements listed as Tasks I through X of the document entitled "Comprehensive Site Assessments at LUST Sites: Basic Tasks and Minimal Elements" prepared by the Groundwater Section of the North Carolina Department of Environment, Health and Natural Resources (NCDEHNR). The objective of the Comprehensive Site Assessment is to provide sufficient data to meet the requirements of Sections 280.63 and 280.65 of 40 CFR Part 280, Federal Technical Standards for Underground Storage Tanks and Sections .0704 and .0706 of Title 15A, Chapter 2, Subchapter 2N, North Carolina Criteria and Standards Applicable to Underground Storage Tanks.

2.0 SITE CHARACTERIZATION

2.1 Regional Hydrogeology

In the Camp Lejeune area, sediments deposited in marine or near-marine environments are about 1,500 feet thick and overlie igneous and metamorphic basement rocks. The aquifers of the Camp Lejeune area are the surficial, Castle Hayne, Beaufort, Peedee, Black Creek, and upper and lower Cape Fear aquifers. They are separated by less permeable clay and silt beds (confining units) that serve to impede the flow of ground water between the aquifers (Harned, 1989).

The surficial aquifer is a series of sediments, primarily sand and clay, which commonly extend to depths of 50 to 100 feet. This unit is not used for water supply on the Base. The principal water-supply aquifer for the Base is the series of sand and limestone beds that occur between 50 and 300 feet below land surface. This series of sediments generally is known as the Castle Hayne aquifer. The Castle Hayne aquifer is about 150 to 350 feet thick in the area and is the most productive aquifer in North Carolina. It is a critical water-supply source, not only for Camp Lejeune but



MONITORING SYSTEM, EXISTING & PROPOSED
BUILDING 45, UST S-941-2
MARINE CORPS BASE, CAMP LEJUENE, NORTH CAROLINA

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

DRAWN: LCP	ENG CHECK: pkh	DATE: OCT. 1992	JOB: 475-08138-01
DFT CHECK: WBJ	APPROVAL:	SCALE: 1" = 40'	DWG: 3.1

REFERENCE: ATEC SITE MAP 8/91

Added fieldwork ordered

LAW ENGINEERING

DRAFT REPORT OF LEAKING UNDERGROUND STORAGE TANK SITE ASSESSMENT

VOLUME I

BERKLEY MANOR EXCHANGE SERVICE STATION
UST 820-2
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

Prepared for:

LANTNAVFACENGCOM
6500 Hampton Boulevard
Building A, 2nd Floor
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

Law Engineering, Inc.
3301 Atlantic Avenue
Raleigh, North Carolina

April 29, 1993

Law Engineering Job No. 475-08137-01

undeveloped land and on the east by Stone Street Extension, across which is base housing and a day-care center.

2.2 History and Operations of Berkley Manor

Rachel Johnson of the Environmental Management Department (EMD) of the Installation/Restoration Division at Camp Lejeune provided information concerning the history and operations of Berkley Manor, which opened in 1980. Storage of petroleum products in USTs at Berkley Manor began in 1984, when four fiberglass USTs (Numbers 820-1, 820-2, 820-3 and 820-4) were installed. Table 2.1 provides details of these USTs. These are the original USTs; none have been removed or replaced. The USTs are filled from above by tanker truck. Inventory is balanced daily.

There are two dispensing islands (Drawing 2.1) at Berkley Manor, each with four pumps. The first island was installed in 1984 and the second during an expansion in 1988. During the expansion, a second underground fuel line was installed which was connected to the line serving the original pump island.

Jones and Frank pressure-tested the USTs for tightness in 1990. Ms. Johnson provided portions of a report by EG&G Idaho, Inc. which included the results of pressure-testing of UST Nos. 1 and 3. Ms. Johnson also provided the results of pressure-testing of UST Nos. 2 and 4, which was performed one week later. The results of the pressure testing are also shown on Table 2.1. Under 40 CFR 280.43, a UST is considered to have passed a pressure-tightness test if the leak rate is less than 0.05 gallons per hour. The results of these tests indicate that UST Nos. 2 and 4 failed the pressure test. Law Engineering is coordinating the pressure-testing of approximately 120 USTs at Camp Lejeune in April/May 1993, during which the four USTs at Berkley Manor will be retested.

Tracer Research Corporation performed Tracer Tight™ testing of the USTs and distribution lines in 1992. The results of this testing was documented in a report by R.E. Wright Associates, Inc. (1992), portions of which were provided to Law Engineering by Ms. Johnson. According to the results of this testing, the UST system met EPA criteria for tank tightness. However, high levels of total volatile hydrocarbons were documented from probes placed in the UST excavation. In addition, one inch of water was discovered in UST No. 1.

7.4 Recommendations

To assist in developing the corrective action plan to restore subsurface conditions at Berkley Manor, Law Engineering recommends the following activities:

- Identify possible on-going releases by testing the integrity of the UST systems and the underground lines. This testing is taking place in May 1993.

- Install a single-cased monitoring well upgradient of the dispensing island to delineate the northern extent of the contaminant plume. Collect and test in the laboratory ground-water samples from these wells.

- Install a single-cased monitoring well downgradient of the estimated southern extent of the contaminant plume to delineate the southeastern extent of the contaminant plume. Collect and test in the laboratory ground-water samples from these wells.

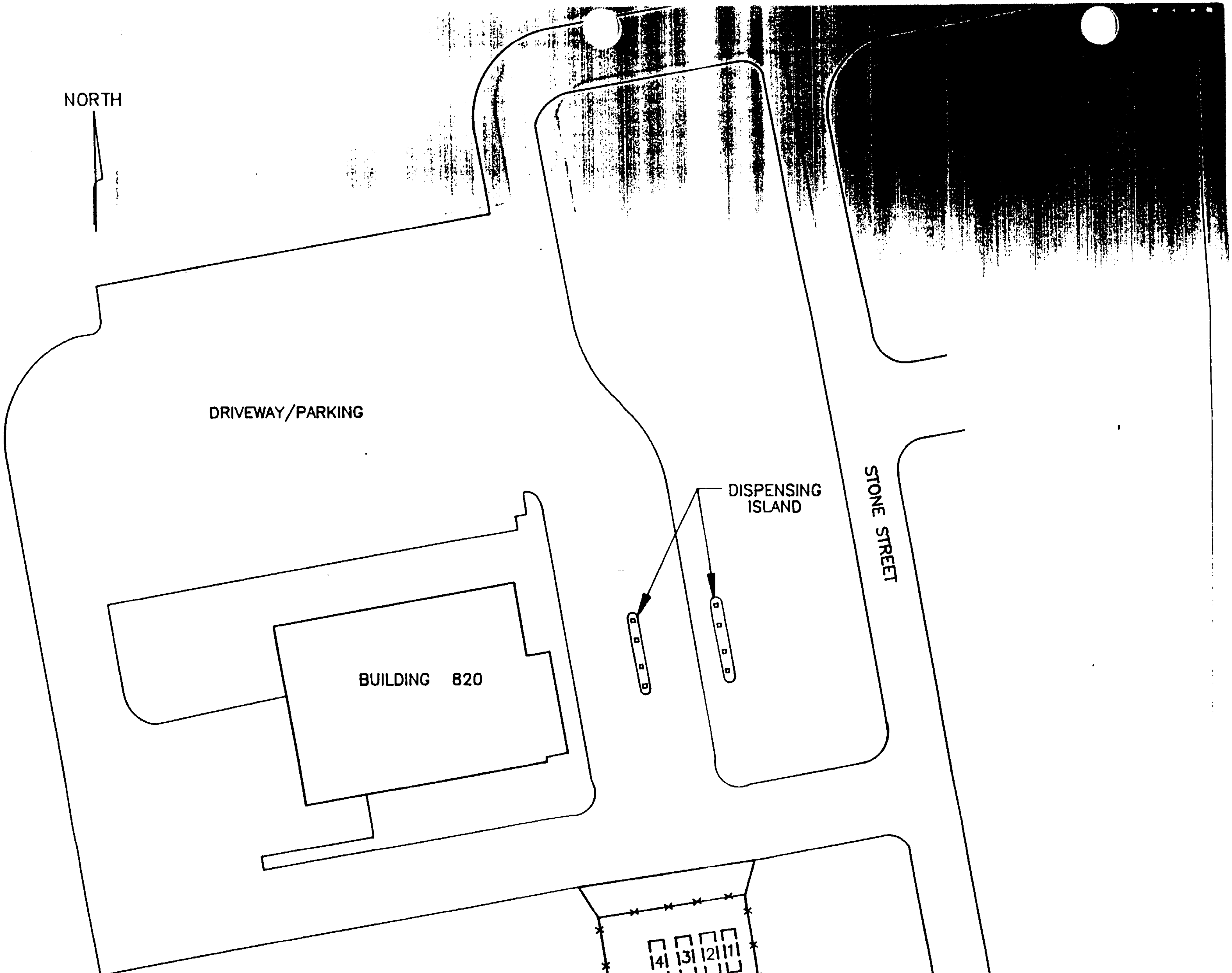
- Install double-cased monitoring wells north, west and south of the estimated extent of the deep contaminant plume to delineate the lateral extent of this plume. Collect and test in the laboratory ground-water samples from these wells.

- Install additional double-cased monitoring wells to depths deeper than the present double-cased wells to delineate the vertical extent of the deep contaminant plume. Install these wells at the locations of present double-cased wells to create well pairs or clusters. Collect and test in the laboratory ground-water samples from these wells.

- Install additional soil borings in the vicinity of the dispensing islands and underground fuel-dispensing lines to delineate the extent of petroleum-contaminated soils. Collect and test in the laboratory soil samples from these borings.

- Develop design plans and implement a free-product recovery system.

- Notify DEM of the findings and results of this investigation.


NORTH
DRIVEWAY/PARKING
BUILDING 820
DISPENSING ISLAND
STONE STREET
4
3
2
1

final
Retest EPA 610

Report

Addendum Site Assessment
Tanks M232-M236

Contract N62470-90-R-7626

Camp Johnson
Marine Corps Base
Camp Lejeune, North Carolina

July 1993

O'BRIEN & GERE
ENGINEERS, INC.

SECTION 1 - INTRODUCTION

1.01 Purpose and Scope

The objective of this report is to present information that has been gathered regarding any subsurface contamination in the vicinity of Buildings M232 through M236 at Camp Johnson, Marine Corps Base Camp Lejeune, North Carolina. O'Brien & Gere Engineers, Inc. (O'Brien & Gere Engineers) has completed two site investigations which included monitoring well installation, penetrometer probes, soil borings, groundwater elevation monitoring, soil and groundwater sampling and analysis and in-situ permeability testing. This report presents an Addendum Site Assessment, a risk assessment, a remediation assessment and recommendations for the study area.

1.02 Site History and Description

The study area is located in Camp Johnson, previously referred to as Montford Point and under the jurisdiction of Marine Corps Base, Camp Lejeune, Jacksonville, N.C. (Figure 1) The site lies approximately 800 feet inland of the New River and consists of 5 rectangular buildings (M232 - M236) used as living quarters for bachelor military personnel (Figure 2). Between 1942 and 1990, each building possessed an underground storage tank (UST), located at the northeast corner, used for heating oil. In May 1990 the USTs were exhumed by UTTS Environmental and reported by UTTS to be corroded. Soil samples collected at the time of the UST removals

3.02.4 Soil Exposure Pathway

Soil contamination has been identified at depths of six to eight feet below grade. Since the horizontal and vertical extent has not been completely established, there is a possibility that additional contamination may exist in the areas of the tanks. It is known that contaminated soils were used in filling the UST excavations. Current disturbance is limited to occasional foot traffic over the grassy cover and there are no plans for subsurface disturbance of the area, such that subsurface soils may be disturbed and direct contact might occur. Therefore, there is no potential for contact with contaminated soils under current and anticipated future conditions.

3.03 Conclusion of Qualitative Risk Assessment

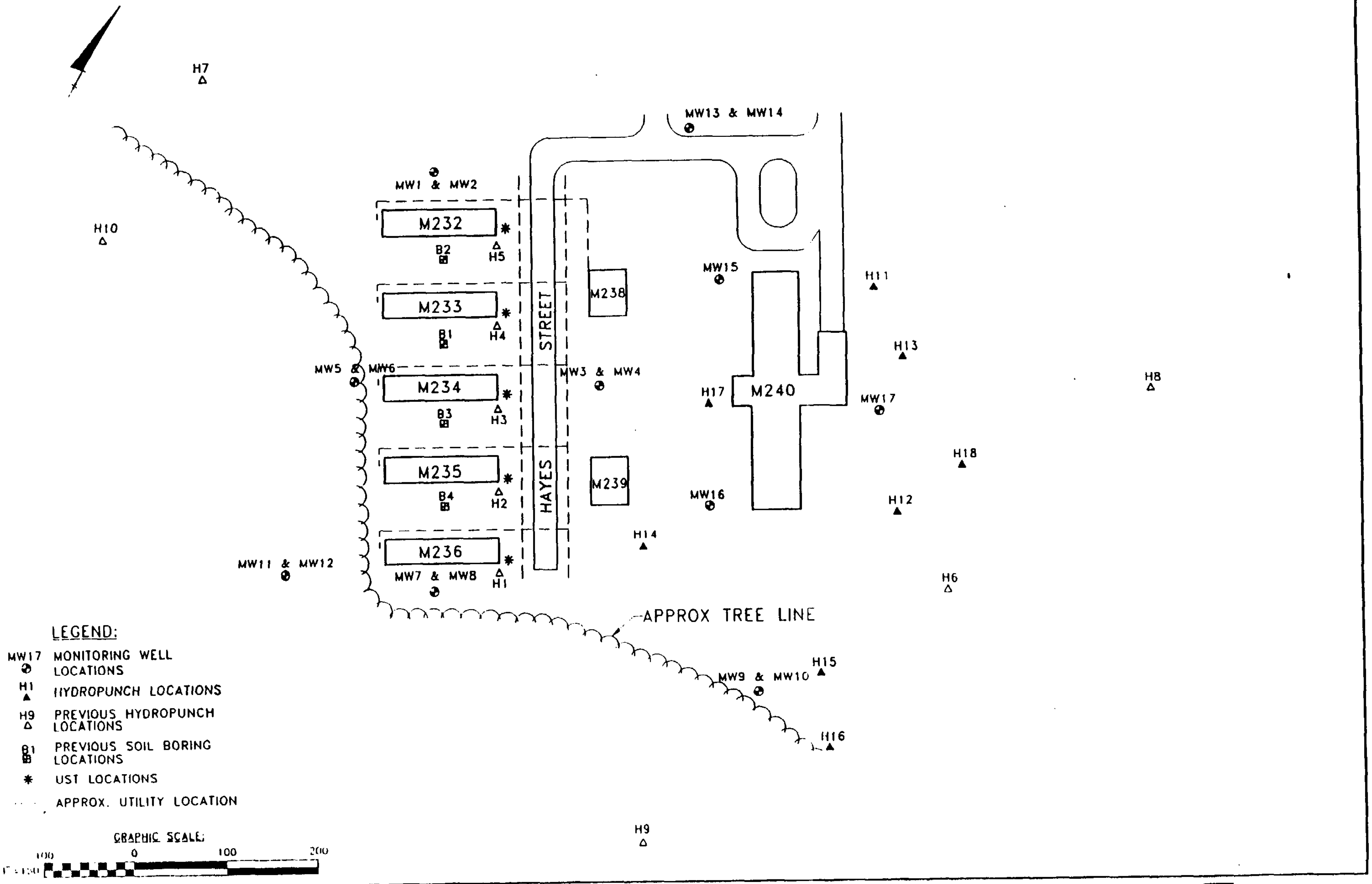
Potential complete exposure pathways have been identified, based on assumptions made regarding the extent of the source(s) of contamination. These are summarized on Table 7. Currently there is insufficient data available to further evaluate the pathways related to soil contamination. As a conservative measure, remediation of the source of the contamination in the immediate area of the tanks (i.e., contaminated soils) would be appropriate.

In accordance with North Carolina DEHNR guidance, remediation efforts at MW3 are also appropriate, based on the presence of free product, and the presence of phenanthrene greater than the DEHNR groundwater criterion.

It should be noted, as stated previously, the presence of chloroform and benzene in excess of DEHNR groundwater criteria are outside the scope of this investigation (since their presence is not related to the former USTs, but rather from an alternate source), and therefore have not been addressed in this risk assessment. These compounds are further addressed in Section 4.

FIGURE 3

CAMP JOHNSON
JACKSONVILLE, NC
TANKS M232 – M236
DRILLING LOCATIONS
DECEMBER 1992



O'BRIEN & GERE

Sent comments to LANTDIV 4/13/93

LAW ENGINEERING

DRAFT
LEAKING UNDERGROUND STORAGE TANK SITE ASSESSMENT REPORT

VOLUME I

MINI C STORE SERVICE STATION
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

Prepared For:

Commander
Naval Facilities Engineering Command
Atlantic Division
Norfolk, Virginia 23511-6287

TC912

Prepared By:

Law Engineering, Inc.
3301 Atlantic Avenue
Raleigh, North Carolina 27604

March 4, 1993

Law Engineering Job No. 475-08136-01

the ATEC Underground Storage Tank Site Check Investigation Report, dated February 18, 1992, the shallow ground-water flow direction across the project site was determined to be generally towards the east/northeast, toward the barracks, training facilities, and Edwards Creek.

2.0 SITE DESCRIPTION

2.1 Area of Investigation

The project site is located on A Street, MCB Camp Lejeune, Jacksonville, Onslow County, North Carolina. The site location is shown in Drawing 1.1. The site is situated entirely within the confines of the MCB and is bounded to the east by the enlisted men's club and barracks. South of the site is a recreation building, west of the site is a trailer housing a fast food restaurant, and north of the site is a wooded area.

2.2 Site History and Operations

Information concerning the history of the Mini C Store Service Station was provided by Ms. Debra Pickett, a Physical Science Technician with the Installation Restoration Division of the Environmental Management Department at Camp Lejeune. According to the information provided by Ms. Pickett, a Tank Removal Report prepared by Environmental & Regulatory Consultants, Inc. dated September 15, 1992, the UST systems at the Mini C Store Service Station were installed in 1964. The UST systems at the site consisted of five underground storage tanks (one 4,000 gallon gasoline UST, two 6,000 gallon gasoline USTs, one 550 gallon diesel UST, and one 550 gallon used oil UST). According to the Tank Removal Report, UST No. TC-912-1, a 6,000 gallon regular gasoline UST, failed a tank system check performed on June 28, 1990 by Jones and Frank with a full system volume change of 0.5795 gallons per hour. The petroleum USTs were deactivated in 1990 and excavated and removed in June 1992; however, it appears that the used oil UST, located on the western side of the service station, has not been removed from the site.

2.3 Contaminant Source Inventory

USTs identified at the Mini C Store facility are listed in Table 2.1 along with the product type, installation date, size of tank and tank status. The location of the USTs with respect to the site are presented in Drawing 2.1. It should be noted that Table 2.1 includes only those underground tanks that have been identified during the course of this investigation.

2.4 Drinking-Water Well Inventory

To identify potential receptors of ground-water contaminants, a survey of drinking water wells in the vicinity of the project site was performed by reviewing United States Geological Survey (USGS) Report 89-4096 and discussing water wells in the

- Definition of the spatial extent of vadose zone contamination, including the soils below the service station building, resulting from near surface discharges of petroleum.

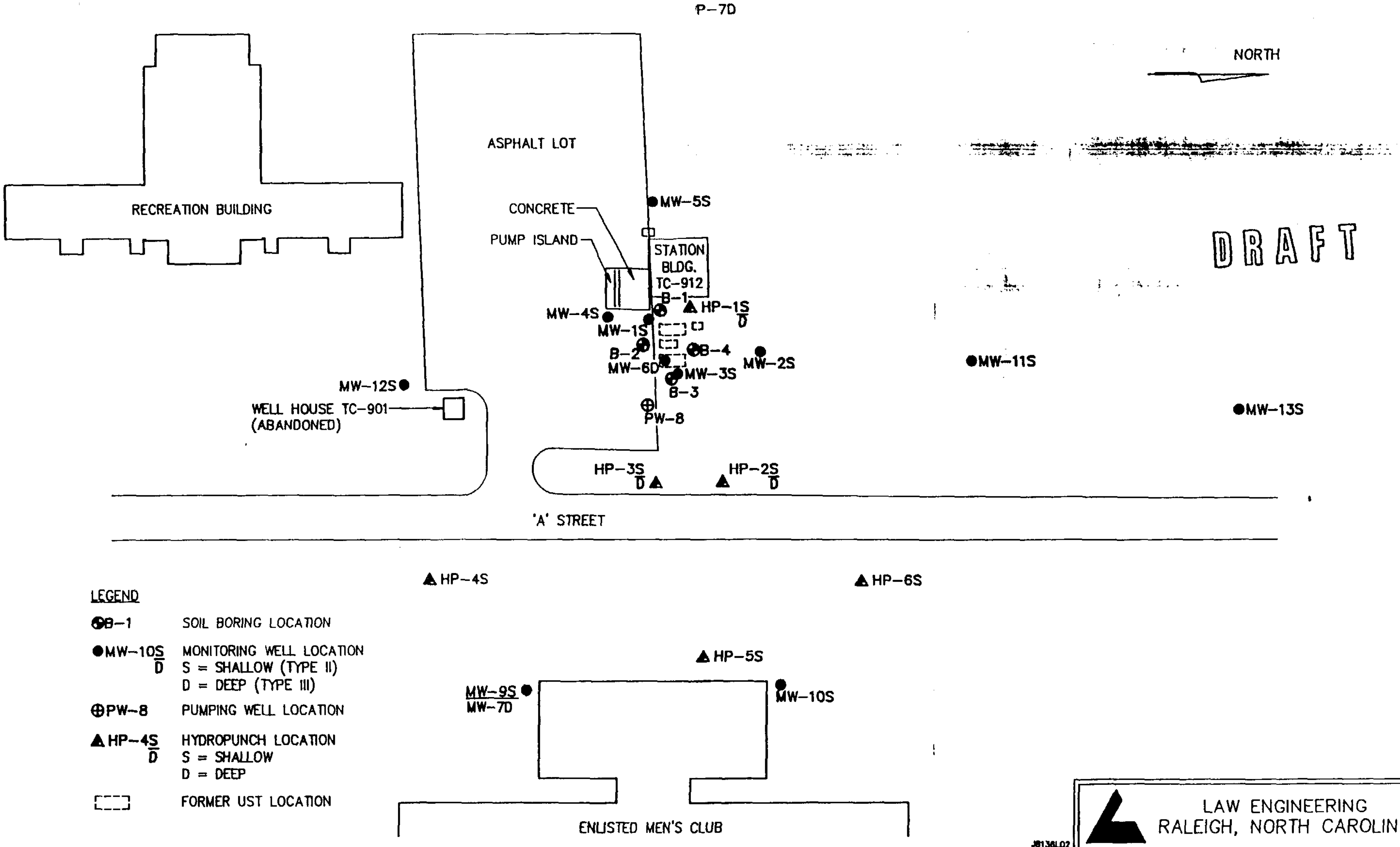
7.5 Recommendations

- Implementation of a monitoring program for MCB Camp Geiger drinking water wells TC-600 and TC-700 as a precautionary measure. Sampling and analysis should be conducted on a quarterly basis and test parameters should include (but not necessarily be limited to) benzene, toluene, ethylbenzene, MTBE, lead, and total xylenes.

- Re-sampling of the ATEC monitoring wells to verify the concentrations of petroleum-related contaminants in the wells.

- Notification of the North Carolina Division of Environmental Management of the findings and results of this investigation.

DRAFT



NOTES:
1. MONITORING WELLS MW-1S THROUGH MW-5S INSTALLED BY ATEC ASSOCIATES, AUGUST 1991.
2. MONITORING WELL MW-3S APPARENTLY DESTROYED DURING UST EXCAVATION PROCESS.

LAW ENGINEERING
RALEIGH, NORTH CAROLINA

BORING, MONITORING WELL & HYDROPUNCH LOCATION PLAN
GEIGER MINI C STORE SERVICE STATION
MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

DRAWN:	DATE: FEB. 1993
DFT CHECK: WBJ	SCALE: 1"=50'
ENG CHECK:	JOB: 475-08136-01
APPROVAL:	DWG: 3.1

REFERENCE: MARINE CORPS SITE AND UTILITIES PLAN, 1963; JAMES E. STEWART AND ASSOCIATES, INC. SURVEY, JANUARY 1993.

Final

Site Assessment Report

Building A-47
Amphibious Vehicle Maintenance Facility
Underground Storage Tank System SA-21

MCB Camp Lejeune, North Carolina

Prepared For

Department of the Navy
Atlantic Division

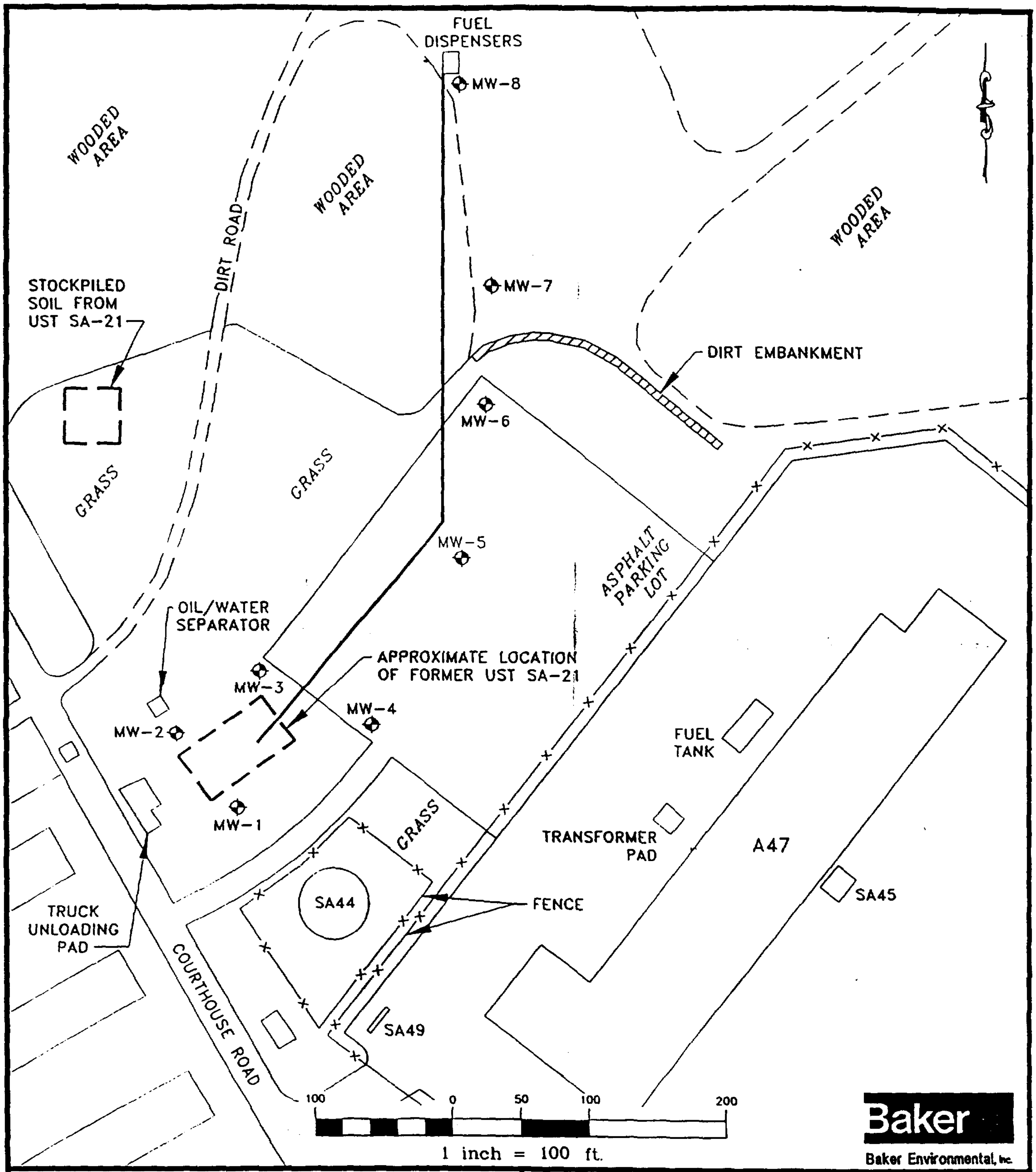
Naval Facilities Engineering Command

Norfolk, Virginia

Under The

LANTDIV CLEAN Program

Comprehensive Long-Term
Environmental Action Navy



LEGEND

MW-1 ⊕ EXISTING TYPE II GROUNDWATER MONITORING WELL INSTALLED BY ATEC ASSOC., AUGUST 1991

— APPROXIMATE LOCATION OF UNDERGROUND FUEL DISTRIBUTION LINE

SOURCE: LANTDIV. OCT. 1991

FIGURE 2-1
SITE PLAN
AMPHIBIOUS VEHICLE MAINTENANCE AREA
BUILDING A-47
UST SYSTEM SA-21
MCB CAMP LEJEUNE
CAMP LEJEUNE, NORTH CAROLINA

3.0 POTENTIAL RECEPTORS/SITE UTILITIES

3.1 Site Description

UST System SA-21 was formerly located west of Building A-47, the Amphibious Vehicle Maintenance Facility. Building A-47 is situated on Courthouse Road at the MCB Camp Lejeune, North Carolina. The site consists of a truck unloading pad connected to an oil/water separator, a fuel distribution line, and fuel dispensers. Figure 2-1 shows the locations of these structures.

North of the parking lot is a clearing situated in a wooded area where the fuel dispensers are located. The fuel distribution line that connects the UST to these dispensers lies under both grass as well as paved asphalt. To the south and to the east are various other support buildings. Also to the east is Courthouse Bay which is part of the New River Estuary.

3.2 Off-Site Contamination Sources

Approximately 1,050 cubic feet of soil was excavated when UST SA-21 was removed. The stockpiled soil (on plastic sheeting and covered) is located approximately 250 feet northeast of the former UST SA-21 tank pit. The location of this stockpile is shown on Figure 2-1.

3.3 Potential Receptors/Site Utilities

3.3.1 Local Land Use

Land cover in the subject area is mixed urban. Local land uses are limited to the Boat Basin, and Courthouse Bay which includes the Amphibious Vehicle Maintenance Facility. Undeveloped, wooded land is located to the north and west of the site. Further, there does not appear to be any other structures in the immediate vicinity of the site that may contain petroleum products.

3.3.2 Inventory of Water Supply Wells

As required by the North Carolina Department of Environment, Health, and Natural Resources (DEHNR), information on water supply and observation wells located within 1,500-foot radius of the site must be identified. This was accomplished by notifying Activity personnel at the MCB Camp Lejeune and reviewing appropriate documents. As shown on Figure 3-1, one supply well was identified within 1,500 feet of the site. The supply well, A-5, is located approximately 1,320 feet northwest of the site. Additional information regarding well construction details is provided in Table 3-1.

3.3.3 Site utilities

The only underground utility located in the immediate vicinity of the site that could potentially assist in contaminant migration was the main water line along Courthouse Road. Other on site utilities include the abandoned fuel distribution pipeline still in place from UST System SA-21 and the drain pipe connecting the truck unloading pad and oil/water separator. The locations are shown on Figure 3-2.

11.0 CONCLUSIONS

The following conclusions are based on the results of the site assessment:

- TPH concentrations detected in site soils ranged from 1.0 mg/kg to 70.0 mg/kg for low/medium boiling points (i.e., gasoline) and from 9.0 mg/kg to 2,004 mg/kg for medium/high boiling points (diesel, kerosene, or No. 6 fuel oil). Samples collected from 12 soil boring locations exhibited TPH concentrations that exceed the DEHNR action limit of 10 mg/kg, based on the SSE evaluation. Based on the TPH analysis, the contamination present in the soils is most representative of gasoline, diesel fuel, kerosene, and No. 6 fuel oil.

- The extent of TPH soil contamination has not been fully evaluated in the northern, western, and eastern portions of the site. Additional field work is recommended to identify the lateral limits of soil contamination.

- The NCWQS and Federal MCL for benzene of 1.0 µg/L and 5.0 µg/L, respectively, was exceeded in one groundwater sample. Monitoring well MW-15 exhibited a benzene concentration of 38.0 µg/L which exceeds the State and Federal limits. Two ATEC wells, MW-3 and MW-7, also exhibited benzene concentrations above the NCWQS with concentrations of 3.0 µg/L and 45.0 µg/L, respectively, during the initial site check. Additional field work is recommended to identify the lateral limits of benzene contamination in the groundwater.

- Concentrations of purgeable halocarbons were not detected in any of the groundwater samples analyzed.

- Concentrations of BNAs were detected in one deep monitoring well (DW-2).

- The direction of groundwater flow in the vicinity of the site appears to be northeast at a rate of approximately 3 feet/year.

- The average hydraulic conductivity calculated for the shallow water-bearing zone is 4.6×10^{-1} feet/day; for the deeper water-bearing zone, the average hydraulic conductivity is 2.8 feet/day. These values are based on slug test data.

- The average groundwater gradient for the site is 5.4 x10^{-3} based on water level data collected on May 5, 1992.

- Estimated porosity for the site was 0.30 (Fetter 1989).

- Remediation of the soils in the immediate vicinity of the former UST SA-21 tank pit, the southern end of the fuel distribution line, and the stockpiled soils is recommended. It is anticipated that if these soils are remediated, the condition of the shallow and deeper water-bearing zones will improve without performing active groundwater remediation. After remediation of the soils is completed, periodic monitoring of monitoring wells should be performed to evaluate groundwater conditions.

Report

Site Assessment
Tank STT61 - STT66
Tarawa Terrace

Marine Corps Base
Camp LeJeune
North Carolina

Contract N62470-90-R-7626

Naval Facilities Engineering Comma
Norfolk, Virginia

April 1992

O'BRIEN & GERE

1990 by Dewberry and Davis. This investigation included hand augering and soil boring sampling in the area of the tanks. Data from this investigation indicate some TPH contamination in soils, in excess of the North Carolina action level of 10 mg/kg. Also, benzene, toluene, ethylbenzene, xylenes, styrene and 1,1,1-trichloroethane were detected as soil contaminants.

3.02.02 Site and Surrounding Area Description

The tanks are located approximately 200 feet west of Tarawa Terrace, MCB Camp Lejeune. The immediate area of the tanks is undeveloped, and covered by wooded and brush areas. The ground cover within the fence consists of grassy and coarse vegetative covers, with some gravel near the fence line. According to Environmental Management Dept. personnel the area is not serviced by underground utilities. An out of service fire hydrant was observed adjacent to the west side of the fenced-in area.

Residential family housing is located approximately 1600 feet away, toward the north.

Previous inspection notes, supplied by Mr. Morris, indicated that structure cracks were observed in the concrete cradles supporting the tanks.

No surface contamination, nor surface drainage pathways, were observed in the tank area. There are no water supply wells operating within 1500 feet of the study area.

A map of the site is presented as Figure 2.

3.02.03 Demographics

The population at MCB Camp Lejeune includes military personnel and their families, as well as civilian employees. The tank area itself is unoccupied; it is entered once per week for inspection.

3.03 Current Site Data

The site investigation involved the installation, development and sampling of seven shallow monitoring wells and seven deep monitoring wells (as nested pairs; MW1 - MW14), four soil borings (B1 - B4), and ten hydropunches (H1 - H10). These are described in detail in Section 2.01 of this report.

3.03.01 Soil Data

Two soil samples from each of the four soil borings, and two soil samples from each of the seven deep monitoring wells were selected for laboratory analyses for TPH by gas chromatograph/flame ionization detector (GC-FID). Deep samples were collected at the water table, and shallow samples were collected five feet above the water table. Five deep soil samples (MW2, MW4, MW6, MW8, and MW14) were analyzed for flashpoint and pH. Four deep soil samples (MW2, MW6, MW8 and a composite) were selected for full-scan toxicity characteristic leaching procedure (TCLP) analyses.

The pH results ranged from 4.1 to 5.4; flashpoint tests were negative; the TCLP results were below EPA regulatory criteria for this procedure. Barium and pentachlorophenol were detected above the analytical detection limits. The presence of pentachlorophenol (PCP) in the TCLP leachate from MW6 indicates that PCP is present in the site subsurface soils.

Soil TPH results ranged from non-detectable to 13.2 mg/kg in MW4 (9 - 11 feet depth). Two soil samples exceeded 10 mg/kg TPH, as follows:

Sample #	Sample Location	TPH (mg/kg)
MW4	9' - 11'	13.2
MW6	14' - 16'	12.3

All other soil samples analyzed, including samples from other depths at MW4 and MW6, and samples from borings (B1 and B2) which lie between MW4 and MW6, were less than 10 mg/kg.

3.03.01.1 Soil Data Evaluation

Nine of the 22 samples were non-detectable, while detected concentrations ranged from 1.16 mg/kg to a maximum of 13.2 mg/kg. Two samples yielded TPH results in excess of the North Carolina criterion. While these data do not indicate a "pocket" area of contamination, nor relatively high concentrations of TPH, as a conservative approach the presence of TPH in subsurface soils in two samples, at concentrations up to 13.2 mg/kg will be addressed as a potential source.

3.03.02 Ground Water Data

No free product was detected in the fourteen ground water monitoring wells, nor was free product detected in the ten hydropunches.

Ground water samples from each monitoring well and hydropunch were analyzed for volatile organic compounds by SW-846 methods 8010 and 8020. In addition, samples from MW1, MW3 and MW7 were analyzed by EPA SW-846 method 8100 (polynuclear aromatic hydrocarbons; PAHs). Ground water samples from MW3 were analyzed for full scan TCLP compounds. Section 2 of this report provides additional details on the analytical scheme.

TCLP results were less than detection limits; PAH results were less than the detection limits.

The 8010/8020 results were below method detection limits, with the exception of the following compounds:

Detected Compound	Sample	Results (mg/l)	NC Standard (mg/l)	MCL (mg/l)
benzene	MW10	0.014	0.001	0.005
	MW14	0.023		
	H1	0.022		
	H3	0.007		
	H4	0.007		
toluene	MW10	0.003	1.0	2.0 *
	H1	0.190		
	H4	0.003		
ethyl benzene	MW10	0.004	0.029	0.7 *
	H1	0.017		
	H4	0.002		
xylenes (total)	MW10	0.017	0.4	10 *
	H1	0.062		
	H3	0.003		
	H4	0.012		
tri-chlorofluoromethane	MW10	0.005	n/a	n/a
	H1	0.001		
1,1-dichloroethane	H1	0.002	n/a	n/a

The NC standards are the water quality standards applicable to the ground waters of North Carolina, as dictated in Title 15, Subchapter 2L, Section 0.0200, of the North Carolina Administrative Code, dated 12/1/89. The standard applies to Class GA waters, which are considered to be drinkable in their natural state (i.e., potable water supplies).

MCL's are the Maximum Contaminant Level allowable for drinking water, under the National Primary Drinking Water Regulations. Those marked with the * indicate proposed limits; all others are final and current limits.

"n/a" indicates that North Carolina has not established a criterion for this chemical.

3.03.02.2 Ground Water Data Evaluation

Benzene was detected in excess of both the North Carolina and Federal MCL criteria in two wells and three hydropunches. The other organic compounds detected in the ground water samples are within regulatory limits, as presented on the above table. The only exceptions are trichlorofluoromethane and 1,1-dichloroethane, for which no regulatory limits have been established to date.

As no criteria for trichlorofluoromethane and 1,1 dichloroethane exists, these compounds, along with benzene, will be considered in assessing the potential risk related to the presence of these organic compounds in the ground water.

Ground water flow, based on data collected from the seven nested wells, is in a southerly direction; ground water flow velocity is calculated to be approximately 3 feet/year.

3.03.03 Ambient Air Data

Ambient air quality was monitored during field activities with a photoionizing organic vapor detector (PID) with a 10.2 eV lamp. PID readings were recorded from the breathing zone of the on-site workers and at the ground surface every 15 to 30 minutes. The PID readings did not exceed the detection limit of the PID (1 ppm) at any time during the ambient air monitoring.

3.04 Identification of Chemicals and Media of Concern

Based on the results of the site investigation, as described in the previous section, the environmental contaminants to be considered in the following exposure scenarios are benzene, trichlorofluoromethane and 1,1-dichloroethane in the ground water, the groundwater and the prevention of down gradient migration of the contaminants. This option could be considered as a remedial technology.

Groundwater Containment

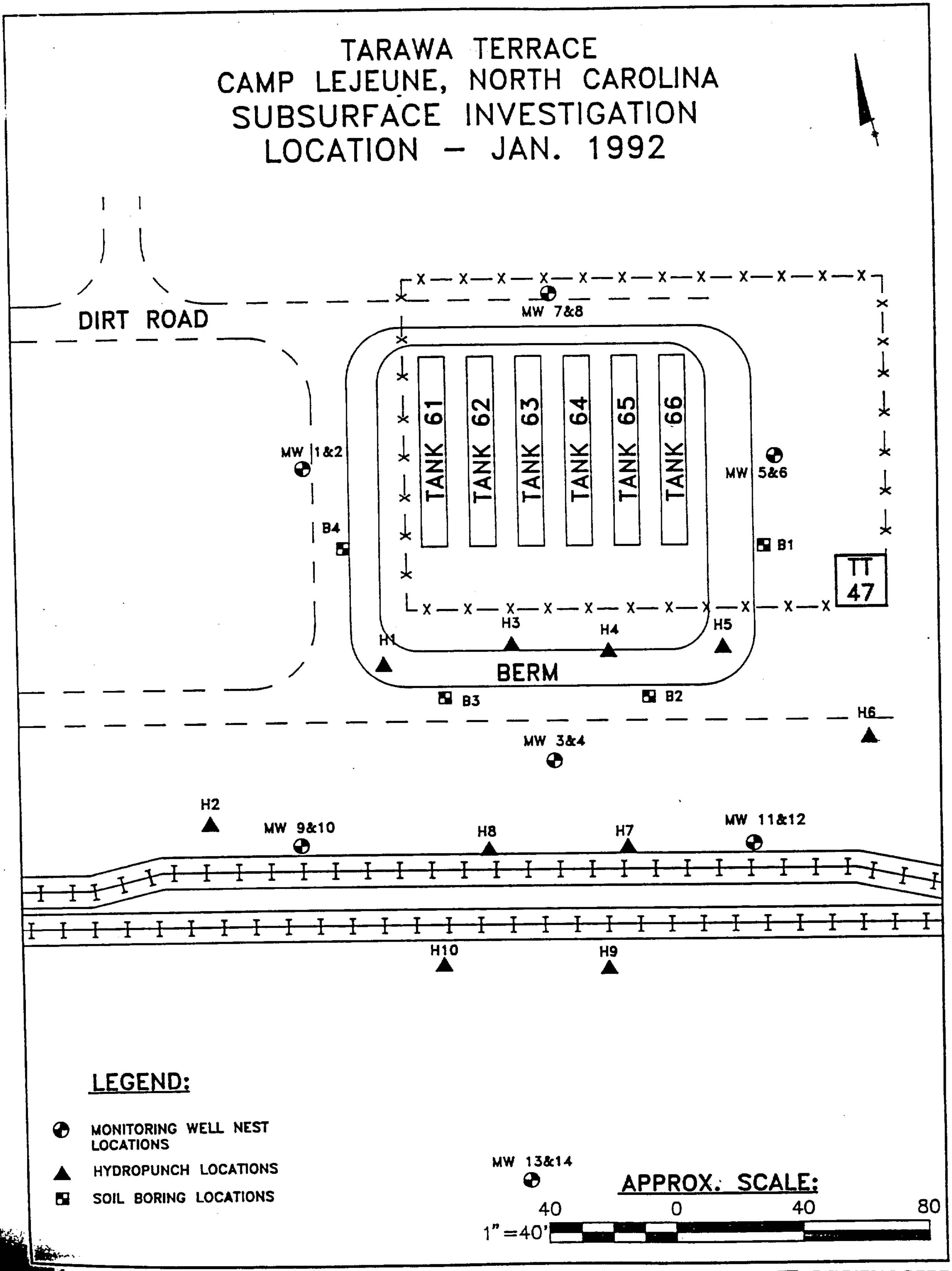
Groundwater containment is a process by which an area of concern is separated from the surrounding environment thereby minimizing the potential migration of hydrocarbon compounds. The separation may be accomplished by the installation of grout curtains, cut-off walls, and/or slurry walls. Recovery wells would then be installed to remove contaminants. Due to the distance between contaminant occurrence this technology is not recommended for this site

4.03 Recommendations

In order to prevent a release that could be potentially harmful in the future, it is recommended that each tank undergo testing for leakage before subsequent usage. Since there is still waste oil present in tank STT66 it is suggested that it be emptied until such time that its integrity is established.

Additional site assessment work will be useful to identify the lateral and vertical extent of contamination to the west and south of the site. Installation of additional monitoring wells and hydropunches would be necessary to delineate the extent of the benzene plume prior to recommending the most appropriate remedial technique.

FIGURE 2



TARAWA TERRACE
CAMP LEJEUNE, NORTH CAROLINA
SUBSURFACE INVESTIGATION
LOCATION – JAN. 1992

O'BRIEN & GERE ENGINEERS, INC.

Report

Addendum Site Assessment Tanks STT61-STT66

Contract N62470-90-R-7626

Tarawa Terrace
Marine Corps Base
Camp Lejeune, North Carolina

June 1993

O'BRIEN & GERE
ENGINEERS, INC.

SECTION 2 - SITE ASSESSMENT

2.01 Hydrogeology

2.01.1 Preliminary Field Investigation

In order to explore the site's geologic conditions and identify the presence of a possible petroleum hydrocarbon plume, seven shallow monitoring wells, seven deep monitoring wells, four soil borings, and ten hydropunches were installed in the vicinity of Tanks STT61 - STT66 between 12 December 1991 and 11 January 1992.

Under the supervision of an OBG geologist, drilling operations were performed by ATEC Associates, Inc., of Raleigh, North Carolina, in accordance with the drilling procedures outlined in Appendix E. Figure 2 is an illustration of the various drill locations.

Monitoring wells were installed in nested pairs, comprising one shallow well and one deep well. Each monitoring well was constructed of 2" ID, schedule 40, PVC, with 10 feet of 0.01 slot screen. Shallow wells (odd numbered) were installed to a depth between 12 and 15 feet below grade. Within 3 feet of each shallow well a deep monitoring well (even numbered) was emplaced to a depth between 28 to 30 feet below grade. Appendix A contains well construction diagrams for each well. Soil borings were terminated at the water table which was encountered between 4 and 8 feet below grade. Cuttings generated from drilling activities were contained in 55 gallon drums and left at the site for future management.

Split spoon samples were collected during the drilling of the 7 deep wells and the 4 soil borings. Split spoon sampling occurred continuously from 0 to 6 feet below grade and in 5 foot intervals thereafter in accordance with ASTM D-1586. Detailed lithologic descriptions of each soil sample were recorded in the field on boring logs located in Appendix A. Each soil sample was screened for volatile organic compounds using an Hnu. Two soil samples from each deep well and soil boring were selected for laboratory analysis as discussed in section 2.02.3.

Each well's horizontal location and top of casing elevation was established to 0.01 ft. accuracy by a survey conducted by Robert H. Davis, RLS (Exhibit A).

<u>Addendum Field Investigation</u>

Resultant of the preliminary site assessment, additional field activities were warranted to better define subsurface contamination identified in the vicinity of MW13 and MW14. In December 1992, addendum field activities were completed which included the installation of 6 monitoring wells, a test well, six hydropunches, soil and ground water sampling and analysis and the completion of an eight hour pump test.

Drilling operations were completed by ATEC Associates under the supervision of an OBG geologist. Procedures for drilling activities are located in Appendix E. Figure 2 illustrates the location of all drilling activities.

Three monitoring wells (MW15, MW17 and MW19) were installed at a maximum depth of 15 feet and three monitoring wells (MW16, MW18 and MW20) were installed at a maximum depth of 30 feet below grade. The 6" ID test well was installed at a depth of 20 feet below grade. Well construction diagrams of each well are located in Appendix A. After installation each well was developed by continuous low yield pumping and sampled for volatile organics by method 601/602. Ground water analytical results are further discussed in Section 2.02.4. Aquifer characteristic testing, in the form of in-situ permeability testing and an eight hour pump test was conducted on each newly installed monitoring well and the test well, respectively. Aquifer characteristics are presented in Section 2.01.3.

Soil samples were collected during the installation of the three deep wells and the test well. Detailed lithological descriptions of each sample were recorded on bore logs presented as Appendix A. Two soil samples from each location were sent to ETS Laboratory for analysis of TPH, pH, and flash point. One sample, obtained from MW20, was also analyzed for TCLP to facilitate drill cutting disposal. Results of laboratory analyses are further discussed in Section 2.02.3.

Penetrometer probes were installed in 15 foot and 30 feet depths. Before completing the 30 foot deep hydropunches (H12, H14 and H16) site conditions necessitated initial augering to 20 feet below grade before attempting the hydropunch. An instrument survey was conducted by R.H.Davis (RLS) to determine the location and elevation of each hydropunch and well. Survey data is located in Exhibit A.

All fluids and soils generated by field activities were containerized and transported to a permitted disposal facility for subsequent disposal.

2.01.2 Geologic Conditions

MCB Camp Lejeune is situated in the Atlantic coastal Plain Physiographic Province which, in North Carolina, is characterized by a broad flat surface that slopes gently to the southeast (USGS, 1988). The MCB Camp Lejeune area overlies Cretaceous sediments of sands, silts and clays that thicken towards the east and reach a thickness of approximately 2500 feet. The investigation at Tarawa Terrace, Tanks STT61 - STT66, involved the upper 30 feet of sediments. Split spoon samples (Appendix A) revealed a subsurface geology characterized by sand, silt and clays in various hues of gray (bluish, greenish and pinkish) and light brown. Figures 5 and 6 present a geologic cross section of the study area along the downgradient direction. Split spoon samples from addendum drilling activities demonstrated findings consistent with the preliminary site investigation. A grain size analysis of soil obtained from the unconfined aquifer encountered during the installation of the test well (9 - 11 feet below grade) revealed sediments ranging from fine-to-medium, sandy-clay to fine-to-medium clayey-sand. Results of this grain size analysis, conducted by McCallum Testing Laboratories of Chesapeake, Va., by method ASTM D-422 are included in Appendix H. An Inclusive Graphic Standard Deviation (Folk) calculation determined the aquifer to be extremely poorly sorted.

2.01.3 Aquifer Testing

In-situ Permeability Testing

Hydraulic permeability (or conductivity) was estimated for each monitoring well with the performance of an in-situ permeability (slug) test. The test involves the removal of several gallons of water from each well, creating a potential for flow into the well from the surrounding aquifer. The rate at which the ground water re-enters the well is monitored until the well's static water level is approached. Ground water levels during the tests were measured with an electronic oil/water interface probe. Values of hydraulic conductivity were calculated based on the change in water level versus the change in time using Horselov's formula. Appendix D contains the test data and the results are summarized on Table 2. Using this method, the geometric mean for hydraulic conductivity was estimated to be 24 gpd/ft^2.

Pump Test

A six inch ID test well (TW) was installed at the site to determine the hydraulic characteristics of the aquifer including transmissivity, hydraulic conductivity and the pumping well's radius of influence. The test well was installed to a depth of 20 feet below grade with 15 feet of 0.01 slot screen. On December 17 1992, a pump test was performed with the constant discharge rate (Q) of 5.5 gallons per minute (gpm) for a duration of eight hours. The pumping rate was maintained by using a submersible pump with the pumping rate being calibrated every 30 minutes for the duration of the test. Water levels in the pumping well and two nearby well clusters (MW3&MW4 and MW9&MW10) were measured and recorded at various intervals during, and directly following the test. Following the pump test, ground water recovery of the test well was measured until the aquifer had recovered to within 95% of its static level.

Using a graphical well analysis computer program, data collected from the in-field testing was evaluated to determine the aquifer's hydraulic parameters by matching the drawdown data to Theis type curves. Aquifer coefficients were also calculated using a modification of the Theis type curve matching by the Cooper & Jacob (1946) straight line method, by plotting the drawdown of the ground water versus elapsed time and the drawdown versus distance from the pumping well on semi-logarithmic paper. By using these methods the values were determined for transmissivity, storage and hydraulic conductivity. Evaluation of data collected from MW9 and MW10 determined that the distance from MW9 and MW10 to the pumping test well may have been too great for the data to be utilized. MW10 did not demonstrate enough drawdown to be considered effective in the evaluation of aquifer characteristics, and was not used. The following values were determined for transmissivity, storage and hydraulic conductivity for the test well (TW), MW3, MW9 (shallow wells) and MW4 (deep well):

	Transmissivity (gpd/ft)-	Hydraulic Conductivity (gpd/ft^2)	Storativity
TW-Theis	494	16	0.30
TW-Cooper/Jacob	449	15	0.06
MW3-Theis	2845	95	0.08
MW3-Cooper/Jacob	2850	95	0.06
MW4-Theis	10332	340	0.005
MW4-Cooper/Jacob	10103	340	0.004
MW9-Theis	2050	70	0.076
MW9-Cooper/Jacob	2604	90	0.035

The hydraulic conductivity determined by the pump test differs from that determined by the slug test by approximately one order of magnitude. Slug test results provide a more localized interpretation of conductivity whereas the 6" ID test well is more likely to provide a better estimate for a site-wide hydraulic conductivity.

Values in transmissivity and hydraulic conductivity appear to fluctuate with depth within the aquifer suggesting a heterogeneous formation. Differences in conductivity between shallow and deep wells are larger than those calculated for vertically equivalent depths at greater horizontal distances. This type of layered heterogeneity is common in unconsolidated marine deposits.

For the purpose of estimating the radius of influence, a geometric mean of transmissivity values (2000 gpd/ft) was used in the following equation:

$YL = Q/2Ti$ where:

YL = Radius of influence
i = Hydraulic gradient (0.001 ft/ft)
T = Estimated transmissivity (2000 gpd/ft)
Q = Pumping rate (7920 gpd)

From this equation, the radius of influence, using Theis type curves, is calculated to be approximately 2200 feet. Calculations utilizing values from the Cooper & Jacob straight line method approximate the radius of influence to be 2000 feet. These two values appear to be in agreement with one another. Data generated from the pump test can be reviewed in Appendix F.

2.01.4 Ground Water Flow

On December 17 1992, ground water elevations were gauged in all of the monitoring wells at the site. Using an electronic oil/water interface probe, ground water was measured to be between 4 and 8 feet below the top of the well casing. After installation, each well was surveyed to establish top of casing elevations relative to 100.00 feet. From these elevations, the ground water elevation in each well can be determined. Using the elevational data summarized on Table 1, ground water contour maps were derived. Figure 3 depicts the ground water flow across the study area as monitored by the shallow wells. Figure 4 illustrates the ground water flow monitored by the deep wells. Ground water appears to be flowing in an overall southerly direction. Variances in ground water elevations north of the railroad tracks suggest a possible re-charge boundary in the shallow ground water system, created by the railroad tracks and compacted path around the tank area. Differences in coarseness and compaction of shallow subsurface materials can produce a re-charge effect, especially during times of increased precipitation. The deeper monitoring wells do not appear to be affected by such shallow factors. With an estimated hydraulic gradient of 0.001 ft/ft and an effective porosity of 0.40, the flow velocity of the ground water can be approximated at 0.008 ft/day or 3 ft/yr.

2.02 Environmental Assessment

2.02.1 Free Product Characterization

With an electronic oil/water interface probe each well was monitored for the possible presence of free product on at least two occasions. Free product was not detected in any of the wells during preliminary or addendum field events.

2.02.2 Air Characterization

During all field operations ambient air and sample head space was monitored for volatile organics using an Hnu or PID (photoionization detector). At no time did the workers' breathing zone or the ambient air quality exceed 1 ppm. As each soil and liquid sample, was collected the Hnu/PID was used to detect volatile emissions. Only one soil sample (MW12) demonstrated volatile organic levels above 5 ppm (a reading of 9 ppm was recorded). Hnu/PID values for soil samples were recorded on the bore logs included in Appendix A. All the liquid samples registered below 5 ppm on the Hnu/PID.

2.02.3 Soil Characterization

Preliminary Field Investigation

Two soil samples from each soil boring and deep monitoring well were selected for laboratory analysis. At each location a sample from the water table and five feet above the water table was sent to Environmental Testing Services, Inc., in Norfolk, Virginia, for TPH analysis (California method).. Five water table samples (MW2, MW4, MW6, MW8, and MW14) were also analyzed for flash point (Pensky-Martin closed cup technique) and pH. Three water table samples (MW2, MW6, and MW8) and a composite sample (obtained from directly beneath the tanks) were selected for Toxicity Characteristic Leaching Process (TCLP) analysis (EPA Manual SW-846 Method 1311). Laboratory results are presented in Appendix C.

Total Petroleum Hydrocarbons (TPH) for the 22 samples collected ranged from below method detection limits to 13.2 mg/kg. The geometric mean concentration was 2.31 mg/kg and only one water table sample (MW6) was above 10 mg/kg. Flash point testing on five soil samples was negative at the maximum temperature tested (110°C). Of the forty TCLP parameters, two constituents were found above method detection limits. Barium and Pentachlorophenol were present, however neither represented concentrations above regulatory levels.

Addendum Field Investigation

Two soil samples from each deep well and the test well were submitted to ETS Laboratory for analysis of TPH by methods 3550 and 5030, Flash Point by method 1010 and pH by method 9045. Only one soil sample exhibited TPH above laboratory detection limits. Soil obtained from 0-2 feet below grade from the test well contained 12 mg/kg TPH by method 3550. Analysis by method 5030 of the same interval did not demonstrate TPH values above laboratory detection limits. For the purpose of soil disposal, a TCLP analysis was conducted on soil collected from 10-12 feet below grade from MW20. Barium was the only parameter to be detected above laboratory detection limits. The detected concentration of Barium (0.641 mg/l) was below the regulatory level of 100 mg/l.

Flash point and pH analyses were conducted on three soil samples collected at the water table of each deep monitoring well. In each instance, flash point was less than 140°F. Measurements of pH ranged from 4.70 to 5.31. Laboratory results are presented in Appendix C.

2.02.4 Ground Water Characterization

Preliminary Field Investigation

Between January 7 and 11 1992 ground water samples were collected from each monitoring well and hydropunch. Hydropunch sampling was accomplished by the methods previously described in Section 2.01.1 Ground water samples from each monitoring well were obtained by using a stainless steel bailer and following the procedures dictated in Appendix G. Prior to sample collection, each monitoring well was purged of three times the well's volume. Ground water samples were sent to OBG Laboratories in Syracuse, N.Y. for analysis by EPA methods 8010, 8020, 8100 and TCLP. EPA methods 8010, 8020, and 8100 are derived from, and equivalent to, EPA methods 601, 602 and 610, respectively. They utilize the same technique and include the same parameters. Laboratory results are available for review in Appendix B.

Of all the parameters analyzed, only benzene was found to exist in concentrations over North Carolina Ground Water Standards. Monitoring well MW14 and hydropunches H1, H3 and H4 contained benzene concentrations ranging from 0.007 mg/l (H3 and H4) to 0.023 mg/l (MW14), compared to the State standard of 0.001 mg/l. Trichlorofluoromethane, and 1,1 dichloroethane were present in two sample locations (MW10 and H1), however, there are no regulatory standards listed for these analytes.

At the time of sampling specific conductivity and pH measurements were obtained from each of the monitoring wells. These measurements are summarized on Table 3.

Addendum Field Investigation

In December 1992, ground water from each newly installed monitoring well and hydropunch was collected and sent to OBG Laboratory for analysis by method 601/602 for volatile organics. Benzene, toluene, ethylbenzene, xylene (BTEX), trichlorofluoromethane, 1,1-dichloroethane, 1,1,1-trichloroethane, tetrachloroethene and chloroform was found to exist in the ground water in concentrations above laboratory detection limits. Six sample locations exhibited benzene in concentrations ranging from 0.001 mg/l (MW20) to 0.042 mg/l (H13). Monitoring well MW15, H12 and H13 were the only sample locations to demonstrate toluene, ethylbenzene and xylene above laboratory detection limits. MW15 contained toluene, ethylbenzene and xylene values of 0.009 mg/l, 0.010 mg/l and 0.019 mg/l, respectively. H12 demonstrated toluene, ethylbenzene, xylene concentrations of 0.10 mg/l, 0.03 mg/l and 0.17 mg/l, respectively. Toluene, ethylbenzene, xylene concentrations in H13 were 0.008 mg/l, 0.003 mg/l and 0.012, respectively. The toluene, ethylbenzene, xylene values were at or below the State Ground Water Standards. MW16 demonstrated a 0.002 mg/l concentration of chloroform. H12 and H13 were the only sample locations to exhibit the presence of trichlorofluoromethane. Concentrations were found to be 0.055 mg/l (H12) and 0.001 mg/l (H13). H12 was the only sample location to demonstrate 1,1-dichloroethane (0.002 mg/l), 1,1,1-trichloroethane (0.009 mg/l) and tetrachloroethene (0.002 mg/l) above laboratory detection limits. Ground water laboratory results are located in Appendix B.

Specific conductivity, measured at the time of sampling, ranged between 98 and 135 umhos/cm. Measurements of pH varied between 5.27 and 6.75 (standard units). Field measurements are included in Table 3.

2.03 Quality Assurance/Quality Control

Throughout field operations steps were taken to maintain quality assurance and quality control (QA/QC). Field instruments such as the Hnu/PID, pH meter and specific conductivity meter were calibrated on site. The Hnu/PID was calibrated to 100 ppm isobutylene. Specific conductivity and pH meters were calibrated with standardized solutions.

Sampling equipment was decontaminated by using a series of rinses involving distilled water, non-phosphate detergent, methanol and dilute nitric acid. A rinse blank (field blank) was included in the analysis to confirm the decontamination process effectiveness.

Standard laboratory QA/QC procedures were applied in accordance with the referenced EPA Methods. In addition, trip blanks and duplicate samples were used.

Report

Site Assessment
Tanks AS419 - A42
Marine Corps Air Station

New River
North Carolina
Contract N62470-90-B-7628

Naval Facilities Engineering Command
Norfolk, Virginia

June 1992

[illegible]

The primary guidance document applied is the EPA's "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual". As such, it analyzes potential site-related acute and chronic health risks to on-site and off-site receptors, under both current and future use scenarios.

3.02 Site-Specific Descriptive Information

3.02.1 History

The three 25,000 gallon tanks were installed in 1954 for storage of #6 fuel oil and used for such until 1979. From 1979 until 1988 the tanks were used for waste oil storage. The tanks were emptied in 1988, according to Tom Morris, Environmental Management Department MCB Camp Lejeune. Mr. Morris is O'Brien & Gere Engineers, Inc. environmental contact for this project. The tanks currently remain empty, with the exception of 2 - 3 inches of residual product at the bottom of each tank.

According to Mr. Morris, a spill occurred in the tank area (date, quantity and details unknown).

Preliminary site investigations were conducted in November 1990 by Dewberry and Davis. This investigation included soil borings in the area of the tanks. Soil samples were analyzed for total petroleum hydrocarbons (TPH) by both California GC Method and EPA IR method 418.1 and for volatile organic compounds (VOC) (EPA Method 8010/8020). TPH results from two soil samples are as follows (as reported in the Dewberry and Davis report):

- Sample NRSB-5, near the valves on the west sides of the tanks, 1 - 2 feet below grade. 211 ppm diesel (GC method), 7000 ppm total (IR method).

- Sample NRSB-7, near the valves on the east sides of the tanks, 0.5 - 2" feet below grade. 70 ppm diesel (GC), 7500 total (IR). A sample from the same boring, at 3.5 - 4 feet was 200 ppm total (IR).

Results of the other nine soil boring samples were below the detection limit of 10 ppm. Soil samples analyzed for VOC's (34 priority pollutants; EPA Methods 8010/8020) yielded 0.006 ppm chloroform, 0.03 ppm methylene chloride, 0.035 ppm 1,1,1-trichloroethane, and 0.061 ppm 1,1,2-trichlorotrifluoroethane. Dewberry & Davis concluded that, based on the locations and concentrations of the detected compounds, the results are likely related to localized surface spills.

3.02.2 Site & Surrounding Area Description

The tanks are located on the southwest corner of Foster Street and Campbell Street at the Air Station. The base fire station is located 200 feet to the south; the air station's taxiway is located 800 feet further south of the fire station. Large machinery buildings, aircraft hangars and the base's commissary building are located to the west. Further east on Foster Street is an area recently graded, for construction of an aircraft hangar. Office buildings are located north of the site. The nearest surface water body is the New River, located approximately 4000 feet to the east.

The tanks are surrounded by an earthen berm. Ground cover in the immediate area of the tanks is grassy; surrounding area cover consists of buildings and pavement. The tanks are connected by piping and a hose to a small building which likely served as a pump house. A storm water drainage ditch runs around the outside of the berm. Steam lines are located overhead in the area of the tanks.

It appears that storm water lines run underground in the area of the tanks. No surface contamination was observed in the tank area.

According to Mr. Morris, all buildings in the area of the tanks are constructed on concrete slab. There are no known tunnels, underground storage areas, or similar underground spaces, according to Mr. Morris.

A map of the site is presented as Figure 3.

3.02.3 Demographics

The population at Marine Corps Air Station, New River includes military personnel and their families, as well as civilian employees. The tank area itself is adjacent to office buildings, machinery buildings and the fire station (i.e., buildings in which people work approximately 8 a.m. to 5 p.m.). Daily vehicular traffic passes near the tanks along Foster Street and Campbell Street, but not directly through the tank area. Foot traffic around the tanks is possible, as there is no base regulation or fencing prohibiting such.

The tanks are inspected weekly, according to Mr. Morris.

3.03 Current Site Data

The site investigation involved the installation, development and sampling of seven shallow monitoring wells and seven deep monitoring wells (as nested pairs; MW1 - MW14), four soil borings (B1 - B4), and ten hydropunches (H1 - H10). These are described in detail in Section 2.01 of this report.

3.03.1 Soil Data

Two soil samples from each of the four soil borings, and two soil samples from each of the seven deep monitoring wells were selected for laboratory analyses for TPH (California GC/FID method). Deep samples were collected at the water table (14′ - 16′ depth), and shallow samples were collected five feet above the water table (9′ - 11′ depth). Five deep soil samples (MW2, MW4, MW6, MW8, and MW12) were analyzed for flashpoint and pH. Two deep soil samples (MW2 and MW6) were selected for full-scan toxicity characteristic leaching procedure (TCLP) analyses.

The pH results ranged from 4.8 to 7.6; flashpoint tests were negative; the TCLP results were below EPA regulatory criteria for this procedure.

Soil TPH results were below the North Carolina action level of 10 mg/kg for 21 of the 22 samples. The TPH concentration from boring B2, at a depth of 4 - 6 feet, was 125 mg/kg.

3.03.1.1 Soil Data Evaluation

Fourteen of the 22 soil samples results were below the detection limit of 1 mg/kg, while detected concentrations (below 10 mg/kg) ranged from 1.13 to 4.06 mg/kg. One sample (B2, 4′ - 6′) yielded results exceeding the North Carolina criterion. Results of the sample from B2 at 8 - 10 feet were below the detection limit. Based on these results, it appears that the occurrence of 125 mg/kg in B2 (4′ - 6′) is an isolated incident.

As a conservative approach the presence of TPH in subsurface soils at B2 will be addressed as a potential source for exposure in this risk assessment.

3.03.2 Ground Water Data

No free product was detected in the fourteen ground water monitoring wells, nor was free product detected in the ten hydropunches.

Ground water samples from each monitoring well and hydropunch were analyzed for volatile organic compounds by SW-846 methods 8010 and 8020. Ground water samples from MW5 were analyzed for TCLP compounds. Section 2 of this report provides additional details on the analytical scheme.

TCLP results from the MW5 ground water sample were less than detection limits for metals, volatiles, pesticides and herbicides. The 8010/8020 results were below method detection limits, with the exception of the following compounds (concentrations given in mg/l):

Cmpd.	MW2	MW3	MW4	MW6	MW8	MW10	MW12	H9	NC	MCL
benzene	nd	nd	.006	.001	nd	nd	nd	nd	.001	.005
toluene	.350	nd	nd	nd	.002	nd	.001	nd	1.0	2.0*
1,1-DCA	nd	nd	nd	nd	nd	.750	nd	nd	na	na
1,2-DCE	nd	nd	.094	nd	nd	.076	nd	nd	na	.07*
TCE	nd	nd	.280	.004	nd	.077	.001	nd	.0028	0.005
perc	nd	.004	nd	nd	nd	.210	.004	nd	.0007	na
chloroethane	nd	nd	nd	nd	nd	.012	nd	nd	na	na
1,1,1-TCA	nd	nd	nd	nd	nd	nd	nd	.002	0.2	0.2

KEY:
1,1-DCA = 1,1-dichloroethane
1,2-DCE = 1,2-dichloroethylene (total)
TCE = trichloroethylene
Perc = perchloroethylene (or tetrachloroethylene)
1,1,1-TCA = 1,1,1-trichloroethane
NC = North Carolina criteria (explained below)
MCL = maximum contaminant level (explained below)

Results of analyses of field blanks and trip blanks were all below detection limits.

The North Carolina standards are the ground water quality standards, as dictated in Title 15, Subchapter 2L, Section 0.0200, of the North Carolina Administrative Code, dated 12/1/89. The standard applies to Class GA waters, which are considered to be drinkable in their natural state (i.e., potable water supplies).

MCL's are the Maximum Contaminant Level allowable for drinking water, under the National Primary Drinking Water Regulations. Those marked with the * indicate proposed limits; all others are final and current limits.

"n/a" indicates that there is no established criterion for this chemical.

3.03.2.2 Ground Water Data Evaluation

Eight organic compounds were detected in ground water samples; none of the detected compounds were detected in the field or trip blanks. Therefore, it is assumed that they are related to the site. These compounds are:

benzene
toluene
1,1dichloroethane
1,2dichloroethylene
trichloroethylene
perchloroethylene
chloroethane
1,1,1-trichloroethane

Of these, benzene, trichloroethylene and perchloroethylene were detected above their corresponding NC standard in one or more samples. Toluene and 1,1,1-trichloroethane were detected below the NC standards. 1,1-dichloroethane, 1,2-dichloroethylene and chloroethane do not have standards established by North Carolina.

These eight compounds will be considered in assessing the potential risk related to the presence of these organic compounds in the site ground water.

Except for MW3, the other six wells in which contaminants were detected are deep wells. Three compounds were detected in MW12, which is approximately 100 feet from the tanks; five compounds were detected in MW10, which is approximately 150 feet southeast of the tanks. The other well locations are within 50 feet of the tank.

Based on data collected from the seven shallow wells, localized and surficial ground water flow is in a radial pattern skewing to the east. Deep wells indicate a northeast flow direction. Ground water flow velocity is calculated to be approximately 1.6 feet/year.

3.03.3 Ambient Air Data

Ambient air quality was monitored during field activities with a photoionizing organic vapor detector (PID) with a 10.2 eV lamp. PID readings were recorded from the breathing zone of the on-site workers and at the ground surface every 15 to 30 minutes. The PID readings did not exceed the detection limit of the PID (1 ppm) at any time during the ambient air monitoring.

3.04 Identification of Chemicals and Media of Concern

Based on the results of the site investigation, as described in the previous section, the environmental contaminants to be considered for exposure scenarios in the groundwater are:

benzene
toluene
1,1dichloroethane
1,2dichloroethylene
trichloroethylene
perchloroethylene
chloroethane
1,1,1-trichloroethane,

3.05.5.1 Potential Exposure via Direct Contact with Contaminated Subsurface Soils

No current or anticipated disturbance of contaminated subsurface soils exists (see also discussion in Sections 3.05.02.1 and 3.05.04.3). Thus, no potential for direct contact with contaminated subsurface soils under current or anticipated future conditions exists.

In summary, under current and anticipated future conditions, there is no potential for exposure related to direct contact with the contaminated subsurface soils.

Based on the above assessment, there is no significant risk associated with the TPH-contaminated subsurface soils and ground water contamination in the area of tanks AS-419, AS-420 and AS-421 at the Marine Corps Air Station,New River, North Carolina related to the past operations of the tank.

3.06 Conclusion

The presence of eight organic compounds in the ground water, detected at eight different sampling locations (seven monitoring wells and one hydropunch) indicates that the ground water has been impacted. Six of the eight compounds detected were either in excess of the North Carolina ground water standards, or have no published regulatory standard for comparison. As stated above, potential exposure under current and anticipated future land uses do no include ground water use or consumption.

However, if site use is changed in the future to a previously unanticipated use, such that ground water is accessed (for potable or nonpotable uses), then additional consideration should be given at that time to the potential health effects related to the presence of benzene, trichloroethylene, toluene, perchloroethylene, 1,1-dichloroethane, chloroethane, 1,2-dichloroethylene, and 1,1,1-trichloroethane detected in the site ground water under this investigation.

SECTION 4 - REMEDIATION ASSESSMENT

4.01 Remedial Technologies

The Risk Assessment indicates that there is an absence of any identifiable complete exposure pathways (i.e. no risk) at this time. However, organic compounds are present in the ground water above North Carolina State Regulations. The incidence of TPH in the soil at B2 appears to be a localized, isolated spill occurrence. In order to address the necessity of ground water remediation the following technologies have been considered.

Air Stripping

An air-stripping treatment system removes volatile organics from the ground water through a chemical process involving the mass transfer of organics from the aqueous phase to the gaseous phase. The volatile organics desorb from the ground water into the passing air stream in accordance with Henry's Law. The process usually occurs within a cylindrical tower containing packing. The packing provides surface area upon which the desorption process can occur. The turbulent conditions within the tower are caused by the air stream flowing upward, counter-currently to the water. The water exits the base of the packed bed and is collected in a sump below the injection point of the air. The air stream passes through a demisting pad prior to exhausting to the atmosphere. This pad removes entrained water droplets through an impingement process.

Alternatively, a low profile air stripper (typically less than five feet high) may be used to remove volatile organics from the ground water. A low profile air stripper consists of multiple trays, each of which receives a source of clean air. Since each tray receives a source of clean air a greater stripping efficiency is achieved.

The performance of an air stripper depends upon the temperature of the ground water, the type of packing selected, the packing bed depth or tray interval spacing, the air to liquid ratio, and the concentration of contaminants in ground water. The solvents detected in the ground water at this site have been successfully removed from ground water using this technology.

Carbon Adsorption

A granular activated carbon (GAC) treatment system removes the volatile organics from the ground water through physical adsorption of the organic molecules onto the porous carbon surface. Ground water would be pumped from the aquifer directly into a pressure vessel housing the GAC. As the ground water flows downward over the carbon, the zone of contaminant saturation moves down the bed. "Breakthrough" occurs when the zone of contaminant saturation has moved completely down the bed, exhausting all the carbon, and allowing volatile organics to exit the bed with the water flow. The movement of this zone of saturation is a function of the organic's adsorption capacity (or lading onto the carbon), the concentration of contaminants in the ground water, the operating temperature and pressure of the system, and the quality of the ground water with respect to solids, hardness, and other water quality parameters.

Once the carbon has been exhausted, the bed must be regenerated in ordered to resume its intended function. Several procedures are available for regenerating the bed, ranging from disposal of the exhausted carbon and replacement with new, virgin carbon to thermal regeneration of the exhausted carbon. Additionally available are disposable carbon units (i.e. 55 gallon drums) that can be returned to the manufacturer for replacement. Carbon adsorption would be considered applicable at this location.

Bioremediation

Bioremediation is a process by which the growth and activity of naturally occurring microorganisms are stimulated to degrade the compounds of interest. Stimulation of microbial growth and activity for hydrocarbon removal is accomplished through the addition of oxygen and nutrients. There are several factors that dictate the appropriateness of biodegradation. These include, but are not limited to the following: availability of oxygen and nutrients; type of hydrocarbon present and characteristics of the contaminated soils.

Bioremediation can be implemented in-situ or ex-situ. To implement in-situ bioremediation, wells and infiltration galleries are used to transport oxygen and nutrients to the subsurface. To implement ex-situ bioremediation, ground water is pumped above ground and treated.

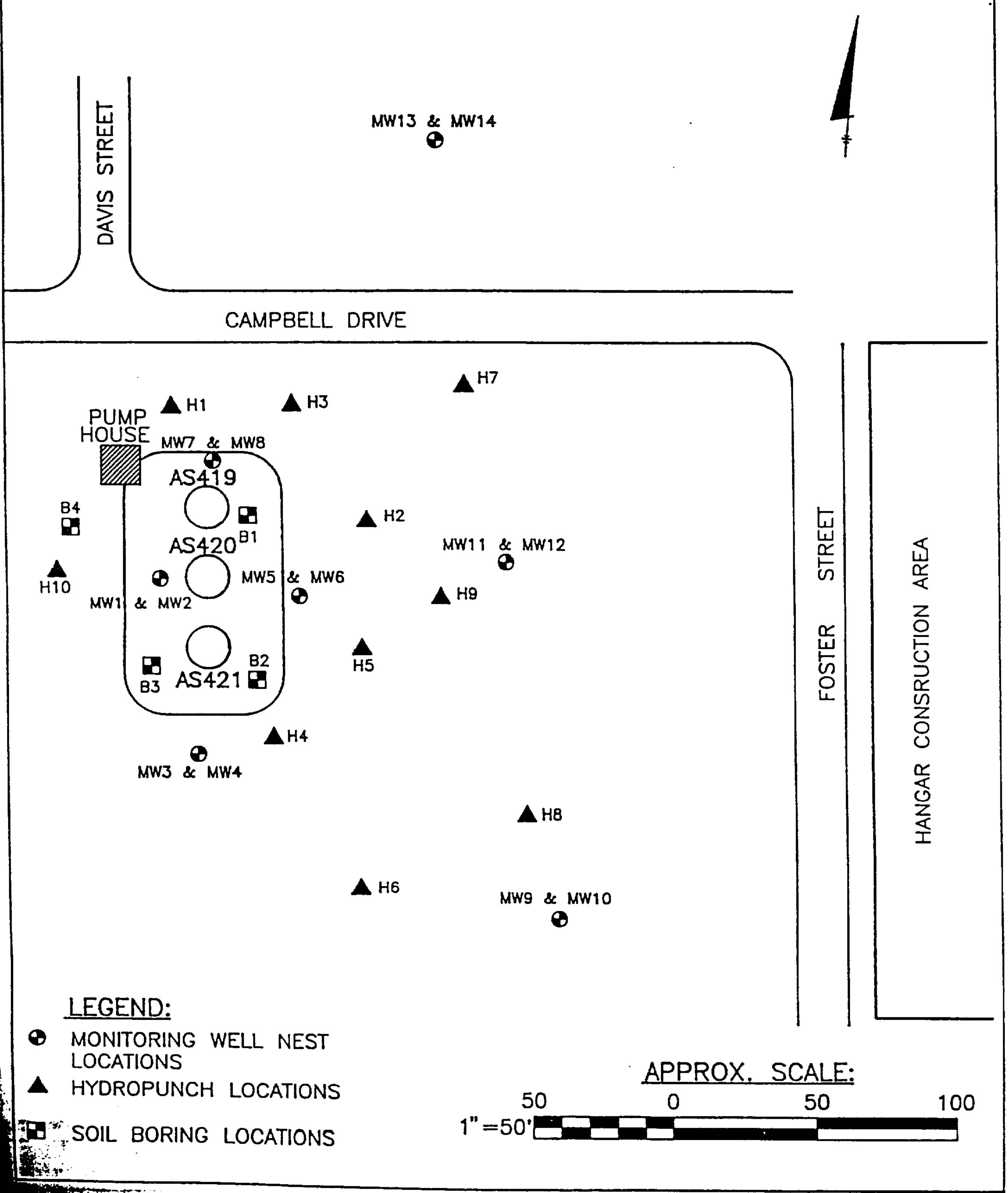
Due to substances present, the low concentrations and distribution of the organic compounds at the site, bioremediation does not appear to be an appropriate selection of remedial technology.

4.02 Recommendations

While there is no risk associated with the study area of Tanks AS419 - AS421, low concentrations of volatile organics were found to be present in the ground water. During a previous investigation, two out of nine soil samples analyzed exhibited TPH concentrations above method detection limits. Both of these samples were found in the near surface soil and contained approximately 7,000 ppm of TPH. During this investigation only one out of twenty two soil samples revealed a TPH level above 10 mg/kg (124 ppm). The location and depth of soils containing TPH concentrations above the North Carolina Action level of 10 mg/kg suggest the source to be from localized surficial spills. Investigations to determine the lateral and vertical extent of the chlorinated compounds should be continued using the appropriate sampling and testing protocols. Remediation of the ground water could be implemented effectively using recovery wells and air stripping.

FIGURE 3

MARINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA
TANKS AS419 – AS421
SUBSURFACE INVESTIGATION LOCATIONS



Final Report

Site Assessment
Holcomb Boulevard
Tanks S889 and S891
Marine Corps Base,
Camp Lejeune,
North Carolina

Contract N62470-90-D-7626

Naval Facilities
Engineering Command

Norfolk, Virginia

April, 1992

O'BRIEN & GERE

it analyzes potential site-related acute and chronic health risks presented to on-site and off-site receptors, under both current and future use scenarios.

3.02 Site-Specific Descriptive Information

3.02.1 History

The above ground storage tanks are large cylindrical tanks, resting horizontally on concrete cradles, approximately ten to twelve feet above ground level. Tank S889 has a capacity of approximately 17,600 gallons and Tank S891 has a greater capacity of 30,000 gallons. The tanks were installed in 1942, when the base opened. The tanks were initially used for storage and distribution for liquid petroleum (LP). The LP was off-loaded from rail cars to the tanks, and then pumped from the tanks via a small concrete structure pumping station, to delivery trucks which serviced the base. Service of the tanks was changed in 1980, to waste oil storage. The waste oils included skimming oils from an oil/water separator. Tanks S889 and S891 currently contain waste oils. According to Mr. Tom Morris, of the Environmental Management Department, Marine Corps Base, Camp Lejeune, a pipe freeze and break occurred at tank S889 within the past 5 years. Mr. Morris stated that an immediate clean-up followed the release, and that no additional actions were merited. Additional discussion of the site history is presented in Section 1.02 of this report.

3.02.2 Site & Surrounding Area Description

Tanks S889 and S891 are two of four tanks in a row, all connected to the pumping station by piping. The four tanks and the station are surrounded by a two-feet-high earthen berm. The area immediately surrounding the berm and the tanks contains small metal sheds, old empty tanks, drums, lumber, animal traps, and other miscellaneous discarded items. The ground cover is comprised of dirt/sand, with some gravel and sparse vegetation outside of the berm. The entire tank area, including the gravel area with stored materials, is enclosed by a fence and secured by a locked gate. The rail tracks, once used to service the tanks, lie on an embankment, west of the fence. Immediately outside the fence are wooded areas, and a dirt road along the north border which leads to Holcomb Boulevard. A map of the site is presented as Figure 3.

Current underground utilities in the vicinity include a water line running to the north of the site which services Building No. 803 and electrical lines along the north side of the site access road and running along the west of Building No. 804 and the earthen bern.

One facility water supply well has been identified within 1500 feet from the site. Well No. 633 is located to the west of Holcomb Blvd. and is listed as being 205 feet in total depth. A 24-inch diameter casing extends to a depth of 42 feet below grade and the remaining casing is eight inches in diameter. The pump is set at 93 feet and the discharge rate is 205 gallons per minute (GPM).

3.02.3 Demographics

The population at The Base includes thousands of military personnel and their families, as well as civilian employees. No one works at the S889 and S891 tank area. The tank area typically remains locked, and is entered once per week for a routine inspection of the tanks and the area. The nearest residential or occupied (work-related) buildings are over one-half mile away.

3.03 Current Site Data

The site investigation involved the installation, development and sampling of seven shallow monitoring wells and seven deep monitoring wells (as nested pairs), four soil borings, and ten hydropunches, as described in detail in Section 2.01 of this report.

3.03.1 Soil Data

From each of the four soil borings, and each of the seven deep monitoring wells, two soil samples were selected for laboratory analyses. Shallow samples were collected at a depth of two to four feet (B1-A indicates shallow soil sample from boring 1), and deep samples were collected immediately above the water table, 13 to 15 feet below grade (B1-B indicates deep soil sample from boring 1).

Soil samples were analyzed for pH, total petroleum hydrocarbons (TPH) by GC-FID, flash point and full-scan toxicity characteristic leaching procedure (TCLP). The pH results were within a typical range (3.4 - 5.1); flash point tests were negative; the TCLP results were below EPA regulatory criteria for this procedure.

Soil TPH results indicated some petroleum hydrocarbon contamination, primarily in shallow soils. The TPH sample results exceeding the North Carolina criterion of 10 mg/kg are as follows:

Sample #	Sample Type	TPH (mg/kg)
1DA	shallow, from well boring	126
2DA	shallow, from well boring	35
2DB	deep, from well boring	20
4DB-DUP	deep, from well boring	252*
B-1A	shallow, from soil boring	172
B-2A	shallow, from soil boring	176
B-4B	deep, from soil boring	43

* Sample 4DB collected at the same location registered 5.7 mg/kg TPH.

The location of these samples is presented in Figure 3.

3.03.2 Ground Water Data

No free product was detected in the fourteen ground water monitoring wells, nor was free product detected in the ten hydropunches.

Ground water samples were analyzed for volatile organic compounds by SW-846 methods 8010 and 8020. Three samples (from wells 4S, 5S and 7S) were analyzed by EPA SW-846 method 8100 and one sample (MW-4S) was analyzed for full scan TCLP.

The 8010/8020 results were below method detection limits, with the exception of dichloromethane. Dichloromethane was found at one to four ug/l in eight samples; dichloromethane was also found in the reagent blank at three ug/l. Based on the occurrence of dichloromethane in the blank and the low levels detected in the samples, it is concluded that the dichloromethane detected is likely a laboratory contaminant, and is not related to operations at the site.

TCLP metals were also below method detection limits, as were the semivolatiles. The only volatile compound detected in ground water above method detection limits was toluene, at three ug/l, from monitoring well MW-6D. MW-6D is a deep downgradient monitoring well, located south of the tank area, outside the berm (see Figure 3). A comparison of this analytical result, along with the North Carolina (NC) ground water standards, is presented below:

Detected Compound	Sample	Results (mg/l)	NC Standard (mg/l)
toluene	6D	0.003	1.0

The NC standard is the water quality standard applicable to the ground waters of North Carolina, as dictated in Title 15, Subchapter 2L, Section 0.0200, of the North Carolina Administrative Code, dated 12/1/89. The standard applies to Class GA waters, which are considered to be drinkable in their natural state (i.e., potable water supplies).

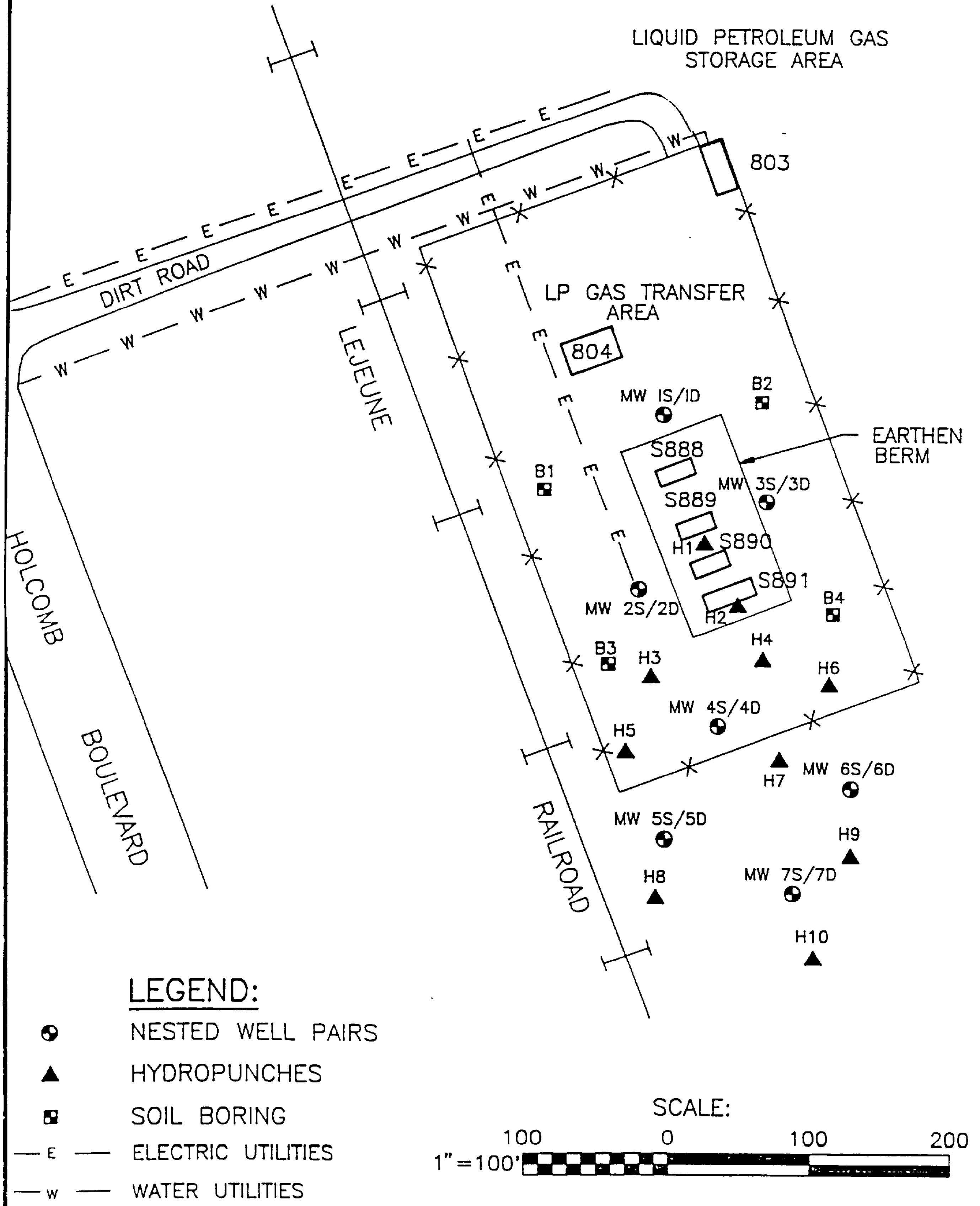
Ground water flow, based on data collected from the seven nested wells, is in a southerly direction; depth to ground water is approximately 13' - 16' below grade; ground water flow velocity is calculated to be approximately 5.8 feet/year.

FIGURE 3

HOLCOMB BLVD.
TANKS S889 AND S891
CAMP LEJEUNE N.C.

SUBSURFACE INVESTIGATION LOCATION MAP

NOVEMBER, 1991



Addendum

Site Assessment Addendum
Tank S781
Midway Park
Marine Corps Base
Camp LeJeune, North Carolina

Contract N62470-90-R-7626

Naval Facilities Engineering Command
Norfolk, Virginia

October 1992

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SECTION 2 - SITE ASSESSMENT

2.01 Hydrogeology

2.01.1 Field Investigation

A subsurface investigation, designed to define the site's geologic conditions and delineate the extent of a possible contaminant plume, was completed in December 1991. Fourteen monitoring wells (seven nested pairs), four soil borings and ten penetrometer probes were completed in the study area. Figure 2 illustrates the subsurface drilling locations of 1991. Laboratory results from that investigation indicated that additional soil borings were required to better define the contaminant extent. During the week of October 4th 1992, twelve soil borings were completed in the study area. Drilling operations were completed in accordance with drilling procedures outlined in Appendix D, and under the supervision of an OBG geologist by ATEC Associates, Inc. (ATEC) of Raleigh, NC. An illustration of the addendum soil boring locations is provided as Figure 6.

Each of the twelve soil borings was completed to a depth of fifteen feet below grade. Cuttings generated from drilling operations were containerized for future disposal. Split spoon samples were collected in five foot intervals during the drilling of each soil boring. All soil sampling was conducted under the guidelines of ASTM D-1586. Appendix A contains lithologic descriptions of each soil sample, recorded in the field at the time of collection. Two soil samples from each location were selected for laboratory analysis as discussed in Section 2.02.3.

2.01.2 Site Geologic Conditions

Camp LeJeune is situated in the Atlantic Coastal Plain Physiographic Province which, in North Carolina, is characterized by low elevations and limited topographic relief (USGS, 1988). The Camp LeJeune area overlies cretaceous sediments of sands, silts and clays that thicken towards the east and reach a thickness of approximately 2500 feet. The subsurface investigation of December 1991 of Tank S781 involved the upper 30 feet of sediments. Split spoon samples (Appendix A) revealed a subsurface geology characterized by unconsolidated sands, silts and clays. Below the topsoil and the brown, medium to fine grained sand of the uppermost four feet lie at least twenty feet of sands with small amounts of silt and clay which vary in colors from buff to orange, brown and white. At approximately 11 to 19 feet below grade lies a thin lamina of coarse to very coarse sand, which is underlain by gray to greenish-gray medium sands. Figures 4 and 5 present an approximate geologic cross section of the study area.

Lithological descriptions of soil samples obtained from borings completed in October 1992 are recorded on bore logs located in Appendix A. Sediments from the soil borings are dominated by sands with small amounts of clay and silt and are consistent with past studies.

2.01.3 Groundwater Flow

On two separate occasions groundwater elevations were gauged in all of the monitoring wells at the Site. Using an electronic oil/water interface probe, groundwater was measured to be between

17 and 19 feet below the top of casing, or between 3 and 5 feet above mean sea level (AMSL). Using the elevational data summarized on Table 1, a groundwater contour map was derived. Figure 3 illustrates the groundwater flow for December 1991. The measurements obtained on the second monitoring event (January 1992) support this flow direction. The groundwater measurements at MW7 were dubious on both monitoring occasions and this measurement was not used when formulating the groundwater contour map. Applying and estimated effective porosity of 0.40, and an average hydraulic gradient of 0.002 ft/ft, the groundwater appears to be flowing in a west to northwesterly direction at approximately 0.03 ft/day or 10 ft/yr. Groundwater elevations, flow direction and local topography all suggest that groundwater from the site discharges to Northeast Creek.

2.02 Environmental Assessment

2.02.1 Free Product Characterization

Using an electronic oil/water interface probe, groundwater and possible free product were measured in each monitoring well. On two separate occasions all fourteen monitoring wells were gauged and free product was not detected in any of the wells. Groundwater samples obtained from the penetrometer probes were also scrutinized for the possible presence of free phased hydrocarbons. None of the ten samples contained free product.

2.02.2 Air Characterization

During all field activities worker's breathing zone and ambient air were monitored for volatile organics using a calibrated photoionization detector (PID). At no time did the worker's breathing zone or the ambient air quality exceed 1 ppm.

2.02.3 Soil Characterization

Two soil samples from each addendum soil boring were selected for laboratory analysis. At each location a sample from the water table and five feet above the water table were sent to Environmental Testing Services, Inc., in Norfolk, Virginia for analysis of Total Petroleum Hydrocarbons (TPH) by Methods 3550 and 5330. One sample, taken from B11A was also analyzed for TCLP compounds. Laboratory results are available for review in Appendix C.

TCLP analysis was conducted on a soil sample from boring 11a. All parameters of the TCLP analysis were below laboratory detection limits with the exception of barium. Barium was present in levels below regulatory levels (0.091 mg/l).

Samples analyzed for TPH by Method 5030 (low to medium boiling point hydrocarbons) demonstrated TPH concentrations ranging from below laboratory detection limits to 2.0 mg/kg. This analysis will detect fuel types with low to medium boiling points (including BTEX-containing hydrocarbons). TPH concentrations by Method 3550 (medium to high boiling point including hydrocarbons containing semi-volatile constituents) ranged from below laboratory detection limits to 59 mg/kg. Soil boring B11A contained the highest concentrations of TPH by Method 3550 (59.0 mg/kg) and Method 5030 (2.0 mg/kg). Soil TPH concentrations are summarized on Figures 7 and 8 and are described below.

Tank S781 Area

As shown on Figure 7, soil borings in the immediate vicinity of Tank S781 had the following concentrations of total petroleum hydrocarbons:

Sample#	Sample Depth (feet)	TPH (mg/kg)
B1-A	14-16	25
B-4	4-6	11,000
B-4	9-11	12,000
MW-4	14-16	255
MPSB1	0-5	1200
MPSB2	0-5	1400-2200

As discussed in Section 3 of the May, 1992 Site Assessment Report, it is not unreasonable to assume that these TPH concentrations are the result of the operation of tank S781.

Field to the Northwest of Building 45 Complex

The field to the northwest of the building 45 complex shows evidence of past industrial use. A road traverses this field, and a piece of equipment was discovered in this field near MW-14 during the Fall 1991 investigation.

As shown on Figure 8, soil borings in the field to the northwest of the building 45 complex had the following concentrations of total petroleum hydrocarbons:

Sample#	Sample Depth (feet)	TPH (mg/kg)
MW-8	0-2	6.7
MW-8	4-6	22.8
MW-14	0-2	4.3
MW-14	2-4	11.4

B-4A	9-11	LT-1
B-4A	14-16	LT-1
B-5A	0-2	17
B-5A	4-6	LT1
B-6A	0-2	20
B-6A	4-6	4
B-10A	0-2	LT-1
B-10A	4-6	LT-1
B-11A	0-2	59
B-11A	4-6	LT1

Relatively low concentrations of TPH are consistent throughout this area and likely unrelated to the operation of Tank S781. This conclusion is drawn based on the following:

- Volatile organic compounds were not detected in hydropunches H-7, H-4, and H6, which are located between the tank and this field.
- TPH was not detected in water table soils from B5A, and B11A (i.e., 4'-6'), whereas TPH was detected in the surface soils (i.e., 0'-2'), suggesting a surface source.
- TPH was not detected at all in soils from boring 10A.
- TPH concentrations in the surface sample from B6A was higher than the water table sample, suggesting a surface source.
- TPH was detected at a higher concentration in the water table sample from MW-8 than the surface soil sample. However, the fact that TPH was detected in the surface soil sample suggests that surface deposition of petroleum compound could be a source.

The observation might be made that the concentrations of TPH in the surface soils are due to a fluctuating ground water table, instead of a surface source. This would be plausible, however, the absence of TPH in the groundwater table soil samples from B5A and B11A, coupled with the detection of TPH in those surface soil samples, would suggest a surface source.

Based on the above evaluation, the TPH concentrations detected in the field to the west of the building 45 complex are unlikely to be related to the operation of Tank S781 and are therefore considered outside the scope of this report.

2.02.4 Groundwater Characterization

Between December 6 and 12, 1991 groundwater samples were collected from each monitoring well and hydropunch location. Groundwater samples were sent to OBG Laboratories in Syracuse, NY for analysis by EPA Methods 8010, 8020, 8100 and TCLP. Standard laboratory QA/QC procedures were applied in accordance with the referenced EPA methods. Laboratory results are available for review in Appendix B.

All parameters, included in analytical methods EPA 8100 and TCLP, demonstrated values below laboratory detection limits. Constituents of the EPA 8010 and 8020 methodologies that were found to be above laboratory detection limits were below Ambient Water Quality Criteria.

(B
dichloro
084 ppm
See pg 34

Report

Site Assessment
Tank S781
Midway Park

Marine Corps Base
Camp Lejeune
North Carolina
Contract N62470-90-R-7626

Naval Facilities Engineering Command
Norfolk, Virginia

May 1992

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for Superfund, Volume I: Human Health Evaluation Manual". As such, it analyzes potential site-related acute and chronic health risks presented to on-site and off-site receptors, under both current and future use scenarios.

3.02 Site-Specific Descriptive Information

3.02.1 History

The 176,000 gallon capacity storage tank was originally owned and operated by Tidewater Electric, prior to 1942, and was used to store fuel oil. Following the Marine Corp acquisition of the property in 1942, the tank was used to store waste oils, primarily related to diesel engine maintenance and repair. The tank is surrounded by a brick retaining wall, approximately five feet high. Ground level inside the retaining wall slopes downward toward the tank.

The tank was emptied in 1988, according to Tom Morris, Environmental Management Department, MCB Camp Lejeune, N.C. for this project. According to Mr. Morris, approximately eight inches of thick sludge still remains in the bottom of the tank. There is no history of leaks from the tanks. However, Mr. Morris reported that a pump leak occurred, possibly when the tank was emptied. According to Mr. Morris, this leak resulted in excavation of the impacted soils within the surrounding brick wall.

Preliminary site investigations were conducted in November 1990 by Dewberry and Davis. Five hand auger, five soil borings and two monitoring wells were completed in the area of tank S-781. While the ground water samples did not indicate contaminant levels above method detection limits, three soil samples yielded total petroleum hydrocarbon (TPH) concentrations exceeding 10 ppm. TPH concentrations ranged from below method detection limits to 2200 ppm.

3.02.2 Site & Surrounding Area Description

The tank is located adjacent to Building 45, the Base's heavy equipment maintenance and storage building. The tank and Building 45 are located approximately 130 feet southwest of the Camp Lejeune railroad, which parallels a four-lane road (Hwy 24). Residential housing is located on the other side of this road, northeast of the tank. There are no water supply wells within 1500 feet of the site. The area south and west of the tank/Building 45 is undeveloped and wooded. The Building 45 area, including tank S-781 is enclosed by a locked fence. Access is gained only during regular work hours. The fencing to the east runs between the site and the railroad tracks. Surface drainage ditches parallel the railroad, between the fence and the railroad.

The ground cover in the immediate area of the tank is grassy, with some pavement and gravel immediately adjacent to Building 45. The nearest surface water is Northeast Creek, approximately 800 feet to the northwest. There are no water supply wells within 1500 feet of the site. The only utilities servicing the site are above ground electric lines as illustrated on Figure 6. A map of the site is presented as Figure 2.

3.02.3 Demographics

The population at Camp Lejeune includes military personnel and their families, as well as civilian employees. Based on observations made during a site visit, approximately 10 - 20 people are employed at the Building 45 compound, a typical 8-hour/day, 5-day/week job.

3.03 Current Site Data

The site investigation involved the installation, development and sampling of seven shallow monitoring wells and seven deep monitoring wells (as nested pairs; MW1 - MW14), four soil borings (B1 - B4), and ten hydropunches (H1 - H10). These are described in detail in Section 2.01 of this report.

3.03.1 Soil Data

Two soil samples from each of the four soil borings, and two soil samples from each of the seven deep monitoring wells were selected for laboratory analyses for TPH using a gas chromatograph/flame ionization detector (GC-FID). Soil samples were collected at the water table and five feet above the water table. Five soil samples collected from the water table (MW2, MW4, MW6, MW8, and MW12) were analyzed for flash point and pH. Two other soil samples (MW2 and MW4) were selected for full-scan toxicity characteristic leaching procedure (TCLP) analyses.

The pH results ranged from 4.8 to 7.4; flash point tests were negative; the TCLP results were below EPA regulatory criteria for this procedure.

Soil TPH results ranged from 4.3 mg/kg in MW14 (0′ - 2′ depth) to 12,000 mg/kg in B4 (4′ - 6′ depth). Twelve soil samples exceeded 10 mg/kg TPH, as follows:

Sample #	Sample Depth	TPH (mg/kg)
MW2	14′-16′	19
MW2	9′ - 11′	15
MW4	9′ - 11′	15
MW4	14′ - 16′	255
MW6	9′ - 11′	14
MW6	14′ - 16′	13
MW8	11′ - 6′	23
MW10	4′ - 6′	17
MW14	2′ - 4′	11
B1	4′ - 6′	11
B4	4′ - 6′	12,000
B4	9′ - 11′	11,000

3.03.01.1 Soil Data Evaluation

Two sampling locations stand out as having TPH-contaminated soils significantly exceeding 10 mg/kg. These are monitoring well MW4 and soil boring B4. Referencing Figure 2, B4 is located west of the tank, while MW4 is southwest of the tank. Located in the immediate area of B4, MW4 and tank S-781 is a small uncovered, subgrade structure that appears to be a pit or catch basin, and a small building that appears to be the pump house for the tank system. As such, it is reasonable to assume that subsurface piping related to the tank system exists in the area of B4, running between the tank, the pump house, and perhaps the catch basin. MW4 is located perpendicular to the downgradient direction of tank S-781 and B4, approximately 25 feet west of the pump house and catch basin.

In summary, it appears that TPH-soil contamination is present in close proximity to the tank and associated pump house and catch basin, and is likely related to the former operation of tank S-781. Raleigh, N.C. and Jacksonville, N.C. offices of Carolina Power and Light (CP&L) were contacted regarding the operation of tank S781 under the ownership of CP&L (previously named Tidewater Electric), prior to 1942. No historical information on the past operation of the tank was available from CP&L. According to Environmental Management Department, MCB Camp Lejeune, the operation of the tank involved the tank itself, the pump house, lines between the tank and pump house, and lines running from the tank to the building and there are no other sources or avenues for petroleum hydrocarbons at the site. According to Major McLain, Facilities Utilization Officer, in charge of the operations at building 45, there are no other sources or avenues for petroleum hydrocarbons at the site related to tank S781 other than the pump house and building 45. The presence of the TPH materials in soil samples from MW4 and B4 are considered in the exposure pathways, as discussed in subsections 3.05.2, 3.05.4 and 3.05.5.

3.03.2 Ground Water Data

No free product was detected in the fourteen ground water monitoring wells, nor was free product detected in the ten hydropunches.

Ground water samples from each monitoring well and hydropunch were analyzed for volatile organic compounds by SW-846 methods 8010 and 8020 (equivalent to EPA Methods 601 and 602). In addition, samples from MW1, MW7 and MW11 were analyzed by EPA SW-846 method 8100 equivalent to Method 610), (polynuclear aromatic hydrocarbons;

PAHs). Ground water samples from MW3 were analyzed for full scan TCLP compounds. Section 2 of this report provides additional details on the analytical scheme.

TCLP results were below regulatory limits; PAHs results were less than the detection limits.

The 8010/8020 results were below method detection limits, with VOC the exception of the following compounds:

Detected Compound	Sample Number	Results (mg/l)	NC Standard (mg/l)	MCL (mg/l)
chlorobenzene	H5	0.005	0.3	0.1 *
1,2-dichlorobenzene	H8	0.031	0.62	0.6 *
1,3-dichlorobenzene	H5	0.006	0.62	0.6 *
1,4-dichlorobenzene	H5	0.084	0.0018	0.075
1,1-dichloroethane	MW3	0.016	n/a	n/a
"	H1	0.002	n/a	n/a
1,1-dichloroethylene	MW4(dup)	0.002	0.007	0.007
1,2-dichloroethylene	MW4	0.002	n/a	0.07 *
ethylbenzene	MW3	0.016	0.029	0.7 *
toluene	MW12	0.002	1.0	2.0 *
"	H9	0.002	1.0	2.0 *
vinyl chloride	MW4(dup)	0.002	0.000015	0.002

The NC standards are the water quality standards applicable to the ground waters of North Carolina, as dictated in Title 15, Subchapter 2L, Section 0.0200, of the North Carolina Administrative Code, dated 12/1/89. The standard applies to Class GA waters, which are considered to be drinkable in their natural state (i.e., potable water supplies).

MCL's are the Maximum Contaminant Level allowable for drinking water, under the National Primary Drinking Water Regulations. Those marked with the * indicate proposed limits; all others are final and current limits.

"n/a" indicates that North Carolina has not established a criterion for this chemical.

3.03.02.2 Ground Water Data Evaluation

The following compounds were detected in excess of the North Carolina criteria:

- 1,4-dichlorobenzene (p-dichlorobenzene) in H5
- vinyl chloride, in duplicate sample for MW4.

1,4-dichlorobenzene, detected in H5 at 0.084 mg/l, exceeds the regulatory criteria. This is an isolated occurrence of a compound not typically related to waste diesel oils. Therefore, the 1,4-dichlorobenzene detected in H5 is not likely related to the past operation of tank S-781. However, it is considered in the exposure scenarios, as discussed in subsections 3.05.02, 3.05.03 and 3.05.04.

The vinyl chloride was below detection limits in the other portion of the duplicate sample for MW4. Vinyl chloride detected at 0.002 mg/l is within the federal MCL criterion.

The other organic compounds detected in the ground water samples are within regulatory limits, as presented on the above table. The only exception is 1,1-dichloroethane, for which no regulatory limit has been established to date.

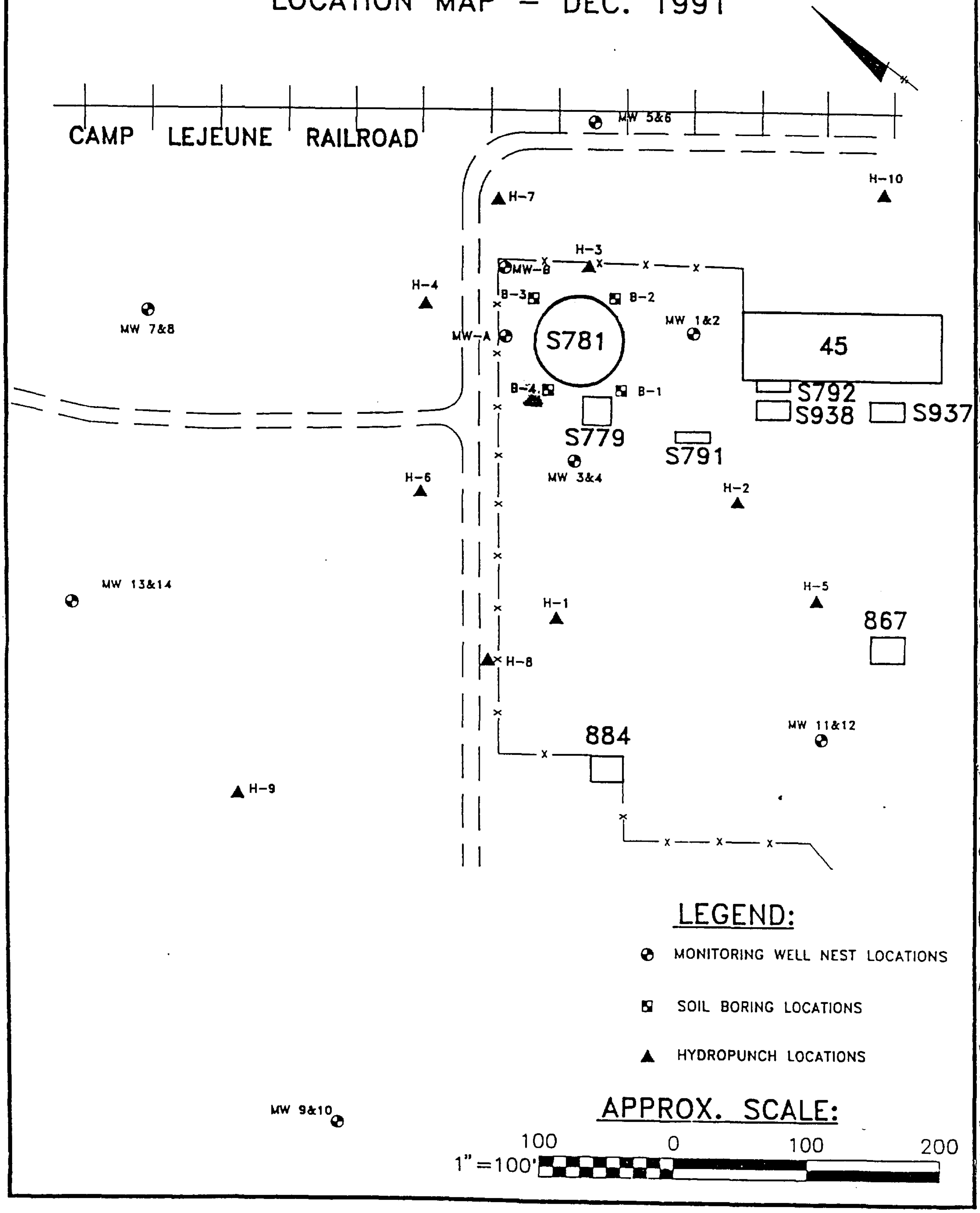
Ground water flow, based on data collected from the seven nested wells, is in a west-northwesterly direction; ground water flow velocity is calculated to be approximately 10 feet/year. It is possible that ground water samples collected during the summer season, rather than the winter season, may reflect different analytical results.

3.03.03 Ambient Air Data

Ambient air quality was monitored during field activities with a photoionizing organic vapor detector (PID) with a 10.2 eV lamp. PID readings were recorded from the breathing zone of the on-site workers and at the ground surface every 15 to 30 minutes. The PID

FIGURE 2

MIDWAY PARK
CAMP LEJEUNE N.C.
BLDG 45, TANK S781
SUBSURFACE INVESTIGATION LOCATION MAP – DEC. 1991



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FINAL
REMEDIAL INVESTIGATION REPORT FOR HADNOT POINT INDUSTRIAL AREA OPERABLE UNIT SHALLOW SOILS AND CASTLE HAYNE AQUIFER CHARACTERIZATION STUDY TO DETERMINE EXISTENCE AND POSSIBLE MIGRATION OF SPECIFIC CHEMICALS IN SITU

VOLUME 1

MARINE CORPS BASE
Camp Lejeune, North Carolina

Contract No. N62470-83-C-6106

Prepared for:

NAVAL FACILITIES ENGINEERING COMMAND
Atlantic Division

APRIL 1992

Prepared by:

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.
Orlando, Florida

4902036-0150

EXECUTIVE SUMMARY

MCB Camp Lejeune is a training base for the Marine Corps, located in Onslow County, North Carolina. It covers approximately 170 square miles, and is bounded to the southeast by the Atlantic Ocean, to the west by U.S. 17, and to the northeast by State Road 24. The base is bisected by the New River estuary, which occupies approximately 30 square miles of the total area of the facility.

The Hadnot Point Industrial Area (HPIA) of MCB Camp Lejeune is located on the east side of the New River estuary. The HPIA is comprised of approximately 75 buildings and facilities. These include maintenance shops, gas stations, administrative offices, commissaries, snack bars, warehouses, storage yards and a dry cleaning facility. A steam plant and training facility occupy the southwest portion of HPIA. In addition, underground storage tanks, stormwater drains, and oil/water separators are present. As a result of Marine operations and activities, wastes that contain hazardous and toxic compounds are generated at the base. This has resulted in the storage, disposal, and/or spillage of these wastes. Several of the base's water supply wells at HPIA have been shut down as a result of the presence of contaminants.

Due to the potential of spillage of wastes in the HPIA, several investigations have been conducted to date on the Hadnot Point Operable Unit which is defined as that area bounded by Holcomb Boulevard to the west, Sneads Ferry Road to the north, Louis Street to the east, and the Main Service Road to the south. The Hadnot Point Operable Unit also includes the two primary hydrologic units; an unconfined surficial aquifer and a semi-confined potable aquifer (Castle Hayne). This report summarizes to date data which has been collected from the shallow and Castle Hayne aquifers and the unsaturated shallow soils.

A transformer storage yard (Site 21) and a fuel tank farm (Site 22) are located within the northern portion of HPIA. Two other study areas, the industrial area fly ash dump (Study Area 24) and the Hadnot Point burn dump (Study Area 28) lie to the south and southwest of the site. These areas of concern are not included in the operable unit and will be considered in separate studies at a later date.

The investigation of the HPIA has been completed as a phased approach, with the results of one investigation being the basis for the next phase. Three major investigations or Studies have been completed at the installation prior to the completion of this report. These investigations are described below.

An Initial Assessment Study (IAS) was conducted under the Navy Assessment and Control of Installation Pollutants (NACIP) program at MCB Camp Lejeune in 1983. The IAS report (Water and Air Research, 1983), which was a record search of the installation, identified a number of areas within MCB Camp Lejeune, including the HPIA, as potential sources of contamination. As a result of this study, Environmental Science and Engineering, Inc. (ESE) was contracted by the Navy to investigate the HPIA as well as other potential source areas.

The initial ESE investigation, referred to as the Confirmation Study is divided into two investigation steps: the Verification Step and the Characterization Step. The Verification Step at HPIA was conducted to determine if areas of suspected contamination, as documented in the IAS, were indeed contaminated. This investigation was conducted from April 1984 through January 1985, and involved the installation of three shallow groundwater monitor wells and the sampling of the potable water supply wells in the HPIA, as well as the investigation of other sites within Camp Lejeune. This step identified the presence of volatile organic compounds (VOCs) in the shallow aquifer in the vicinity of the Hadnot Point Industrial Area Tank Farm (Site 22) and in a single potable Supply Well (602).

Based on the results of the Verification Step, the Characterization Step was performed at HPIA during the period of 1986 through 1988. This phase was designed to evaluate the extent of the VOC contamination identified in the Verification Step within the HPIA. The Characterization Step consisted initially of a records search of available base records, a physical inspection of each building within HPIA, and a soil gas survey targeted to those areas identified by the records search as being potential contamination sources.

Each of the areas identified by the records search as potential sources of VOCs was investigated with the use of the soil gas technique which focused on TCE as the contaminant of concern. Areas which exhibited TCE or other VOC contamination in the soil included the areas around Bldgs. 901, 902, and 903, Bldg 1202, and Bldgs. 1502, 1601, and 1602.

Following analysis of the record search and soil gas data, locations were chosen for the installation of 27 shallow (25 feet), 3 intermediate (75 feet), and 3 deep (150 feet) monitoring wells to determine if contamination identified during the soil gas investigation had migrated to the shallow and deeper groundwater. All new and existing HPIA monitoring wells and nearby water supply wells were then sampled.

Aquifer testing of one deep potable supply well was conducted to evaluate the hydraulic parameters of the Castle Hayne aquifer and to determine the transport mechanisms between the shallow and Castle Hayne aquifers.

The Confirmation Study served to narrow the list of source areas to three primary areas, being the areas surrounding buildings 902, 1202, and 1601.

The Supplemental Characterization Step, performed at HPIA in 1990-1991, was designed to further evaluate the extent of contamination in the Castle Hayne aquifer and to characterize the contamination within the shallow soils at suspected source locations. The Supplemental Characterization Step consisted of 30 soil borings at the 3 suspected source locations (Bldgs. 902, 1202, and 1601) to characterize shallow soil contamination, installation of additional intermediate and deep monitoring wells into the Castle Hayne aquifer, and sampling of all new and existing HPIA monitoring wells and nearby water supply wells.

The groundwater sampling and analysis program continues to reflect two nodes of VOC and\or petroleum hydrocarbon contamination within the shallow aquifer. The northern node consists of two separate sources of contamination--one centered near the maintenance facility associated with Bldg. 901, and another centered at the Hadnot Point Fuel Tank Farm (Site 22). Contaminant isopleth modeling suggests that these two source areas may have effectively coalesced into one larger node of contamination. The southern node is centered near the maintenance facility associated with Bldg. 1601. The surficial aquifer will initially be remediated under an Interim Remedial Action which is the subject of reports prepared under separate cover.

A Risk Assessment (RA) has been completed for the shallow soils at the 3 remaining areas of concern. This assessment has shown that the low levels of contamination detected within the soils do not pose a human or ecological threat. This RA also addressed the groundwater within the Castle Hayne aquifer. While contaminants have been detected in one monitor well and in several potable wells, no current risk was identified. Additional studies addressing the extent of contamination within the Castle Hayne aquifer are being undertaken under separate cover.

6.0 SUMMARY AND CONCLUSIONS

6.1 RECORDS SEARCH

The existing IAS report (NEESA, 1983) was reviewed, and potential sources of the contamination identified by the Verification Step efforts were noted. With the assistance of Camp Lejeune staff, a 2-person team from ESE conducted a building-by-building evaluation of all past and/or current activities that may have utilized any solvent compounds. buildings and other facilities identified in the IAS report were evaluated with extra caution. In many cases, the physical facilities of the buildings (i.e, floor drains, sumps, and unmarked pipe lines) were inspected to identify the general purpose and any interconnections. Any pits, tanks, or other drainage structures outside of the buildings were also closely investigated.

A number of potential source areas within HPIA were identified, for the most part associated with vehicle maintenance facilities. Three specific areas exhibited a higher probability of actually being the source of the observed contamination: (1) Bldgs. 901, 902, and 903; (2) Bldg. 1202; and (3) Bldgs. 1502 and 1601.

6.2 SOIL INVESTIGATION

6.2.1 Soil Gas Survey

To optimally site monitor well locations, soil gas sampling and analysis was conducted in the vicinity of all buildings that could potentially act as VOC source areas, as indicated by the records search effort.

VOCs, if present in groundwater or in the soil matrix, occupy the interstices or voids in the soil. Vapors from the interstitial space were sampled and characterized using a portable gas chromatograph (GC). Determination of contaminant concentrations to the low parts-per-billion level was made with this system. TCE was used as the indicator compound at HPIA to trace volatile plumes.

The soil gas investigation corroborated the records search efforts by verifying the presence of TCE within the unsaturated soils at the three primary sites. Limited amounts of TCE contamination were detected at sites other than the three major ones.

6.2.2 Soil Sampling and Analytical Results

Shallow soil borings were performed at HPIA to evaluate the extent of shallow (above the water table) soil contamination in three areas of concern at HPIA. These areas are located in the vicinity of Buildings 1601, 902, and 1202.

Each soil boring was advanced to the water table. Continuous split spoon sampling was conducted while vapor monitoring with an photoionization detector, and samples were selected from each boring for chemical analysis. Ten percent of the samples collected were analyzed for full Target Contaminant List (TCL) parameters. The remaining 90% were analyzed for volatile organic compounds (TCL VOAs), pesticides and PCBs, and Toxicity Characteristic Leaching Procedure (TCLP) metals.

While TCE and other volatile compounds were the primary concern during the soil gas survey, these compounds were detected in few of the soil samples collected. Quantifiable concentrations of TCE, toluene and 1,2-DCE were detected in samples collected from one soil boring (SB-5), and ethylbenzene and xylenes were detected in another. Several other compounds were detected as TICs. Semi-volatile compounds were quantified in one soil sample and were detected as TICs in eight others. Pesticides were quantified in a total of five samples collected from three boreholes.

Three metals (aluminum, calcium, and iron) were abundant in many of the soil samples analyzed in concentrations greater than 1,000 ug/kg. Many of the other metals analyzed for were also detected, but were detected in quantities that were above the instrument detection level but below the certified limit of the method. TCLP analysis of 27 samples showed detectable quantities of virtually all analytes with the exception of mercury and silver. Mercury was detected in one sample and silver was not detected in any sample. Those analytes which were detected typically were detected in quantities that were above the instrument detection level but below the certified limit of the method.

Based on these analyses, the shallow soils at the areas investigated do not appear to be heavily contaminated. Volatile compounds detected in the soil gas remain in the vapor phase and have not adhered to the soils. The hits in the sample from SB-5 were collected near the old TCE tank at Building 902 and appear to be associated with that tank.

The semi-volatile compounds detected in boring SB-6 and the volatile compounds detected in SB-14 are fuel related (diesel) and fit with the use of these areas (Buildings 902 and 1202) as vehicle repair and maintenance.

Pesticide contamination is limited and occurs in the surface soils (0-2 feet) in three of the five samples where they were detected.

Many of the metals detected were found in all samples analyzed and are therefore indicative of the soil matrix and associated clays.

6.3 GROUNDWATER INVESTIGATION

6.3.1 Monitor Well Installation

A network of groundwater monitoring wells was installed at the site to define the nature of the contaminants within the groundwater and to determine the horizontal and vertical extent of the identified contaminants. A total of 33 wells were installed during the Characterization phase (September 1986 through August, 1987); 27 shallow wells, three intermediate wells, and three deep wells. Additionally, two shallow wells were installed at the Hadnot Point Fuel Farm (Study Area 22) and one at the transformer storage yard (Study Area 21) during the Verification investigation.

In December 1990, eight groundwater monitoring wells were installed downgradient of the four areas of concern in the Hadnot Point area at Camp Lejeune. Both an intermediate and deep well were installed at each location in order to evaluate the vertical distribution of contaminants in the groundwater downgradient of specific areas of concern. The areas of concern are Building 1602, Building 902, Building 1202, and the Industrial Area Tank Farm (Site 22).

Shallow wells were completed to a depth of 25 feet. Each of the intermediate wells were screened from approximately 65 to 75 feet below grade. The deep wells were screened from approximately 140 to 150 feet below grade. All wells were developed by pumping, and well elevations and locations were surveyed.

6.3.2 Groundwater Sampling

Characterization Phase

Each of the shallow wells installed during the Characterization were sampled three times during the phase, with a period of approximately 60 days between sampling events. The intermediate and deep wells were sampled once during this phase. All samples collected were analyzed for lead, oil and grease and volatile organics (EPA Method 624).

Supplemental Characterization

Each of the groundwater monitor wells and nine water supply wells were scheduled to be sampled during the field investigation. One shallow well and one deep well could not be sampled because they could not be located after numerous attempts to find them. Water supply wells 608 and 630 were not sampled because the wells were either welded shut (608) or demolished (630).

All groundwater samples collected during this phase were analyzed for full TCL parameters.

6.3.3 Analytical Results

Surficial Aquifer

The sampling and analysis program has delineated the extent of contamination within the surficial aquifer at the HPIA. Two nodes of VOC and\or petroleum hydrocarbon contamination were found to exist. The northern node consists of two separate sources of contamination--one centered near the maintenance facility associated with Bldg. 901, and another centered at the Hadnot Point Fuel Tank Farm (Site 22). Contaminant isopleth modeling suggests that these two source areas may have effectively coalesced into one larger node of contamination. The southern node is centered near the maintenance facility associated with Bldgs. 1601 and 1709.

When looking at the type of contamination at each of the nodes, fuel related compounds, as would be expected, constitute the bulk of the contamination at the tank farm, where a layer of floating product has been identified. The contamination centered near building 901 consists primarily of 1,2-DCE and TCE with minor secondary contamination by fuel related compounds. The contamination at Building 1601 also consists of 1,2-DCE and TCE, but there is a strong fuel related component. Wells within the remainder of the plume are contaminated primarily by solvents. A comparison of the Characterization and supplemental Characterization data indicates that the strength of the VOC plume has increased based on the source strength at the center of each node. The horizontal extent of the plume has remained generally the same.

Semi-volatile compounds were detected in only six of the shallow wells tested. These compounds occurred in areas with high VOC contamination and were compounds commonly associated with diesel fuels or oils.

Pesticide contamination was limited to one compound in one well and reflects the soil data in that any pesticides present are typically contained in the upper portion of the soil column.

Metals in the shallow groundwater also reflect the soils data. High concentrations of basic metals typically associated with clays were in all samples. Part of this may be attributed to the unfiltered samples which are collected and analyzed. Release of metals adsorbed to the clays or contained in the clay minerals themselves can be achieved through the acidification of the sample during preservation. The shallow wells at the HPIA are all set into a silty clayey sand which extends to a depth of approximately 30 feet across the site. Four metals (chromium, iron, manganese, and sodium) were detected in concentrations above the primary or secondary drinking water standard in the majority of the wells tested. Lead was also in concentrations over the standards in one third of the wells.

Castle Hayne Aquifer

Low concentrations of VOCs (1-50 ug/L total) were detected in all of samples collected from the intermediate depth wells. These compounds consisted of 1,2-DCE and the four fuel related compounds (benzene, toluene, ethylbenzene, and xylenes) although vinyl chloride was detected in well HPGW30-2. Most of the fuel related compounds were detected as TICs only.

Semi-volatile compounds were detected in four of the intermediate depth wells. These compounds are typically associated with diesel fuels and oils, although a phthalate compound was detected as a TIC in three of the wells. Two of the wells contained naphthalene at levels greater than 50 ug/L.

No pesticides were detected in any of the samples collected from the intermediate depth wells.

Metals concentrations decreased significantly in the samples collected from the intermediate depth wells as compared to the shallow wells. This may be attributed to fewer clay minerals in the monitored zone. The intermediate wells are set into a lithological layer composed of sand, shells, and cemented clastics. The rise in the calcium concentrations reflects this change in lithology. Iron remained in concentrations above the standards in all of the intermediate depth wells sampled, and manganese and thallium each exceeded the standards in one well.

Deep Wells

Fuel related VOCs (total 107 ug/L) were detected in one sample collected from a deep well (HPGW32-3). These compounds were also detected in the sample collected from the intermediate depth well at this location. No shallow well exists in this cluster, but the cluster is located within the shallow plume originating from the fuel tank farm area. Solvents were detected as TICs in one other well.

One semi-volatile compound was detected as a TIC in two of the samples collected from the deep wells. No pesticides were detected in any of the samples collected from the deep wells.

Metals concentrations were also decreased in the samples collected from the deep wells as compared to the shallow wells. The deep wells are set into similar materials as the intermediate depth wells; a lithological layer composed of sand, shells, and cemented clastics. Elevated calcium concentrations also occur in these wells. Iron remained in concentrations above the standards in all but one of the deep wells sampled, but these concentrations are up to 300 times less than those seen in the shallow well samples. Manganese barely exceeded the standard in one well.

Water Supply Wells

Solvent contamination was detected in four water supply wells in 1984. Contamination in these wells included solvents and fuel related compounds. These wells were taken off line upon the discovery. VOC contamination in these wells has dropped since they were taken off line. With the end of pumping from these locations, contamination is no longer being drawn into this zone. VOC contamination in the worst well (WS602) has dropped from a total of approximately 2,400 ug/L in 1984 to less than 60 ug/L. Samples collected from four additional wells continue to show very low concentrations (1-3 ug/L) of solvent compounds as TICs.

Iron and manganese continue to be elevated above standards in some of the wells tested.

6.4 AQUIFER TESTING

An aquifer pumping test was conducted at HPIA in April, 1987 to determine site-specific aquifer characteristics for the Castle Hayne aquifer, and to evaluate the interconnection between this unit and the surficial aquifer. Water supply well 642 was selected for the pumping test because it was the closest, active well to HPIA that was not within the zone of deep contamination. The three observation wells included in the pumping test were a USGS well and two observation wells.

Drawdown data from the pumping test was analyzed by a number of analytical methods. The methods of Theis (1985), Hantush (1955), and Walton (1962) were employed to analyze drawdown data for values of transmissivity and storage coefficient. The distance drawdown method of Cooper and Jacob (1946) was also used to analyze drawdown data. Additionally, the methods of Hantush and Jacob (1955) and Walton (1962) were used to evaluate properties of the semi-confining layer.

6.5 GEOHYDROLOGY

The installation of the shallow monitor well network identified the presence of interlayered sands, silts, and clays in the shallow subsurface. This mixed sequence of materials appears to extend to a depth of approximately 100 feet at which point a more permeable unit of sand and limestone dominates the lithology. All potable groundwater at Camp Lejeune is obtained from this sand/limestone interval (Castle Hayne aquifer).

Groundwater flow at the HPIA is generally toward the New River. Horizontal hydraulic gradients in the surficial aquifer at HPIA were determined from the potentiometric surface map. In general, the horizontal hydraulic gradient in the surficial aquifer at HPIA is approximately 0.003 feet/ft. Specifically, the northern and southern portions of HPIA exhibit a horizontal hydraulic gradient of 0.003 feet/ft. However, the west-central portion of HPIA exhibits a horizontal hydraulic gradient of approximately 0.004 feet/ft (ESE, 1991). al. (1989) and ESE (1988).

Hydraulic gradients were also calculated for the deep and intermediate zones. Due to there being fewer measured points in these zones, the gradients are calculated from one end of the site to the other between well clusters 4 and 24. The calculated gradient for the intermediate zone was 0.0015 ft/ft and for the deep zone the gradient was 0.0021 ft/ft. All gradients were calculated using the February 1991 data.

Vertical flow gradients were determined at monitoring well cluster locations by comparing water level measurements taken from shallow, intermediate, and deep monitoring wells. The shallow monitoring wells are approximately 25 feet deep, the intermediate monitoring wells are approximately 75 feet deep, and the deep monitoring wells are approximately 150 feet deep.

The vertical gradient between the shallow zone and the deeper zones (intermediate and deep wells) is in the downward direction and increases as you move upgradient across the site. This downward gradient is most pronounced in cluster 24. The occurrence of this downward gradient is most likely a result of pumping from the lower zones for potable uses and provides the hydrologic mechanism to carry contaminants from the shallow zones to the lower zones.

In general, the water levels within the intermediate and deep well of each well cluster are nearly the same with the exception of cluster 24 which shows an upward gradient. This data reflects the fact that the intermediate and deep zones behave hydrologically as one unit.

The Castle Hayne aquifer was found to have an average transmissivity of 9.6×10^3 gpd/ft and an average storage coefficient of 8.8×10^{-4}. The hydraulic conductivity of the semi-confining bed separating the shallow and deep aquifer zones was found to be approximately 4.6×10^{-3} ft/day. The overall average leakance of this semi-confining bed was determined to be 1.1×10^{-3} day^{-1}.

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FINAL

REMEDIAL INVESTIGATION REPORT
FOR
OPERABLE UNIT NO. 2 (Sites 6, 9 and 82)

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

CONTRACT TASK ORDER 0133

Prepared For:

DEPARTMENT OF THE NAVY
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7.0 CONCLUSIONS AND RECOMMENDATIONS

This section presents the conclusions of the remedial investigation, and the human he ecological risk assessment. Although the ecological risk assessment is presente separate cover, the conclusions are provided herein in order to summarize the resu entire remedial investigation. Recommendations for further action and pre-design st also provided in this section.

7.1 Conclusions

Based on the results of the various environmental investigations conducted at Oper No. 2, conclusions for each area of concern and media were developed and are presente

7.1.1 Site 6, Lot 201

- The northeast corner of Lot 201 (i.e., grid area A) at the former pesticide sto is contaminated with elevated levels of pesticides and volatiles that may be a with former waste storage/handling activities. The extent of soil contami limited in area since only two sampling locations (SB16 and SB17) exhibitec contaminant levels.

- Former waste storage/handling activities at Lot 201 have not adversely groundwater quality in this portion of Operable Unit No. 2.

- The presence of low levels of pesticides throughout Lot 201 is indicative of fo control practices and is probably not associated with the former storage of p Low levels of pesticides were detected at similar concentrations throug 210-acre Operable Unit.

- Reported storage of PCB transformers at Lot 201 has not resulted in si impacts to soil or groundwater, based on the limited number of occurrences a contamination.

- Overall, the current health risk to base personnel working at Lot 201 is v target range of $1x10^{-4}$ and $1x10^{-6}$.

7.1.2 Site 6, Lot 203

- Pesticide levels detected in soil at Lot 203 are not indicative of pesticide Pesticide levels at Lot 203 are comparable to other portions of Operable Un The southeast corner of Lot 203 did not reveal elevated pesticide levels gi pesticides were reported to be disposed of in this area.

- The area of Lot 203 near the former railroad spur may be associated with disposal activities. A limited number of surface and subsurface soil samples near the former railroad spur have revealed elevated levels of PCB-1260 an Historical aerial photographs indicate significant activity (i.e., surficial anon this area of Lot 203.

- Disposal activities may have occurred in the north central portion of Lot 203 (6GW15) where elevated levels of PCBs were detected in subsurface soil san addition to PCBs, elevated levels of PAHs were also detected in this area.

- The reported PCB disposal area in the northeast corner of Lot 203 did n elevated levels of PCBs. The reported area may have been inaccurately ide Marine Corps Memorandum.

- Military training operations at Lot 203 resulted in a substantial amount debris including communication wire, rocket casings, battery packs, small containers, and bivouac wastes. No 55-gallon drums were uncovered in any pit excavations within Lot 203. Trenches identified in historical photogra probably excavated as a means to dispose of military-type wastes and not for of disposing hazardous wastes.

- Numerous drums on the surface of Lot 203 present a potential impact to hum and the environment. Samples collected from these drums indicate that so drum contents are characteristically hazardous. None of the drums were n leaking.

- Groundwater quality at Lot 203 has not been significantly impacted b disposal and storage practices. Trace levels of TCE were detected in wel which is located in the north central portion of Lot 203 where disposal activ have occurred. Trace levels of TCE and PCE were detected in well 6(Well 6GW23 is located in the south central portion of Lot 203. The source o contamination in well 6GW23 is unknown. Soil samples collected from this b(as well as other nearby soil borings did not indicated a source. The so contamination may have been from a previous spill, which has since migrated fr soil to groundwater.

- Currently, Lot 203 is inactive and access is restricted. If the storage lot r operations, the potential human health risk (i.e., incremental carcinogenic risk be within the target range of 1x10^{-4} to 1x10^{-6}.

7.1.3 Wooded Areas and Site 82

- The wooded area north of Lot 203 (Site 82) exhibited elevated VOC contaminan in soil at two locations near the eastern portion of the site. This area is a p source of VOC contamination in groundwater.

- A large quantity of drums and debris were observed on the surface and subsurf north of Lot 203 in the wooded area (Site 82) near monitoring wells 6GW 6GW1D. Samples collected of the waste material analyzed the waste as No. 6 which is typically used for heating. Other drums uncovered could not be ide This area may also be a source of groundwater contamination at Site 82.

- Shallow and deep groundwater north of Lot 203 (Site 82) exhibited elevated l VOC contaminants. Deep groundwater quality was found to be significantl contaminated than shallow groundwater quality.

- The horizontal extent of shallow groundwater contamination is defined. The apparently originates just north of Lot 203 (in the southern portion of Site discharges into Wallace Creek. Contaminants have migrated into the deeper of the aquifer as evidenced by elevated VOC levels in deep groundwater mo wells.

- The horizontal and vertical extent of deep groundwater contamination h evaluated. The horizontal extent of off-site contamination west of Site 82 (beyo 6GW37D), however, has not been fully defined. Moreover, the vertical extent h evaluated to a depth of 230 feet. It is unknown at this time whether contamination extends below 230 feet. As mentioned previously, a clay layer is present at approximately 230 feet which may impede the vertical migration of contamination. For purposes of conducting the baseline human health and ecological risk assessment, the current deep groundwater database is adequate. For purposes of performing a feasibility study on the deep aquifer, the current database is also adequate to select feasible remedial alternatives. Additional deep wells west of Holcomb Boulevard and at and/or below the clay formation are required to support the design of an alternative which may employ containment/extraction wells. Installation of these additional wells is currently underway as of August 1993.

- PCBs were detected in surface and subsurface soil near Piney Green Road east of Lot 201. Disposal activities may have occurred in this area, which once served as a training area.

- Disposal activities may have occurred in the wooded area between Lot 201 and 203. One location (soil boring SB1) exhibited moderate levels of PCBs, PAHs, and pesticides in surface soil. The extent of this contamination is limited in area.

- A former disposal area was identified during the test pit investigation in the wooded area between Lot 201 and Lot 203. Numerous 5-gallon containers, bivouac wastes, and battery packs were encountered. All of the containers were rusted and destroyed to the point where their contents could not be identified; however, solvent-like odors were observed by the sampling team. A sample of the sludge material near the containers revealed that the material is characteristically hazardous due to elevated levels of lead. Chloroform was also detected, but was below TCLP regulatory levels.

- Groundwater quality in the wooded area south of Lot 203 (near the above-mentioned disposal area) has been impacted by former disposal practices. Elevated levels of VOCs (chloroform, chlorobenzene, phenol) were encountered in wells 6GW16 and 6GW25.

- Potential human exposure to soil within the wooded portions of Operable Unit No. 2 would not result in significant health risks. Incremental carcinogenic risk values are within the acceptable target risk range of $1x10^{-4}$ and $1x10^{-6}$. The area is frequented by hunters and military personnel.

7.1.4 Ravine

None of the TCL organics detected in the ravine exceeded applicable water quality criteria values. Surface water concentrations of aluminum, cadmium, copper, iron, lead, silver, and zinc exceeded the WQS and/or WQSV in some of the samples. The exceedances of these TAL inorganics occurred in upstream and/or downstream samples or were infrequent in occurrence.

- The presence of elevated levels of PAHs in soil and low levels of PCBs in sediment in the upper portion of the ravine (i.e., near Lot 203) is most likely due to former disposal practices. This portion of the ravine is filled with debris, including empty and partially-filled 55-gallon drums and other containers. In addition, canisters with "DDT" markings were found in the middle section of the ravine (between Lot 203 and Wallace Creek). However, no elevated levels of pesticides were detected in the ravine sediments.

- Soil contamination detected in the ravine has likely migrated to Wallace Creek via surface runoff. Wallace Creek sediments revealed the same constituents detected in ravine soils and sediments.

- Because of the amount of debris and difficulty in accessing the ravine, it is unlikely that human exposure would occur. Incremental carcinogenic risk estimates for the wooded areas and ravine area have indicated that potential human health risks are within the target range of $1x10^{-4}$ and $1x10^{-6}$.

7.1.5 Site 9

- Ongoing fire training exercises at Site 9 have not significantly impacted groundwater quality. Surface soil samples revealed TPH contamination in various areas.

- Low levels of pesticides present at Site 9 are likely the result of former pest control practices and not associated with waste disposal.

- Potential human health risks to military personnel training at Site 9 are within the incremental carcinogenic risk range of $1x10^{-4}$ and $1x10^{-6}$.

7.1.6 Ecological

7.1.6.1 Wallace Creek

- The presence of TCE, PCE, and other VOC contaminants in Wallace Creek shallow and possibly deep groundwater discharge.

- Surface runoff from the ravine and portions of Site 82 (the wooded area nor 203) have impacted sediment quality. Elevated levels of PAHs and PCBs ar in Wallace Creek. These contaminants were also detected in the ravine.

- Pesticides detected in sediment samples have exceeded EPA Region IV s screening values. The source of contamination may be due to either runoff ravine and/or historical pest control spraying practices. The highest pesticides were detected in two sampling stations that were located just down where the ravine discharges into Wallace Creek. One upstream sampling exhibited pesticide levels above the sediment screening values.

- None of the organic chemicals of concern detected in Wallace Creek applicable water quality standards.

- Inorganic levels for cadmium, copper, lead, mercury, nickel, silver, and zinc North Carolina Water Quality Standards (WQS) and/or EPA Region IV chronic WQSVs. Upstream sampling locations also exhibited inorganic lev exceeded these standards. The presence of inorganic constituents in Walla may not be associated with surface runoff from the ravine.

- The fish population and diversity in Wallace Creek appears to be healthy, population statistics. No anomalies were observed on any of the fish collect the aquatic survey.

- Some of the fish collected in Wallace Creek exhibited tissue concentrations pesticides, and TCE, which may be attributable to Site 82 and the rav Ingestion of fish taken from Wallace Creek could result in human hea (incremental carcinogenic risks) above the target point of $1x10^{-4}$.

7.1.6.2 Bear Head Creek

- Sediment quality in Bear Head Creek may be impacted via surface runoff from the wooded areas. Low levels PAHs, pesticides, and PCBs were detected in sampling stations which border Site 6. VOC contaminants were also detected in sediment samples; however, the source of VOC contamination is unknown given that adjacent soil and groundwater did not exhibit VOC contamination. Pesticides in sediment are not likely associated with disposal practices.

- Inorganic constituents detected in sediment are not likely the result of disposal practices at Site 6 or 9. Upstream sampling locations also exhibited inorganic constituents above EPA Region IV sediment screening values.

- The fish community at Bear Head Creek appears to be healthy, based on population statistics and observations. None of the fish collected at Bear Head Creek exhibited lesions or other anomalies that would represent adverse conditions.

- The fish community in Bear Head Creek had elevated levels of pesticides, PCBs, and zinc in tissue. The presence of these contaminants in fish tissue may be the result of contaminated sediment. Ingestion of fish taken from Bear Head Creek could result in incremental carcinogenic risks above the $1x10^{-4}$ departure point.

- None of the TCL organics detected in Bear Head Creek exceeded applicable water quality criteria values. Dissolved oxygen concentrations and pH values were below WQS and WQSV at some of the stations, but probably were associated with natural conditions.

- Surface water concentrations of copper, lead, mercury, nickel, and silver exceeded the WQS and/or WQSV in some of the samples. The exceedances of these TAL inorganics occurred in upstream and/or downstream samples or were infrequent in occurrence.

7.1.6.3 Terrestrial Receptor

Some of the contaminant concentrations in the surface soils of a few TAL inorganics may cause adverse effects to plants and invertebrates. The potential risk for terrestrial vertebrates exposed to on-site soils and surface water is expected to be low based on a comparison of terrestrial reference values to chronic daily intake estimates.

7.2 Recommendations

1. Further groundwater investigations are required to better define the extent of deep groundwater contamination at Site 82. These studies would be required to support the remedial design of alternatives employing containment/extraction wells.

2. Operating supply wells in the vicinity of Lot 203 should be monitored for VOC contamination. If elevated levels of VOCs are detected, the wells should be closed.

3. As a time critical removal action, a fence should be constructed around the wooded area north of Lot 203 (i.e., Site 82), including the ravine to prevent access. Surficial VOC contamination was encountered in this area.

4. Surficial drums at Lot 203 and in the wooded areas and ravine should be removed, overpacked, and properly disposed of as a non-time critical removal action. The drums present a potential source of groundwater contamination and human/ecological health hazard.

5. Additional studies should be conducted in Wallace Creek to determine whether the presence of contaminants such as PCBs and pesticide in fish and shellfish are due to the site. The limited database is not sufficient to conclude whether bioaccumulation is occurring due to the site-related migration pathways.

6. Based on the results of the Human Health Risk Assessment, and on a comparison of contaminant levels to groundwater standards, remedial action of the surficial and deep aquifer under Site 82 is recommended in order to restore the aquifer for future use.

7. Based on the soil data results, remedial action is recommended for "hot spot" areas of soil with elevated levels of VOCs, PCBs, PAHs, and pesticides. These areas may be potential sources of groundwater contamination.

Final

Remedial Investigation Report for Operable Unit No. 2 (Sites 6, 9, and 82)

Marine Corps Base, Camp Lejeune, North Carolina

Volume 1 of 2 Text

Prepared For:

Department of the Navy
Atlantic Division
Naval Facilities
Engineering Command
Norfolk, Virginia

Under the

LANTDIV CLEAN Program

Comprehensive Long-Term
Environmental Action Navy

Final

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3.0 PHYSICAL CHARACTERISTICS OF THE STUDY AREA

This section contains a discussion of the physical characteristics of Sites 6 and 9 (refer to as Operable Unit No. 2 or OU No. 2) including: surface features, meteorology, hydrology, geology, soils, hydrogeology, land use, ecology, and water supply well inventories. This information was obtained from the RI field activities and available literature pertaining to MCB Camp Lejeune.

3.1 Surface Features

The topography of MCB Camp Lejeune is relatively flat with ground surface elevations ranging from mean sea level (msl) to 72 feet above msl. Most of MCB Camp Lejeune lies between 20 and 40 feet msl. The terrain of Camp Lejeune is typical of the North Carolina Coastal Plain. Drainage is generally to the New River and the Atlantic Ocean via the Intracoastal Waterway.

OU No. 2 is dominantly a flat area with some elevation variations occurring near the northern portion of Site 82. Overall, the surface elevation at OU No. 2 ranges between 5 to 30 feet above msl (Figure 3-1). The highest elevations of OU No. 2 are encountered in the vicinity of Site 82 where the elevation increases to approximately 30 feet above msl. Elevations drop off sharply at the banks of Wallace Creek located along the northern portion of Site 82 and Bear Head Creek located in the wooded area south of Lot 201. The terrain near the northern portion of Site 82 indicates that drainage would be toward Wallace Creek while the terrain near the southern portion of Site 6 (or northern portion of Site 9) indicates that drainage would be toward Bear Head Creek.

Several major land surface features are present at OU No. 2. These features include a large ravine area, a smaller ravine area, surface depressions, and mounds as shown on Figure 3-1. The large ravine area, which has been discussed throughout this report (refer to Section 2.1.1.3), is located north of Lot 203. This larger ravine is approximately 40 feet in width at its widest point (southern end) and extends from just north of Lot 203 to Wallace Creek (approximately 1,250 feet in length). A smaller ravine area is also located near the eastern boundary of Site 82, northeast of monitoring well 6GW1S. This smaller ravine is approximately 20 feet in width at its widest point and extends approximately 600 feet in the north to south directions. Surface water was noted in the larger ravine periodically while surface water was not noted in the smaller ravine.

A series of depressions and mounded areas are also present near the southern portion of Site 82. Some of these features do not appear to be naturally occurring land features. The depressions appear to be former excavation areas while the mounded areas appear to be associated with excavations. Within some of these mounds, a large number of 5-gallon pails were noted. These pails contain suspected solvents or lubrication oils.

3.2 Meteorology

MCB Camp Lejeune is located within the Coastal Plain physiographic division of North Carolina. Coastal Plain elevations range from 200 feet above msl at the western boundary to generally 30 feet or less in areas of tidal influence to the east. The tidal portion of the Coastal Plain, where Camp Lejeune is situated, is generally flat and swampy.

Although coastal North Carolina lacks distinct wet and dry seasons, there is some seasonal variation in average precipitation. July tends to receive the most precipitation and rainfall amounts during summer are generally the greatest. Daily showers during the summer are not uncommon, nor are periods of one or two weeks without rain. Convective showers and thunderstorms contribute to the variability of precipitation during the summer months. October tends to receive the least amount of precipitation, on average. Throughout the winter and spring months precipitation occurs primarily in the form of migratory low pressure storms. Camp Lejeune's average yearly rainfall is approximately 52 inches. Table 3-1 presents a climatic summary of data collected during 27 years (January 1955 to December 1982) of observations at Marine Corps Air Station (MCAS) New River.

Coastal Plain temperatures are moderated by the proximity of the Atlantic Ocean. The ocean effectively reduces the average daily fluctuation of temperature. Lying 50 miles offshore at its nearest point, the Gulf Stream tends to have little direct effect on coastal temperatures. The southern reaches of the cold Labrador Current offsets any warming effect the Gulf Stream might otherwise provide.

Camp Lejeune experiences hot and humid summers; however, ocean breezes frequently produce a cooling effect. The winter months tend to be 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.

TABLE 3-1

CLIMATIC DATA SUMMARY FOR MCAS NEW RIVER
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

	Precipitation (Inches)			Relative Humidity (Percent)	Temperature (Fahrenheit)			Mean Number of Days With				
								Precipitation		Temperature		
	Maximum	Minimum	Average		Maximum	Minimum	Average	>=0.01"	>=0.5"	>=90 F	>=75 F	<=32 F
January	7.5	1.4	4.2	76	54	34	44	11	2	0	1	14
February	7.0	1.5	3.8	74	57	36	46	9	3	0	1	11
March	8.0	0.8	3.5	78	64	42	53	10	2	0	5	7
April	6.5	0.5	3.0	79	73	51	62	8	2	--	14	--
May	8.4	1.7	4.3	86	80	60	70	10	3	2	25	0
June	11.8	2.4	5.8	85	85	67	76	11	4	6	29	0
July	14.3	4.5	8.0	85	88	72	80	14	5	12	31	0
August	12.6	1.7	6.1	87	87	71	80	12	4	11	31	0
September	12.2	1.4	4.7	87	83	66	75	9	3	3	27	0
October	6.5	0.7	2.8	82	74	54	64	7	2	--	16	--
November	5.7	0.6	2.6	80	66	44	55	7	1	0	6	4
December	6.1	0.4	4.0	77	58	37	48	9	2	0	2	11
Annual	14.3	0.4	52.8	81	72	53	63	117	33	34	188	47

-- Less than 0.5 days

Source: Naval Oceanography Command Detachment, Asheville, North Carolina. Measurements obtained from January 1955 to December 1982.

Observations of sky conditions indicate yearly averages of approximately 112 days clear, 105 partly cloudy, and 148 cloudy. Measurable amounts of rainfall occur 120 days per year, on the average. Prevailing winds are generally from the south-southwest 10 months of the year, and from the north-northwest during September and October. The average wind speed for MCAS New River is 6.9 m.p.h.

3.3 Surface Water Hydrology

The majority of MCB Camp Lejeune is nearly level with wide, undissected interstream areas in which drainage is poor and water movement is slow. The New River is the dominant surface water feature and receives drainage from most of the base. It flows in a southerly direction and empties into the Atlantic Ocean through the New River Inlet.

OU No. 2 is located approximately 1.75 miles east of the New River and 12.5 miles north of the New River's outlet into the Atlantic Ocean. Two drainages exist within and adjacent to OU No. 2. Wallace Creek forms the northern border of Site 82 and flows in a southwesterly direction toward the New River. Wallace Creek is surrounded by marsh that exhibits extensive surface ponding. Bear Head Creek lies within the southern portion of Site 6 and empties into Wallace Creek approximately 0.75 miles downstream from the site.

The NC DEHNR classifies bodies of water within the state according to their designated use. Wallace Creek from its source to the New River and Bear Head Creek from its source to Wallace Creek are designated as Class SB NSW surface waters. The Class SB NSW designation denotes tidal saltwaters protected for primary recreation, fishing and for the propagation and survival of aquatic life.

Tide data was obtained from the National Oceanic and Atmospheric Administration's (NOAA) Hampton Roads, Virginia station in order to quantify tidal effects on the New River and associated tributaries. A correction factor for the New River was applied to tidal data collected from August 1, 1992 to September 18, 1992. High and Low tide data are summarized on Table 3-2.

TABLE 3-2

TIDE DATA FOR THE NEW RIVER IN JACKSONVILLE, NORTH CAROLINA
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Date	High Tide		Low Tide	
	Time	Height (feet)	Time	Height (feet)
08/01/92	13.1	1.74	7.9	0.88
	NA	NA	20.3	0.92
08/02/92	1.5	1.62	NA	NA
	14.1	1.62	8.8	0.84
	NA	NA	21.2	0.90
08/03/92	2.5	1.55	9.5	0.93
	15.0	1.64	22.2	0.92
08/04/92	3.3	1.52	10.1	0.95
	16.5	1.67	22.6	1.05
08/05/92	4.5	1.54	11.4	1.05
	16.9	1.62	NA	NA
08/06/92	NA	NA	0.4	1.02
	5.4	1.47	12.4	1.03
	18.1	1.59	NA	NA
08/07/92	NA	NA	1.3	1.04
	6.3	1.49	13.3	1.04
	19.0	1.59	NA	NA
08/08/92	NA	NA	2.0	1.08
	7.3	1.47	14.4	1.02
	20.1	1.58	NA	NA
08/09/92	8.6	1.44	3.4	1.02
	20.8	1.55	15.4	1.03
08/10/92	9.6	1.50	4.1	1.02
	21.8	1.59	16.2	1.01
08/11/92	10.2	1.52	4.9	1.03
	NA	NA	16.9	1.02
08/12/92	0.3	1.72	NA	NA
	11.1	1.57	5.7	0.99
	22.8	1.59	17.6	0.96
08/13/92	11.4	1.59	6.1	1.02
	NA	NA	18.0	1.06
08/14/92	.04	1.81	NA	NA
	11.9	1.76	6.4	1.19
	NA	NA	19.0	1.21
08/15/92	0.4	1.84	NA	NA
	12.6	1.79	8.0	1.27
	NA	NA	19.7	1.20
08/16/92	1.0	1.76	NA	NA
	13.0	1.73	7.7	1.22
	NA	NA	19.9	1.16
08/17/92	1.4	1.67	NA	NA
	13.7	1.66	8.2	1.11
	NA	NA	20.4	1.14
08/18/92	1.9	1.62	NA	NA
	14.5	1.65	8.6	1.09
	NA	NA	21.4	1.12
08/19/92	2.7	1.55	9.3	1.05
	15.2	1.64	22.2	1.13
08/20/92	3.7	1.54	10.0	1.12
	15.4	1.66	23.3	1.17
08/21/92	4.2	1.55	11.2	1.13
	16.6	1.64	NA	NA
08/22/92	NA	NA	0.2	1.14
	5.0	1.51	12.0	1.06
	17.6	1.58	NA	NA
08/23/92	NA	NA	0.9	1.07
	6.1	1.48	13.1	1.02
	18.7	1.60	NA	NA
08/24/92	NA	NA	2.0	1.05
	7.3	1.52	14.2	1.01
	20.0	1.64	NA	NA
08/25/92	NA	NA	3.1	1.02
	8.4	1.56	15.1	0.95
	21.0	1.65	NA	NA
08/26/92	9.2	1.59	4.0	0.95
	21.8	1.71	16.2	0.90
08/27/92	10.3	1.71	5.0	0.97
	22.5	1.74	17.3	0.95
08/28/92	11.2	1.73	6.0	0.95
	NA	NA	18.5	0.89
08/29/92	0.5	1.64	NA	NA
	12.5	1.81	6.9	0.97
	NA	NA	19.5	0.96
08/30/92	0.9	1.74	NA	NA
	12.9	1.75	7.7	0.96
	NA	NA	20.2	0.93
08/31/92	1.4	1.57	NA	NA
	14.1	1.61	8.5	0.84
	NA	NA	21.0	0.91
09/01/92	2.5	1.56	NA	NA
		NA	9.2	0.96
	14.8	1.65	21.9	1.00
09/02/92	3.1	1.52	10.4	0.94
	15.6	1.59	22.8	0.98
09/03/92	4.1	1.45	11.0	0.95
	16.7	1.55	NA	NA
09/04/92	NA	NA	0.2	1.02
	4.8	1.39	12.0	0.99
	17.7	1.53	NA	NA
09/05/92	NA	NA	0.7	1.02
	6.2	1.44	13.2	1.04
	18.8	1.58	NA	NA
09/06/92	NA	NA	1.7	1.15
	7.2	1.60	14.1	1.15
	19.9	1.68	NA	NA
09/07/92	NA	NA	2.7	1.23
	8.1	1.62	14.9	1.17
	20.4	1.66	NA	NA
09/08/92	8.8	1.55	3.4	1.12
	21.1	1.59	15.7	1.08
09/09/92	9.6	1.55	4.0	1.04
	21.9	1.57	16.5	1.04
09/10/92	10.4	1.54	4.8	0.99
	22.5	1.55	17.2	1.02
09/11/92	10.8	1.66	4.8	1.05
	23.3	1.66	18.1	1.12
09/12/92	11.4	1.71	6.1	1.14
	23.7	1.64	18.5	1.12
09/13/92	12.1	1.69	6.7	1.09
	NA	NA	18.9	1.10
09/14/92	0.3	1.64	NA	NA
	12.7	1.70	7.0	1.08
	NA	NA	19.8	1.11
09/15/92	0.9	1.61	NA	NA
	13.1	1.69	7.6	1.07
	NA	NA	20.2	1.11
09/16/92	1.4	1.58	NA	NA
	13.9	1.62	8.1	1.05
	NA	NA	21.0	1.04
09/17/92	2.2	1.50	9.1	1.00
	14.6	1.57	21.8	1.02
09/18/92	2.9	1.43	9.8	0.96
	15.4	1.56	22.8	1.03

Source: NOAA Tide Station in Hampton Roads, Virginia
NA - Not Available

3.4 Geology

The following sections contain the regional geology of MCB Camp Lejeune and the site-specific geology of OU No. 2.

3.4.1 Regional Geology

MCB Camp Lejeune is located in the Atlantic Coastal Plain physiographic province. The sediments of the Atlantic Coastal Plain consist of interbedded sands, 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. Regionally, they comprise 10 aquifers and nine confining units which overlie igneous and metamorphic basement rocks of pre-Cretaceous age. These sediments were deposited in marine or near-marine environments and range in age from early Cretaceous to Quaternary time. Table 3-3 presents a generalized stratigraphic column for Jones and Onslow Counties, North Carolina (Harned et al., 1989).

United State Geological Survey (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 include the water table (surficial), Castle Hayne, Beaufort, Peedee, Black Creek, and upper and lower Cape Fear aquifers. The combined thickness of these sediments is approximately 1,500 feet. Less permeable clay and silt beds function as confining units or semi-confining units which separate the aquifers and impede the flow of groundwater between aquifers. A generalized hydrogeologic cross-section of this area is presented in Figure 3-2. This cross-section illustrates the relationship between the aquifers in this area (Harned et al., 1989).

3.4.2 Site Geology

Numerous soil borings were advanced in the surficial (depth less than 25 feet bgs) and deep (depth greater than 100 feet) soils within the vicinity of OU No. 2. The following provides a detailed description of the surficial and deeper subsurface soils.

3.4.2.1 Surficial Soil Conditions

Surficial soil conditions are generally uniform throughout OU No. 2. In general, surficial soils consist of unconsolidated deposits of silty and clayey sand, silt, and clay. These soils represent

TABLE 3-3

GEOLOGIC AND HYDROGEOLOGIC UNITS IN THE COASTAL PLAIN OF NORTH CAROLINA
REMEDIAL INVESTIGATION CTO-0133
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 Formation(1)	Pungo River aquifer
		Belgrade Formation(2)	Castle Hayne confining unit
	Oligocene	River Bend Formation	Castle Hayne aquifer
	Eocene	Castle Hayne Formation	Beaufort confining unit(3)
			Beaufort aquifer
	Paleocene	Beaufort Formation	
Cretaceous	Upper Cretaceous	Peedee Formation	Peedee confining unit
			Peedee aquifer
		Black Creek and Middendorf Formations	Black Creek confining unit
			Black Creek aquifer
		Cape Fear Formation	Upper Cape Fear confining unit
			Upper Cape Fear aquifer
			Lower Cape Fear confining unit
			Lower Cape Fear aquifer
	Lower Cretaceous(1)	Unnamed deposits(1)	Lower Cretaceous confining unit
			Lower Cretaceous aquifer(1)
Pre-Cretaceous basement rocks		--	--

Notes:
(1) Geologic and hydrologic units probably 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: Harned et al., 1989

the Quaternary "undifferentiated" formation which characterize the surficial aquifer. Sands are fine to coarse-grained and contain varied amounts of silt (5% to 50%) and clay (5% to 20%). Results of standard penetration tests (commonly referred to as "blow counts," ASTM 1586), indicate that the sands have a relative density of loose to dense. Further, the sands classify as SM and/or SC according to the Unified Soil Classification System (USCS). Silts are generally inorganic (ML) with the exception of organic silts encountered near Wallace Creek, Bear Head Creek, and the ravine (saturated conditions). Clays are plastic to nonplastic, contain varied amounts of silt and sand (5% to 25 %), and classify as CL (inorganic clays). Standard penetration results for cohesive soils (clays and silts) indicate a relative density of medium stiff to stiff.

Several areas investigated within OU No. 2 contain large amounts of fill or reworked material. These materials were encountered throughout Lot 201, Lot 203, and portions of Site 9. Historical aerial photographs revealed that soils within and adjacent to the Lot 203 have been excavated and reworked extensively over the years. Soil boring data indicates that fill material exists in these areas to depths greater than five feet bgs in some cases.

Geologic cross-sections depicting surficial soil conditions underlying OU No. 2 were developed based on information obtained during the Phase I and Phase II drilling programs. As shown on Figure 3-3, two cross-sections within OU No. 2 were traversed for the surficial soils. In general, cross-section A to A' traverses north to south (soil borings 6GW30 to 9GW4) while cross-section B to B' traverses west to east (soil borings 6GW21 to 6GW25).

Geologic cross-section A-A' is presented on Figure 3-4. Surficial soils encountered traversing north to south across OU No. 2 are generally uniform. This area is predominantly underlain by silty sand (SM) with thin interbedded layers of silt (ML or MH) and clay (CL). The sand was typically encountered from just below the ground surface to approximately 25 feet bgs where the shallow borings were terminated. Thin laterally discontinuous layers of silt (1 to 3 feet thick) are present near the northern and southern boundaries of OU No. 2. Additionally, a thin laterally discontinuous layer of clay is present in the vicinity of soils boring 9GW6.

Surficial soils encountered along the general northwest to southeast direction across the site are illustrated on Figure 3-5. Soils encountered along the B-B' traverse are similar to those described for the A-A' traverse. Silty sands underlie the area with thin interbedded layers of silt. The silty sands were encountered to a depth of approximately 25 feet bgs where the borings were terminated. Thin laterally discontinuous layers of silt (approximately 1 to 2.5

feet thick) were encountered in soil borings 6GW21 (located west of Lot 203) and 6GW18 (located in the wooded area east of Lot 201).

Overall, the surficial soils encountered at OU No. 2 were generally consistent throughout. The dominant soil type encountered was a silty sand. Within the area investigated, a laterally continuous confining layer (i.e., one which displays a low enough permeability to impede the migration of contaminants to any stratigraphically lower water-bearing zones) was not encountered.

3.4.2.2 Deep Soil Conditions

Soils were classified during the Phase I and Phase II drilling programs to a maximum depth of 236 feet bgs. Additional information on deep subsurface soil conditions to 310 feet bgs was also obtained from boring logs of supply wells (Hadnot Point supply wells) in the area. The following summarizes deep subsurface soil conditions underlying OU No. 2.

Deeper subsurface soils (below 25 feet) are also generally consistent throughout the site. In general, the deeper subsurface soils consist of fine to medium-grained silty sand, silt, silty-sandy clay, and sandy-marly limestone fragments (gravel size). The appearance and classification (SM) of the deeper sands are similar to that described for the surficial sands. Below a depth of 50 to 60 feet, however, the sands become very dense to hard (blow counts above 50). Large amounts of shell fragments were noted frequently in the sands. Thin lenses of clay are interbedded within the sands. The clays contain trace (up to 10 percent) to little (10 percent to 20 percent) amounts of silt and sand, and are non-plastic to slightly plastic. Limestone is interbedded within the sands or occurs as separate units. The limestone contains mixtures of sand and limey mud (marl). This sandy-marly limestone is reported in the literature as representing the Castle Hayne aquifer (Harned, et al, 1989).

Geologic cross-sections depicting deeper subsurface soil conditions underlying OU No. 2 were also developed (refer to Figure 3-3). In general, cross section C to C' traverses north to south (supply well borings HP-653 to HP-635) while cross-section D to D' traverses west to east (supply well borings HP-633 to deep monitoring well boring 6MW3D).

Geologic cross-section C-C' is shown on Figure 3-6. In general, deeper subsurface soils along this traverse consist of silty sand, clay, and limestone fragments (referred to as limestone, sandy limestone, and marly limestone because of its varied nature).

The upper silty sand unit, which is encountered from the ground surface, ranges in thickness from approximately 40 to 140 feet. This silty sand unit is thickest in the southern portion of the site and decreases toward the northern portion of the site. Within the upper silty sand unit, thin laterally discontinuous layers of clay (borings HP-653 and 6GW2D) and limestone (boring HP-635) are present. The clay varies in thickness from approximately 2 to 10 feet while the limestone varies in thickness from approximately 3 to 5 feet.

Underlying the upper silty sand is a limestone unit. The limestone unit varies in thickness from approximately 5 feet near the southern portion of the site to 80 feet near the northern portion of the site.

Silty sands (lower unit) underlie the limestone unit to a depth of 310 feet bgs (estimated depth). At boring location HP-651, laterally discontinuous layers of clay (approximately 10 feet thick) and limestone (approximately 10 feet) are present at 230 feet and 250 feet deep, respectively.

Geologic cross-section D to D' is shown on Figure 3-7. In general, deeper subsurface soils along this traverse also consist of silty sand, silt, clay, and limestone. Silty sands (upper silty sand unit), which are also encountered from ground surface, range in thickness from 40 feet near the eastern portion of the site (HP-651) to 120 feet just west of Holcomb Boulevard (HP-633). Within the upper silty sand unit, discontinuous to partly continuous interbedded layers of clay (boring 6GW1D and HP-653 ranging in thickness from approximately 1 to 20 feet), silt (boring 6GW28D approximately 5 feet thick), and limestone (boring 6GW1D approximately 10 feet thick) are present. The clay layer within the upper silty sand unit is partly continuous across the site since it is present from borings HP-653 to 6GW2D and at boring 6GW1D (very thin).

A limestone unit (upper limestone unit) is present underlying the upper silty sand unit. This unit varies in thickness from approximately 20 feet just west of Holcomb Boulevard to approximately 140 feet just east of Piney Green Road. Subsequently, the limestone unit appears to decrease in thickness westward across the site.

Underlying the upper limestone unit are alternating sequences of silty sand (approximately 30 feet thick), limestone (approximately 3 to 35 feet thick), and silty sand (approximately 20 to 80 feet thick) to a depth of approximately 310 feet bgs. In general, the limestone unit which separates the silty sands is thinner compared to the silty sands. Moreover, this limestone unit generally becomes thinner eastward across the site.

3.5 Test Pits

3.5.1 Phase I Test Pits

The Phase I exploratory excavations (test pits) completed in September 1992, revealed the presence of buried debris. The material unearthed has been classified as "Military/Construction Debris" for purposes of this study. Buried debris was encountered at several locations and consisted primarily of the following:

- Communication wire
- Spent casings (95 to 105 mm cartridges)
- Scrap metal
- Rebar and wire
- Battery packs
- 5-gallon Buckets

In addition, isolated areas contained burned material/residue within the test pit. Some anomalies identified in the geophysical survey, which did not correlate with trench and fill locations depicted on aerial photographs, were also investigated. The test pits associated with the anomalies revealed buried wood and trace amounts of scrap metal in some cases. It should be noted that these areas were not surveyed in and may have deviated from the actual anomaly detected in the geophysical survey. A detailed description of contents encountered and the approximate depth is illustrated on the test pit logs presented in Appendix D.12.

3.5.2 Phase II Test Pits

The Phase II test pits completed in April 1993, also revealed the presence of buried debris. Communication wire was noted in four (6-TP1, 6-TP2, 6-TP3, and 6-TP4) of the six excavations. In test pits 6-TP5 and 6-TP7, numerous 1- and 5-gallon containers were noted in the excavations. The materials present in the containers appeared to be grease or a lubrication oil, which was greenish-blue in color. Samples of the material were retained for laboratory analysis. Appendix D.12 contains the Test Pit Records which describe the materials encountered during the excavations.

3.6 Soils

Information regarding site soil conditions was obtained from the Soil Survey publication prepared by the U.S. Department of Agriculture - Soil Conservation Service (SCS) for Camp Lejeune, North Carolina (SCS, 1984). As part of the RI, a limited number of soil samples were evaluated for geotechnical properties and classified according to the Universal Soil Classification System (USCS). The findings of that evaluation were used to confirm SCS survey results. Due to past burial and excavation activities at OU No. 2, however, the soils described in the SCS publication may differ from current site conditions.

According to the SCS Soil Survey, OU No. 2 is underlain by a number of distinct soil units. The Baymeade (BaB) urban land complex, which underlies Site 9 and Lot 201, is typically found in areas where the original soil has been cut, filled, or graded. Soil properties of this unit have been altered through slope modification and smoothing. Due to its rapid infiltration rate and well drained nature, Baymeade soil tends to be used for parking lots and light-duty urban areas. The soil series found within Lot 203 and extending southward is characteristic of excavated areas. Excavated soils (Pt) commonly range from 5 to 15 feet in depth and are subject to surface ponding.

The wooded areas that surround both Lots 201 and 203 are underlain by either Kureb (KuB) or Leon (Ln) fine sands. Kureb and Leon fine sands are typically found on uplands near large drainages and on convex divides. Kureb soils are well drained and range from 1 to 6 percent slopes. The Leon fine sand unit, unlike the Kureb, is poorly drained and tends to be nearly level.

Wallace and Bear Head Creeks are bordered by Muckalee (Mk) loam soils that tend to be poorly drained and found on flood plains. The Muckalee unit is frequently flooded for brief periods and is subject to ponding. Marvyn (MaC) loamy fine sands are found upland of the Muckalee unit on side slopes near large drainages. Marvyn soil areas are long and narrow, ranging from 6 to 15 percent in slope.

Generally soils identified by the SCS at OU No. 2 are moderately to strongly acidic in nature (see Table 3-4). With the exception of the Muckalee unit, soils at the site are generally classified under USCS as SM or SP-SM (fine sand or loamy fine sand). Muckalee soils are classified as being ML (loam). Sieve analysis results from the limited number of samples collected during the field investigation are consistent with the SCS Soil Survey (see Appendix P).

3.7 Hydrogeology

The following sections discuss the regional and site-specific hydrogeologic conditions. The information presented on the regional hydrogeology is from literature; site-specific hydrogeologic information presented is from data collected during the field investigation.

3.7.1 Regional Hydrogeology

The surficial aquifer lies in a series of sediments, primarily sand and clay, which commonly extend to depths of 50 to 100 feet. This unit is not used for water supply at MCB Camp Lejeune.

The principal water supply aquifer for the Base lies in a series of sand and limestone beds between 50 and 300 feet below land surface. This series of sediments generally is known as the Castle Hayne formation. The Castle Hayne formation is about 150 to 350 feet thick in the area and contains the most productive aquifer in North Carolina. Estimated transmissivity (T) and hydraulic conductivity (K) values for the Castle Hayne Aquifer range from 4,300 to 24,500 feet^2/day (32,200 to 183,300 gallons/day/feet) and 14 to 82 feet/day, respectively (Harned et al., 1989).

Onslow County and Camp Lejeune lie in an area where the Castle Hayne aquifer contains freshwater, although the proximity of saltwater in deeper layers just below the aquifer and in the New River estuary is of concern in managing water withdrawals from the aquifer. Overpumping of the deeper parts of the aquifer could cause intrusion saltwater. The aquifer contains water having less than 250 milligrams per liter (mg/l) chloride throughout the area of the Base (Harned et al., 1989).

TABLE 3-4

SUMMARY OF SOIL PHYSICAL PROPERTIES
OPERABLE UNIT NO. 2
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Soil Name	Soil Symbol	USCS Classification	Depth (inches)	Moist Bulk Density (g/cc)	Permeability (cm/s)	Soil Reaction (pH)	Shrink-Swell Potential	Organic Matter (percent)
Baymeade	BaB	SM, SP-SM	0-30	1.60 - 1.75	4.2×10^{-3} - 1.37×10^{-2}	4.5 - 6.5	Low	0.5 - 1.0
Kureb	KuB	SP, SP-SM	0-80	1.60 - 1.80	4.2×10^{-3} - 1.37×10^{-2}	4.5 - 7.3	Low	<2.0
Leon	Ln	SP, SP-SM	0-17	1.40 - 1.65	4.2×10^{-3} - 1.37×10^{-2}	3.6 - 5.5	Low	0.5 - 4.0
Marvyn	MaC	SM	0-12	--	1.37×10^{-3} - 4.2×10^{-3}	4.5 - 6.0	Low	<2.0
Muckalee	Mk	ML	0-28	--	4.2×10^{-4} - 1.37×10^{-3}	5.1 - 7.3	Low	0.5 - 2.0

Source: Soil Survey: Camp Lejeune, North Carolina, U.S. Department of Agriculture - Soil Conservation Service

Notes:
ML - Loam
SM - Loamy Fine Sand
SP - Fine Sand
-- - Not Estimated

The aquifers that lie below the-Castle Hayne saturate thick sequences of sand and clay. Although some of these aquifers are used for water supply elsewhere in the Coastal Plain, they contain saltwater in the Camp Lejeune area and are not used (Harned et al., 1989).

Rainfall in the Camp Lejeune area enters the ground in recharge areas, infiltrates the soil, and moves downward until it reaches the water table, which is the top of the saturated zone. In the saturated zone, groundwater flows in the direction of lower hydraulic head, moving through the system to discharge areas like the New River and its tributaries or the ocean (Harned et al., 1989).

Water levels in wells tapping the surficial aquifer vary seasonally. The surficial 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. Therefore, the water table generally is highest in the winter months and lowest in summer or early fall (Harned et al., 1989).

In semi-confined aquifers, water is under excess head and the level to which it rises in a tightly cased well is called the potentiometric surface. The hydraulic head in the semi-confined Castle Hayne aquifer, shows a different pattern of variation over time. Some seasonal variation also is common in the potentiometric surface of the Castle Hayne aquifer, but the changes tend to be slower and over a smaller range than for water table wells (Harned et al., 1989).

3.7.2 Site Hydrogeology

As described in Section 3.4.2, the OU No. 2 is underlain by unconsolidated deposits of sand, silty sand, silt, clay, and limestone fragments which characterize the surficial and deep water-bearing zones. These conditions are consistent with the regional hydrogeologic framework described in USGS publications. The following describes groundwater conditions for both the surficial and deeper water-bearing zones.

3.7.2.1 Surficial Groundwater

Surficial groundwater flow patterns in the vicinity of OU No. 2 were evaluated by a network of previously existing and newly installed shallow monitoring wells (less than 33 feet), and staff gauges installed in Bear Head Creek and Wallace Creek. The shallow monitoring well network extends from north of Wallace Creek to south of Site 9, and east of Piney Green Road to Holcomb Boulevard. Monitoring well and staff gauge locations are shown on Figure 2-8.

Groundwater was encountered during the drilling program at varying depths throughout OU No. 2. This variation in groundwater depths is attributed to topographic (i.e., land surface elevations) changes. A high water table (i.e., less than 2 feet bgs) was typically encountered near the banks of Wallace Creek and Bear Head Creek while a lower (i.e., greater than 15 feet bgs) water table was encountered north of Lot 203 in the vicinities of well clusters 6GW1S/D and 6GW28S/D. An average depth of groundwater across OU No. 2 is approximately 8 feet.

Four rounds of groundwater level measurements were obtained from the shallow monitoring wells at Sites 6 and 82 (September 30, 1992; October 26, 1992; November 7, 1992; and April 1, 1993), and Site 9 (September 15, 1992; September 30, 1992; and October 26, 1992; and April 1, 1993) during the Phase I and II field investigation as shown on Tables 3-5 and 3-6, respectively. Staff gauge surface water measurements from Bear Head Creek (September 30, 1992 and April 1, 1993) and Wallace Creek (April 1, 1993) are shown on Table 3-7.

Groundwater elevations (measured from top of PVC casing reference points) ranged from 1.03 feet [well 82MW2 (10/26/92) located near Wallace Creek] to 29.39 [well 6GW2S (4/1/93) located east of Lot 203 across Piney Green Road] feet above msl. Water levels fluctuated between 0.7 and 5.59 feet over a seven month period. Well 6GW1S exhibited the largest fluctuation in water level of 5.59 feet. In general, the highest water levels were noted on April 1, 1993 and the lowest water levels were noted on November 7, 1992.

Water level data was collected over a 24-hour period from monitoring well 6GW28S. As shown on Table 3-8, water levels were fairly constant over a 24-hour period as a change of only 0.06-feet was observed. This very small change in water level is most likely the result of normal daily fluctuations.

Surficial groundwater flow patterns in the vicinity of OU No. 2 on September 30, 1992 are depicted on Figure 3-8. As shown on Figure 3-8, a groundwater divide occurs near the north-central portion of OU No. 2. Groundwater on the north side of the divide is flowing northwest toward Wallace Creek while groundwater on the south side of the divide is flowing southwest toward Bear Head Creek. The groundwater flow patterns within these areas appear to be influenced by surface elevation changes. The data (i.e., ground surface and groundwater

TABLE 3-5

SUMMARY OF WATER LEVEL MEASUREMENTS FROM SHALLOW MONITORING WELLS ON SEPTEMBER 30, 1992, OCTOBER 26, 1992, NOVEMBER 7, 1992, AND APRIL 1, 1993
SITES 6 AND 82
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Well No.	Top of PVC Casing Elevation(1) (feet, above msl)	Depth to Groundwater (feet, below top of casing) (9/30/92)	Depth to Groundwater (feet, below top of casing) (10/26/92)	Depth to Groundwater (feet, below top of casing) (11/7/92)	Depth to Groundwater (feet, below top of casing) (4/1/93)	Groundwater Elevation (feet, above msl) (9/30/92)	Groundwater Elevation (feet, above msl) (10/26/92)	Groundwater Elevation (feet, above msl) (11/7/92)	Groundwater Elevation (feet, above msl) (4/1/93)
6GW1S(2)	35.18	18.75	19.55	19.86	15.34	16.43	15.63	15.32	19.84
6GW2S(2)	38.37	13.98	14.57	14.91	8.98	24.39	23.80	23.46	29.39
6GW3(2)	31.32	14.84	15.37	15.68	13.03	16.48	15.95	15.64	18.29
6GW4(2)	27.99	7.53	7.85	8.27	4.48	20.46	20.14	19.72	23.51
6GW5(2)	25.67	6.18	6.77	7.01	3.31	19.49	18.90	18.66	22.36
6GW6(2)	26.74	7.70	8.56	8.76	4.45	19.04	18.18	17.98	22.29
6GW7S(2)	17.83	5.49	6.68	6.76	3.34	12.34	11.15	11.07	14.49
6GW8(2)	22.35	6.36	6.82	7.25	4.03	15.99	15.53	15.10	18.32
6GW9(3)	21.11	9.08	9.59	10.03	7.27	12.03	11.52	11.08	13.84
6GW10(3)	19.88	7.30	7.75	8.12	6.22	12.58	12.13	11.76	13.66
6GW11(3)	35.05	--(7)	18.16	18.47	16.88	--	16.89	16.58	18.17
6GW12(3)	18.28	6.45	6.67	6.73	6.30	11.84	11.62	11.56	11.98
6GW13(3)	20.10	5.70	7.56	7.65	4.21	14.40	12.54	12.45	15.89

Notes: (1) - mean sea level
(2) Existing monitoring well installed by ESE, Inc., November 1986.
(3) Phasse I monitoring well installed by Baker Environmental, Inc., September-October 1992.
(4) Phase II monitoring well installed by Baker Environmental, Inc., February-March 1993.
(5) Existing monitoring well installed by NUS Corporation, June 1991.
(6) Existing monitoring well installed by S&ME, April 1992.
(7) -- = Data not collected.

TABLE 3-. NTINUED)

SUMMARY OF WATER LEVEL MEASUREMENTS FROM SHALLOW MONITORING WELLS ON SEPTEMBER 30, 1992, OCTOBER 26, 1992, NOVEMBER 7, 1992, AND APRIL 1, 1993
SITES 6 AND 82
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Well No.	Top of PVC Casing Elevation(1) (feet, above msl)	Depth to Groundwater (feet, below top of casing) (9/30/92)	Depth to Groundwater (feet, below top of casing) (10/26/92)	Depth to Groundwater (feet, below top of casing) (11/7/92)	Depth to Groundwater (feet, below top of casing) (4/1/93)	Groundwater Elevation (feet, above msl) (9/30/92)	Groundwater Elevation (feet, above msl) (10/26/92)	Groundwater Elevation (feet, above msl) (11/7/92)	Groundwater Elevation (feet, above msl) (4/1/93)
6GW14(3)	28.49	--	11.50	11.90	7.70	--	16.99	16.59	20.79
6GW15S(3)	29.07	--	11.09	11.27	6.78	--	17.98	17.80	22.29
6GW16(3)	27.63	--	8.05	8.48	4.60	--	19.58	19.15	23.03
6GW17(3)	28.10	7.82	8.18	8.64	4.30	20.28	19.92	19.46	,23.80
6GW18(3)	29.70	8.58	7.99	9.58	5.61	21.12	21.71	20.12	24.09
6GW19(3)	27.95	--	7.49	7.90	3.95	--	20.46	20.05	24.00
6GW20(3)	25.08	--	6.28	6.67	2.61	--	18.80	18.41	22.47
6GW21(3)	30.30	12.82	13.30	13.63	10.74	17.48	17.00	16.67	19.56
6GW22(3)	24.13	6.32	5.84	--	3.00	17.81	18.29	--	21.13
6GW23(3)	26.96	--	7.56	7.93	4.60	--	19.40	19.03	22.36
6GW25(3)	34.30	--	11.88	12.24	8.10	--	22.42	22.06	26.20
6GW26(3)	23.66	--	10.28	10.53	9.09	--	13.38	13.13	14.57
6GW28S(3)	30.20	--	21.63	21.84	17.93	--	8.57	8.36	12.27
6GW30S(3)	12.60	--	6.07	6.05	3.60	--	6.53	6.55	9.00
6GW31(4)	30.26	--	--	--	11.34	--	--	--	18.92

Notes:
(1) msl - mean sea level
(2) Existing monitoring well installed by ESE, Inc., November 1986.
(3) Newly installed monitoring well by Baker Environmental, Inc., September-October 1992.
(4) Newly installed monitoring well by Baker Environmental, Inc., February-March, 1993.
(5) Existing monitoring well installed by NUS Corporation, June 1991.
(6) Existing monitoring well installed by S&ME, April 1992.

TABLE 3-[illegible]NTINUED)

SUMMARY OF WATER LEVEL MEASUREMENTS FROM SHALLOW MONITORING WELLS ON SEPTEMBER 30, 1992, OCTOBER 26, 1992, NOVEMBER 7, 1992, AND APRIL 1, 1993
SITES 6 AND 82
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Well No.	Top of PVC Casing Elevation(1) (feet, above msl)	Depth to Groundwater (feet, below top of casing) (9/30/92)	Depth to Groundwater (feet, below top of casing) (10/26/92)	Depth to Groundwater (feet, below top of casing) (11/7/92)	Depth to Groundwater (feet, below top of casing) (4/1/93)	Groundwater Elevation (feet, above msl) (9/30/92)	Groundwater Elevation (feet, above msl) (10/26/92)	Groundwater Elevation (feet, above msl) (11/7/92)	Groundwater Elevation (feet, above msl) (4/1/93)
6GW32(4)	21.79	--	--	--	14.29	--	--	--	7.50
6GW33(4)	22.42	--	--	--	7.04	--	--		15.38
6GW34(4)	32.01	--	--	--	17.00	--	--	--	15.01
82MW1(5)	8.58	4.00	4.18	4.17	3.35	4.58	4.40	4.41	5.23
82MW2(5)	6.03	--	5.00	4.17	4.30	--	1.03	1.86	1.73
82MW3(5)	24.31	13.95	15.42	14.59	10.13	10.36	8.89	9.72	14.18
82MW30(5)	32.19	9.29	11.68	12.10	8.46	22.90	20.51	20.09	23.73
6MW2(6)	29.68	--	--	8.36	4.20	--	--	21.32	25.48
6MW3S(6)	30.73	--	9.24	9.42	7.94	--	21.49	21.31	22.79
6MW8(6)	30.62	--	--	10.05	5.93	--	--	20.57	24.69
6MW9(6)	39.98	--	16.01	16.33	11.17	--	23.97	23.65	28.81
6BP-6(6)	37.41	--	--	16.67	12.10	--	--	20.74	25.31

Notes: (1) msl - mean sea level
(2) Existing monitoring well installed by ESE, Inc., November 1986.
(3) Newly installed monitoring well by Baker Environmental, Inc., September-October 1992.
(4) Newly installed monitoring well by Baker Environmental, Inc., February-March, 1993.
(5) Existing monitoring well installed by NUS Corporation, June 1991.
(6) Existing monitoring well installed by S&ME, April 1992.
(7) -- = Data not collected.

TABLE 3-6

SUMMARY OF WATER LEVEL MEASUREMENTS ON SEPTEMBER 15, 1992, SEPTEMBER 30, 1992, OCTOBER 26, 1992, AND APRIL 1, 1993
SITE 9
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Well No.	Top of PVC Casing Elevation(1) (feet, above msl)	Depth to Groundwater (feet, below top of casing) (9/15/92)	Depth to Groundwater (feet, below top of casing) (9/30/92)	Depth to Groundwater (feet, below top of casing) (10/26/92)	Depth to Groundwater (feet, below top of casing) (4/1/93)	Groundwater Elevation (feet, above msl) (9/15/92)	Groundwater Elevation (feet, above msl) (9/30/92)	Groundwater Elevation (feet, above msl) (10/26/92)	Groundwater Elevation (feet, above msl) (4/1/93)
9GW1(2)	30.70	8.85	9.41	10.03	7.18	21.85	21.29	20.67	23.52
9GW2(2)	27.82	8.45	8.97	9.57	6.25	19.37	18.85	18.25	21.57
9GW3(2)	26.42	9.72	10.40	10.99	8.40	16.70	16.02	15.43	18.02
9GW4(2)	30.70	--	9.20	9.69	4.96	--	21.50	21.01	25.74
9GW5(3)	30.81	--	10.24	10.81	8.10	--	20.57	20.00	22.71
9GW6(3)	31.31	--	10.30	11.25	8.16	--	21.01	20.06	23.15
9GW7S(3)	28.76	--	11.13	11.69	8.90	--	17.63	17.07	19.86
9GW7D(3)(4)	29.10	--	13.56	18.40	15.10	--	15.54	10.70	14.00
9GW8(3)	28.39	--	7.93	8.65	5.65	--	20.46	19.74	22.74

Notes:
(1) msl - mean sea level
(2) Existing monitoring well installed by ESE, Inc., November 1986.
(3) Phase I monitoring well installed by Baker Environmental, Inc., September 1992. Note that no additional wells were installed during the Phase II investigation.
(4) Deep monitoring well.

TABLE 3-7

SUMMARY OF STAFF GAUGE READINGS ON SEPTEMBER 30, 1992 AND APRIL 1, 1993
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Staff Gauge No.	Top of Staff Gauge Elevation(1) (feet, above msl)	Height of Staff Gauge (feet)	Staff Gauge Reading (feet) (09/30/93)	Staff Gauge Reading (feet) (04/01/93)	Top of Water Elevation (feet, above msl) (09/30/93)	Top of Water Elevation (feet, above msl) (04/01/93)
BH-SG1(2)	8.1	2.5	0.30	0.60	5.90	6.20
BH-SG2(2)	7.5	2.5	0.20	0.20	5.20	5.20
BH-SG3(2)	6.4	2.5	0.25	--	4.15	--
SGWC1(3)	2.5	2.5	--	1.20	--	1.20(4)
SGWC2(3)	2.5	2.5	--	1.00	--	1.00(4)

Notes: (1) msl - mean sea level
(2) Bear Head Creek staff gauge
(3) Wallace Creek staff gauge
(4) Elevations are direct readings in Wallace Creek

TABLE 3-8

SUMMARY OF WATER LEVEL MEASUREMENTS
OVER A 24-HOUR PERIOD AT SHALLOW MONITORING WELL 6GW28S
SITE 6
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Time From Start (Min)	Depth to Water (Feet, bgs.)	Time From Start (Min)	Depth to Water (Feet, bgs.)	Time From Start (Min)	Depth to Wate (Feet, bgs.)
0.000	21.860 (1)	490.000	21.906	980.000	21.906
10.000	21.906	500.000	21.906	990.000	21.906
20.000	21.906	510.000	21.906	1000.000	21.891
30.000	21.906	520.000	21.906	1010.000	21.906
40.000	21.906	530.000	21.906	1020.000	21.891
50.000	21.906	540.000	21.906	1030.000	21.891
60.000	21.891	550.000	21.906	1040.000	21.906
70.000	21.906	560.000	21.922(2)	1050.000	21.891
80.000	21.906	570.000	21.906	1060.000	21.891
90.000	21.906	580.000	21.906	1070.000	21.891
100.000	21.906	590.000	21.906	1080.000	21.891
110.000	21.906	600.000	21.906	1090.000	21.906
120.000	21.906	610.000	21.906	1100.000	21.906
130.000	21.906	620.000	21.906	1110.000	21.891
140.000	21.906	630.000	21.906	1120.000	21.891
150.000	21.906	640.000	21.906	1130.000	21.891
160.000	21.906	650.000	21.906	1140.000	21.906
170.000	21.906	660.000	21.906	1150.000	21.891
180.000	21.906	670.000	21.906	1160.000	21.891
190.000	21.906	680.000	21.906	1170.000	21.891
200.000	21.906	690.000	21.906	1180.000	21.906
210.000	21.906	700.000	21.906	1190.000	21.906
220.000	21.906	710.000	21.906	1200.000	21.906
230.000	21.891	720.000	21.906	1210.000	21.906
240.000	21.906	730.000	21.906	1220.000	21.906
250.000	21.891	740.000	21.906	1230.000	21.906
260.000	21.891	750.000	21.906	1240.000	21.891
270.000	21.891	760.000	21.906	1250.000	21.906
280.000	21.891	770.000	21.906	1260.000	21.906
290.000	21.906	780.000	21.906	1270.000	21.906
300.000	21.891	790.000	21.906	1280.000	21.906
310.000	21.891	800.000	21.906	1290.000	21.906
320.000	21.891	810.000	21.891	1300.000	21.906
330.000	21.906	820.000	21.891	1310.000	21.891
340.000	21.891	830.000	21.906	1320.000	21.891
350.000	21.891	840.000	21.906	1330.000	21.906
360.000	21.906	850.000	21.891	1340.000	21.906
370.000	21.891	860.000	21.891	1350.000	21.906
380.000	21.891	870.000	21.906	1360.000	21.906
390.000	21.906	880.000	21.891	1370.000	21.906
400.000	21.906	890.000	21.891	1380.000	21.891
410.000	21.906	900.000	21.891	1390.000	21.906
420.000	21.906	910.000	21.906	1400.000	21.906
430.000	21.891	920.000	21.891	1410.000	21.906
440.000	21.906	930.000	21.891		
450.000	21.906	940.000	21.906		
460.000	21.906	950.000	21.891		
470.000	21.906	960.000	21.906		
480.000	21.906	970.000	21.906		

Notes: (1) Minimum Water Level Recorded
(2) Maximum Water Level Recorded

elevations) also suggests that groundwater is recharging in the vicinity well 6GW2S and discharging in the vicinity of Wallace Creek. Flow patterns near the southern portion of OU No. 2 indicate that groundwater is discharging into Bear Head Creek as indicated by surface water staff gauge measurements. This drainage area appears to cover portions of Site 6 (grid areas "201S" and "201E") and all of Site 9.

Surficial groundwater flow patterns on November 7, 1992 and April 1, 1993 are shown on Figures 3-9 and 3-10, respectively. Generally, the groundwater flow patterns on these dates are similar to those described for September 30, 1992.

Estimates of groundwater gradients (i) were calculated from September 30 and November 7, 1992 groundwater elevation data. As shown on Table 3-9, the gradient varies by an order of magnitude across the site. In the vicinity of Wallace Creek and Bear Head Creek, the estimated gradient is approximately 0.01 (range of 0.012 to 0.022). In the north-central portion of the site (northeast of Lot 201), however, the estimated gradient is approximately 0.001 (average of 0.0042). The steeper gradient near Wallace Creek and Bear Head Creek reflects decreasing surface elevations in these areas. Moreover, the data suggest that groundwater velocities near Wallace Creek and Bear Head Creek may be increasing (given that K remained constant) because of the steeper groundwater surface.

Surficial (and deep) aquifer hydraulic characteristics [K, T, and storativity (S)] were not evaluated during this investigation. A recent hydrogeologic investigation conducted by Baker (February, 1993) at Hadnot Point (less than 1/2 miles from OU No. 2) provided estimates of T, S, and K within the surficial water-bearing zones.

Aquifer pump and recovery test results indicate an average T of 561 gallons/day/feet (75 feet^2/day), an average K of 21 gallons/day/feet (2.8 feet^2/day or 8.0×10^{-4} cm/sec), and an average S of 0.015 for the surficial silty-sands (10 to 25 feet bgs). A very low flow rate of 1.2 gpm was maintained during this test. Slightly higher flow rates of 2 to 4 gpm were observed from shallow well development during the field investigation at OU No. 2.

3.7.2.2 Deep Groundwater

Deep groundwater flow patterns in the vicinity of OU No. 2 were evaluated by a network of deep monitoring wells (maximum depth of 230 feet bgs). The deep monitoring well network extends from north of Wallace Creek to Site 9, and east of Piney Green Road to Holcomb

TABLE 3-9

SUMMARY OF ESTIMATED GROUNDWATER GRADIENT VALUES FOR SURFICIAL AND DEEP WATER-BEARING ZONES
OPERABLE UNIT NO. 2
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Surficial Water-Bearing Zones

Date	General Area		
	Vicinity of Wallace Creek	North-Central Portion of Site	Vicinity of Bear Head Creek
9/30/92	1.2×10^{-2}	3.7×10^{-3}	2.2×10^{-2}
11/7/92	1.2×10^{-2}	4.6×10^{-3}	Not Determined
Average	1.2×10^{-2}	4.2×10^{-3}	2.2×10^{-2}

Deep Water-Bearing Zones

Date	General Area		
	Vicinity of Wallace Creek	North-Central Portion of Site	Vicinity of Bear Head Creek
10/26/92	3.5×10^{-3}	4.4×10^{-3}	Not Determined
11/7/92	3.0×10^{-3}	4.0×10^{-3}	Not Determined
Average	3.3×10^{-3}	4.2×10^{-3}	Not Determined

Notes: Values expressed in feet/feet.
Values represent an average of three measurements.

Boulevard (refer to Figure 2-8). Additionally, aquifer hydraulic characteristic data from the deeper water-bearing zones were obtained from well production tests (i.e., also commonly referred to as "well acceptance tests") performed on water supply wells HP-651 and HP-636 which are located along Piney Green Road.

Three rounds of groundwater level measurements were obtained from the deep monitoring wells at Site 9 (September 30, 1992; and October 26, 1992; and April 1, 1993) and Sites 6 and 82; (October 26, 1992; and November 7, 1992; and April 1, 1993) as shown on Tables 3-6 and 3-10, respectively. Groundwater elevations (measured from top of casing reference points) ranged from 9.06 [well 6GW37D (4/1/93) located near the western boundary of Site 82] to 19.13 [well 6GW2D (4/1/93) located east of Piney Green Road] feet above msl. Water levels fluctuated between 2.20 and 5.17 feet over a six month period. Well 6GW2D exhibited the largest fluctuation in water level of 5.17 feet.

Water level data were also collected over a 24-hour period from deep monitoring well 6GW28D. As shown on Table 3-11, the water level was also fairly constant over a 24-hour period as a change of only 0.05-feet was observed. This very small change in water level is most likely the result of normal daily fluctuations.

Figures 3-11, 3-12, and 3-13 depict groundwater flow patterns on October 26, 1992; November 7, 1992; and April 1, 1993 for the deeper water-bearing zones. As shown on these figures, groundwater is flowing toward the west with local penetrations toward the general directions of Wallace Creek and Bear Head Creek. The groundwater flow pattern on November 7 exhibits a similar trend except that flow toward the southeast is not as pronounced. Most likely this trend on November 7 is the result of incomplete water level (i.e., measurements were not taken on this date) data from well 9GW7D.

Estimates of the groundwater gradient for the deep water-bearing zones are presented on Table 3-9. The estimated groundwater gradients calculated are within the same magnitude across OU No. 2. The average groundwater gradients in the vicinity of Wallace Creek and the north-central portion of the site are 0.0030 and 0.0042, respectively.

Overall, the deep and surficial groundwater flow patterns at OU No. 2 exhibit a similar trend. Subsequently, this trend may suggest that the surficial and deeper water-bearing zones are at least partly hydraulically interconnected. Although some clay layers underlie the site (i.e., boring 6GW2D from 25 to 27 feet bgs) which may impede vertical groundwater movement,

TABLE 3-10

SUMMARY OF WATER LEVEL MEASUREMENTS FROM DEEP MONITORING WELLS ON OCTOBER 26, 1992, NOVEMBER 7, 1992, AND APRIL 1, 1993
SITES 6 AND 82
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Well No.	Top of PVC Casing Elevation[1] (feet, above msl)	Depth to Groundwater (feet, below top of casing) (10/26/92)	Depth to Groundwater (feet, below top of casing) (11/07/92)	Depth to Groundwater (feet, below top of casing) (04/01/93)	Groundwater Elevation (feet, above msl) (10/26/92)	Groundwater Elevation (feet, above msl) (11/07/92)	Groundwater Elevation (feet, above msl) (04/01/93)
6GW1D	35.31	23.07	23.32	19.90	12.24	11.99	15.41
6GW2D	37.61	22.15	22.27	18.48	15.46	15.34	19.13
6GW7D	20.08	10.89	8.94	5.72	9.19	11.14	14.36
6MW3D	35.18	--	--	16.92	--	--	18.26
6GW27D	24.47	15.35	15.17	12.50	9.12	9.30	11.97
6GW28D	31.74	22.05	22.10	19.90	9.69	9.64	11.84
6GW30D	11.90	--	--	1.79	--	--	10.11
6GW35D	14.29	--	--	5.18	--	--	9.11
6GW36D	17.61	--	--	5.67	--	--	11.94
6GW37D	15.96	--	--	6.90	--	--	9.06

Notes: (1) msl - mean sea water levels from Phase II

Note that deep wells 6GW1DA and 6GW15D were not obtained because they were installed after April 1, 1993.

TABLE 3-11

SUMMARY OF WATER LEVEL MEASUREMENTS
OVER A 24-HOUR PERIOD AT DEEP MONITORING WELL 6GW28D
SITE 6
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Time From Start (Min)	Depth to Water (Feet, bgs.)	Time From Start (Min)	Depth to Water (Feet, bgs.)	Time From Start (Min)	Depth to Water (Feet, bgs.)
0.000	21.914 (1)	490.000	21.961 (2)	980.000	21.945
10.000	21.945	500.000	21.961	990.000	21.945
20.000	21.945	510.000	21.961	1000.000	21.945
30.000	21.945	520.000	21.945	1010.000	21.945
40.000	21.945	530.000	21.961	1020.000	21.945
50.000	21.945	540.000	21.961	1030.000	21.945
60.000	21.945	550.000	21.945	1040.000	21.945
70.000	21.945	560.000	21.961	1050.000	21.930
80.000	21.945	570.000	21.961	1060.000	21.930
90.000	21.945	580.000	21.961	1070.000	21.930
100.000	21.945	590.000	21.961	1080.000	21.945
110.000	21.945	600.000	21.945	1090.000	21.945
120.000	21.945	610.000	21.961	1100.000	21.930
130.000	21.945	620.000	21.961	1110.000	21.945
140.000	21.945	630.000	21.961	1120.000	21.945
150.000	21.945	640.000	21.961	1130.000	21.930
160.000	21.945	650.000	21.945	1140.000	21.930
170.000	21.945	660.000	21.961	1150.000	21.930
180.000	21.945	670.000	21.961	1160.000	21.930
190.000	21.945	680.000	21.945	1170.000	21.930
200.000	21.945	690.000	21.961	1180.000	21.930
210.000	21.945	700.000	21.945	1190.000	21.930
220.000	21.945	710.000	21.961	1200.000	21.930
230.000	21.930	720.000	21.945	1210.000	21.930
240.000	21.945	730.000	21.945	1220.000	21.930
250.000	21.945	740.000	21.961	1230.000	21.930
260.000	21.945	750.000	21.945	1240.000	21.930
270.000	21.945	760.000	21.945	1250.000	21.930
280.000	21.945	770.000	21.945	1260.000	21.930
290.000	21.945	780.000	21.961	1270.000	21.930
300.000	21.930	790.000	21.945	1280.000	21.930
310.000	21.945	800.000	21.945	1290.000	21.930
320.000	21.945	810.000	21.945	1300.000	21.930
330.000	21.945	820.000	21.945	1310.000	21.930
340.000	21.945	830.000	21.945	1320.000	21.930
350.000	21.945	840.000	21.945	1330.000	21.930
360.000	21.945	850.000	21.945	1340.000	21.930
370.000	21.945	860.000	21.945	1350.000	21.914
380.000	21.930	870.000	21.945	1360.000	21.930
390.000	21.945	880.000	21.945	1370.000	21.930
400.000	21.945	890.000	21.945	1380.000	21.930
410.000	21.945	900.000	21.945	1390.000	21.914
420.000	21.945	910.000	21.945	1400.000	21.914
430.000	21.945	920.000	21.945	1410.000	21.914
440.000	21.945	930.000	21.945		
450.000	21.945	940.000	21.945		
460.000	21.945	950.000	21.945		
470.000	21.945	960.000	21.945		
480.000	21.945	970.000	21.945		

Notes: (1) Minimum Water Level Recorded
(2) Maximum Water Level Recorded

these clay layers are laterally discontinuous and are characterized as leaky semi-confining. Accordingly groundwater recharging the surficial water-bearing zones will, over time, migrate vertically into the deeper soils.

Groundwater elevation differentials (top of casing reference points were used as the datum reference) between the surficial and deeper water-bearing zones were evaluated from the October 26, 1992 groundwater elevation data. These groundwater differentials are presented on Figure 3-14. Negative groundwater values represent downward heads (at well clusters) and positive values represent upward heads. At well cluster 6GW2S/D, a high downward head (-8.34) is observed. A high downward head would be expected at this cluster since groundwater is recharging in this area. At well clusters 82MW3/6GW27D and 6GW28S/D, upward heads (+ 0.23 and + 1.12) are observed. Upward heads at these clusters would be expected since groundwater is discharging in these areas.

As mentioned in Section 3.7.2.1, aquifer hydraulic characteristics were not evaluated during this investigation. Estimates of specific capacity, T and groundwater flow rates (i.e., discharge rates) are available from well performance tests performed on water supply wells HP-651 and HP-636 (well depth and screen intervals for these wells are shown on Table 3-15 in Section 3.10). Estimated specific capacity values from HP-651 and HP-636 are 3.8 and 6.8 gallons/minute/foot (of drawdown), respectively. Transmissivity values from HP-636 and HP-651 are 6,900 and 7,300 feet^2/day (51,600 to 54,600 gallons/day/feet), respectively. Estimates of T and K from other Camp Lejeune water supply wells (in the Castle Hayne aquifer) range from 4,300 to 24,500 feet^2/day (32,200 to 183,000 gallons/day/feet) and 14 to 82 feet/day, respectively (Harned, et. al., 1989). Groundwater flow rates within well HP-651 ranged from 50 gpm (screened from 189 to 194 feet bgs) to 150 gpm (screened from 140 to 155 feet bgs) during testing.

3.8 Land Use and Demography

MCB Camp Lejeune encompasses an area of approximately 170 square miles (108,800 acres), and comprises several distinct areas of development including Hadnot Point, MCAS/Camp Geiger, French Creek, and Courthouse Bay. The installation border is approximately 70 miles in length, which includes 14 miles of ocean front and Intracoastal Waterway.

The New River, which bisects the installation, provides both a commercial and recreational source of fish and shellfish for human consumption. The NC DEHNR reports that during the years 1989 and 1990 over 2.7 million pounds of fish and shellfish were caught commercially in the New River.

Land use within Camp Lejeune is influenced by the topography of the land itself, by established environmental policy, and by base operational requirements. Soil drainage is the most critical factor which determines the suitability of a site for development. Much of the land area found within the facility consists of freshwater swamps that are wooded and largely unsuitable for development. In addition, approximately 3,000 acres of sensitive estuary and other areas set aside for the protection of threatened and endangered species are to remain undeveloped. Operational restrictions and regulations, such as explosive quantity safety distances, impact-weighted noise thresholds, and aircraft landing and clearance zones, may also greatly constrain and influence development (Master Plan, Camp Lejeune Complex, North Carolina, 1988).

The vast majority of Camp Lejeune is used as training ranges and maneuver areas. Although interspersed throughout the installation, these areas are generally concentrated between Sneads Ferry Road and the eastern border of the base.

The combined military and civilian population of the Camp Lejeune/Jacksonville area is approximately 60,000. At the present time nearly 90 percent of the surrounding population resides within urbanized areas. As evidenced by the rapid population growth of Jacksonville and adjacent communities, particularly during the period from 1940 to 1960, Camp Lejeune continues to have a direct effect on regional population growth and development.

3.9 Regional Ecology

MCB Camp Lejeune, North Carolina, is approximately 108,800 acres, with 84 percent of the area covered by forests (USMC, 1987). The base drains primarily to the New River or its tributaries including Northeast Creek, Southwest Creek, Wallace Creek, French Creek, Bear Head Creek, Freeman Creek, and Duck Creek. The soil types range from sandy loams to fine sand and muck, with the dominant series being sandy loam (USMC, 1987).

Vegetation at MCB Camp Lejeune, North Carolina, includes pure pine stands of loblolly and longleaf pine in the drier upland soils, pure pond pine stands in high organic wet soils, pine-hardwood and pure hardwood stands in streamside zones and in more productive soils, and bottomland hardwoods in the floodplains of the major creeks (USMC, 1987). Wildlife on the base includes white-tailed deer, wild turkey, and black bear along with numerous small game species (e.g., bobwhite quail, morning dove, rabbit) (USMC, 1987).

Wallace Creek and Bear Head Creek are designated as Class SB by the North Carolina Department of Environment, Health, and Natural Resources (NC DEHNR), which are saltwaters protected for primary recreation (swimming on a frequent basis), fishing, and aquatic life including propagation and survival (NC DEHNR, 1992a, 1992b). These creeks are classified as Nutrient Sensitive Waters which are waters subject to growths of microscopic or macroscopic vegetation requiring limitations on nutrient inputs (NC DEHNR, 1992a, 1992b). Wallace Creek is classified as Inland Waters above, and Coastal Waters below the first bridge upstream from its mouth (NCMFC, 1992). Wallace Creek and Bear Head Creek are classified as Inland Waters at all the sample stations.

The New River, downstream of OU No. 2, is designated as Class SC: which are saltwaters protected for secondary recreation, fishing, and aquatic life including propagation and survival (NC DEHNR, 1992a, 1992b). All saltwaters in North Carolina are classified to protect these uses at a minimum (NC DEHNR, 1992a, 1992b). This section of the New River also is classified as a Nutrient Sensitive Water (NC DEHNR, 1992a, 1992b).

3.9.1 Sensitive Environments

This section describes the sensitive environments that were evaluated at OU No. 2. These sensitive environments include wetlands, protected species, and other potentially sensitive environments.

3.9.1.1 Wetlands

The NC DEHNR's, Division of Environmental Management (DEM) has developed guidance pertaining to activities that may impact wetlands (NC DEHNR, 1992c). In addition, certain activities impacting wetlands also are regulated by the U.S. Corps of Engineers.

The U.S. Fish and Wildlife Service (FWS) prepared a National Wetlands Inventory (NWI) map for the Camp Lejeune, North Carolina quadrangle by stereoscopic analysis of high altitude aerial photographs (USDI, 1982). OU No. 2 is included in this map (see Appendix A in the Ecological Risk Assessment for a copy of the NWI map). The wetlands were identified on the photographs based on vegetation, visible hydrology, and geography in accordance with

Classification of Wetland and Deep-Water Habitats of the United States (Cowardin, et al, 1979). NWI maps are intended for a initial identification of wetland areas. They cannot be substituted for an actual wetland delineation that may be required by Federal, state and/or local regulatory agencies.

Several types of wetlands have been identified adjacent to Wallace Creek and Bear Head Creek from the NWI map. The wetlands along the creeks primarily are palustine forested wetlands consisting of pond, longleaf or loblolly pines, along with oaks, black gum and baldcypress (NC DNRCD, 1988). [See the NWI map in Appendix A in the Ecological Risk Assessment for the wetland classifications and their locations].

3.9.1.2 Threatened and Endangered Species

Certain species have been granted protection by the FWS under the Federal Endangered Species Act (16 U.S.C. 1531-1543), and/or 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.

Table 3-12 lists the protected faunal species (either endangered, threatened, or special concern) and the only federally endangered or threatened floral species that have been identified in previous studies within the boundaries of MCB Camp Lejeune (USMC, 1991; LeBlond, 1991; Fussell, 1991; and Walters, 1991). The following paragraphs discuss the protected species observed at MCB Camp Lejeune during previous studies.

A Peregrine falcon was spotted approximately five miles southeast of OU No. 2 (Fussell, 1991). These birds potentially may inhabit or feed in areas surrounding OU No. 2 because of their large foraging range. Black skimmers and piping plovers were observed near the New River Inlet (Fussell, 1991). However, these birds primarily inhabit shore line areas and, therefore, are not expected to be found at OU No. 2. Bachmans sparrows and Red-cockaded woodpeckers were observed at numerous locations throughout southern MCB Camp Lejeune. None of these species were observed at OU No. 2 during intensive investigations previously conducted for

TABLE 3-12

OPERABLE UNIT NO. 2
PROTECTED SPECIES WITHIN MCB CAMP LEJEUNE
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Species	Protected Classification
American alligator (Alligator mississippienis)	T(f), T(s)
Bachmans sparrow (Aimophilia aestivalis)	SC
Black skimmer (Rhynochops niger)	SC
Green (Atlantic) turtle (Chelonia m. mydas)	T(f), T(s)
Loggerhead turtle (Caretta caretta)	T(f), T(s)
Peregrine Falcon (*)	(*)
Piping plover (Charadrius melodus)	T(f), T(s)
Red-cockaded woodpecker (Picoides borealis)	E(f), E(s)
Rough-leaf loosestrife (Lysimachia asperulifolia)	E(f), E(s)

Legend:
SC = State Special Concern
E(f) = Federal Endangered
E(s) = State Endangered
T(f) = Federal Threatened
T(s) = State Threatened

* The observer did not differentiate between the American eastern peregrine Falcon [E (f), E (s)] or the Artic peregrine Falcon [T(f), T(s)].

MCB Camp Lejeune, therefore, there is a low potential for them to exist at OU No. 2 (Fussell, 1991; Walters, 1991).

Sea turtles and sea turtle nests have been observed downstream of OU No. 2 in the New River on Onslow Beach. Sea turtles do not swim very far up the New River because of the low salinity, therefore, they are not expected to inhabit areas of OU No. 2 (USMC, 1991). During the ecological investigation conducted in August and September 1992, an alligator was observed in Wallace Creek. In addition, signs were posted at the boat launching ramp in Wallace Creek warning of the American alligators presence in the creek.

A protected floral species and special-interest community survey previously was conducted at Camp Lejeune (LeBlond, 1991). From this list, the Rough-leaf loosestrife was the only Federally threatened or endangered plant species found on the Marine Corp Base. Several State endangered or threatened and Federal and State candidate species were found on the MCB. A road meadow, inhabited by the state watch species Lugwigia microcarpa, was located upstream of OU No. 2 on Wallace Creek (see Appendix B in the Ecological Risk Assessment).

Also upstream of OU No. 2 on Wallace Creek, a state registered natural resource area has been identified (see Appendix B in the Ecological Risk Assessment). The general landscape consists of a broad floodplain and former mill pond on Wallace Creek which is dominated by a Cypress-Gum Swamp Community which grades upstream into a Coastal Plain Small Stream Swamp Community. The Cypress-Gum Swamp Community is dominated by Taxodium distichum, Nyssa biflora, Acer rubrum, Ulmus alata, and Fraxinus pennsylvanica. The Plain Small Stream Swamp Community is dominated by Taxodium distichum, Nyssa biflora, Fraxinus pennsylvanica, Ulmus americana, Acer rubrum, and Liquidambar styraciflua.

3.9.1.3 Other Sensitive Environments

In addition to wetlands and protected species, the presence of other sensitive environments, including those listed in 40 CFR Part 300, were evaluated. These sensitive environments are evaluated when assessing potential hazardous waste sites using the Hazard Ranking System. These sensitive environments and their presence or absence at OU No. 2 are discussed below.

- Marine Sanctuary - OU No. 2 is not located within a Marine Sanctuary (NCMFC, 1992).

- National Park - OU No. 2 is not located within a National Park (NPS, 1991).

- Designated Federal Wilderness Area - OU No. 2 is not located within a Designated Federal Wilderness Area (WS, 1989).

- Areas Identified under the Coastal Zone Management Act - The North Carolina Coastal Area Management Act (CAMA) regulates various types of Areas of Environmental Concern including estuarine waters, coastal wetlands, public trust areas, and estuarine shoreline through the establishment of unified policies, criteria, standards, methods, and processes (CAMA, 1974). Bear Head Creek, the inland portion of Wallace Creek, and any coastal wetlands associated with these waters are regulated under CAMA. The tidal portion of Wallace Creek along with 75 feet adjacent to the mean water line also are regulated under CAMA (NC DEHNR, 1993a).

- Sensitive Areas Identified under the National Estuary Program (NEP) or Near Coastal Waters Program (NCWP) - OU No. 2 is not located within a Sensitive Area identified under the NEP or NCWP (USEPA, 1993).

- Critical Areas Identified under the Clean Lakes Program - OU No. 2 is not located within a Critical Area identified under the Clean Lakes Program (NPS, 1991).

- National Monument - OU No. 2 is not located within a National Monument (NPS, 1991).

- National Seashore Recreational Area - OU No. 2 is not located within a National Seashore Recreational Area (NPS, 1991).

- National Lakeshore Recreational Area - OU No. 2 is not located within a National Lakeshore Recreational Area (NPS, 1991).

- National Preserve - OU No. 2 is not located within a National Preserve (NPS, 1991).

- National or State Wildlife Refuge - OU No. 2 is not located within a National or State Wildlife Refuge (NC WRC, 1992).

- Unit of the Coastal Barrier Resource Program - OU No. 2 is not located within a unit of the Coastal Barrier Resource Program (USDI, 1993).

- Administratively Proposed Federal Wilderness Area - OU No. 2 is not located within an Administratively Proposed Federal Wilderness Area (WS, 1989, 1993).

- Spawning Areas Critical for the maintenance of fish/shellfish species within river, lake, or coastal tidal waters - OU No. 2 is not located within a spawning area critical for the maintenance of fish/shellfish species (Sholar, 1975).

- Migratory pathways and feeding areas critical for maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which fish spend extended periods of time - OU No. 2 is not a migratory pathway or feeding area critical for maintenance of anadromous fish species (NC DEHNR, 1993b). There is not a significant population of anadromous fish in Wallace Creek, Bear Head Creek, or the New River downstream of Wallace Creek.

- Terrestrial areas utilized for breeding by large or dense aggregations of animals - A study of the terrestrial species was not conducted at OU No. 2. However, OU No. 2 probably is not utilized for breeding by large or dense aggregations of animals because the land is open and there is frequent military activity on the land.

- National river reach designated as Recreational - Wallace Creek, Bear Head Creek, or the New River downstream of Wallace Creek are not designated as National Recreational Rivers (NPS, 1990, 1993).

- Federal designated Scenic or Wild River - Wallace Creek, Bear Head Creek, or the New River downstream of Wallace Creek are not Federally designated Scenic or Wild Rivers (NPS, 1990, 1993).

- State land designated for wildlife or game management - OU No. 2 is not located within a State game land (NC WRC, 1992).

- State designated Scenic or Wild River - Wallace Creek, Bear Head Creek, or the New River downstream of Wallace Creek are not State designated Scenic or Wild Rivers (NC MFC, 1992).

- State designated Natural Area - OU No. 2 is not located within a State designated Natural Area or Area of Significant Value (LeBlond, 1991).

- State designated areas for protection or maintenance of aquatic life - No areas within the boundaries of OU No. 2 are designated as primary nursery areas or are unique or special waters of exceptional state or national recreational or ecological significance which require special protection to maintain existing uses (NC DEHNR, 1992b).

- Areas of Significant Value - OU No. 2 is not located within a State Area of Significant Value (LeBlond, 1991).

- State Registered Natural Resource Area - The Wallace Creek Natural Resource Area is located upstream of OU No.2.

3.10 Identification of Water Supply Wells

Potable water supply wells within a one-mile radius of Sites 6 and 82, and Site 9 were identified as shown on Figures 3-15 and 3-16, respectively. Information on well depths, screen intervals, aquifer characteristics (specific capacity and T), well distances and directions is provided on Tables 3-13 and 3-14 for Sites 6 and 82, and Site 9, respectively. Supply well information was obtained in the report entitled, "U.S.G.S. Water Resources Investigation Report 89-4096" (Harned, et al., 1989).

As shown on Table 3-13, eight wells were identified within a one-mile radius of Sites 6 and 82. Wells HP-635 and HP-636 are the closest active supply wells to Sites 6 and 82. These wells are located approximately 80 feet east-southeast across Piney Green Road. These wells are screened between 65 and 227 feet bgs. Based on groundwater flow patterns in the area, these wells are generally upgradient from Sites 6 and 82. Well HP-633 is the closest operating water supply well situated down gradient from Sites 6 and 82. This well is located approximately 1,590 feet northwest and is screened between 55 and 205 feet bgs.

Three supply wells in the area, HP-651 (located approximately 80 feet east) and HP-653 (located approximately 1,950 north), and HP-637 (located approximately 450 feet southwest) are currently out of service due to organic contamination. According to Camp Lejeune Water and Sewer Department personnel, HP-651 was shut down in February 1985. It is unknown when HP-653 and HP-637 were shut down. Groundwater quality data from well HP-651 (prior

TABLE 3-13

SUMMARY OF WATER SUPPLY WELLS WITHIN A ONE-MILE RADIUS OF SITES 6 AND 82(1)
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Well No.	USGS Identification Number	Total Depth (feet)	Screen Interval (feet)	Specific Capacity (gal/min/foot)	Estimated Transmissivities (feet^2/day)	Approximate Distance/Direction from Site(4) (feet)
HP-633	3441580772006.1	205	55-65 75-80 95-105 123-133 138-143 158-168 178-183 195-205	-- (2)	-- (2)	1,390/northwest
HP-635	3440550771933.1	215	65-75 93-108 122-127 136-146 150-155 170-175 185-190 210-215	-- (2)	-- (2)	80/southeast
HP-636	3441190771933.1	227	90-100 115-125 130-135 140-150 158-163 170-175 185-190 200-210 222-227	6.8	6,900	80/east

Notes: (1) Information obtained from "Assessment of Hydrogeologic and Hydraulic Data at Camp Lejeune Marine Corps Base, North Carolina," 1989.
(2) Information not available.
(3) Supply well currently not in service.

TABLE 3-13 (CONTINUED)

SUMMARY OF WATER SUPPLY WELLS WITHIN A ONE-MILE RADIUS OF SITES 6 AND 82(1)
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Well No.	USGS Identification Number	Total Depth (feet)	Screen Interval (feet)	Specific Capacity (gal/min/foot)	Estimated Transmissivities (feet^2/day)	Approximate Distance/Direction from Site(4) (feet)
HP-637(3)	3440390771954.1	172	90-98 102-114 120-128 140-148 156-172	-- (2)	-- (2)	450/southwest
HP-641	3440390771954.1	178	108-118 128-150 158-168	-- (2)	-- (2)	4,100/north
HP-651(3)	3442290771922.1	199	125-135 140-155 189-194	3.8	7,300	80/east
HP-653(3)	3442100771925.1	270	-- (2)	-- (2)	-- (2)	1,950/north
HP-709	3442130771854.1	140	70-90 110-140	4.4	8,500	2,380/northeast

Notes: (1) Information obtained from "Assessment of Hydrogeologic and Hydraulic Data at Camp Lejeune Marine Corps Base, North Carolina," 1989.

(2) Information not available.

(3) Supply well currently not in service.

(4) Distance measured from closest boundary point at Site 6.

TABLE 3-14

SUMMARY OF WATER SUPPLY WELLS WITHIN A ONE-MILE RADIUS OF SITE 9(1)
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Well No.	USGS Identification Number	Total Depth (feet)	Screen Interval (feet)	Specific Capacity (gal/min/foot)	Estimated Transmissivities ($feet^2$/day)	Approximate Distance/Direction from Site(4) (feet)
HP-601(3)	3440180772020.1	195	45-60 95-100 115-130 175-195	-- (2)	-- (2)	3,960/southwest
HP-602(3)	3440180772007.1	160	70-80 100-105 120-125 145-150 155-160	-- (2)	-- (2)	3,300/southwest
HP-634(3)	3440300771935.1	225	63-70 73-78 83-88 107-117 124-129 135-140 153-163 170-175 195-200 215-225	4.5	4,300	2,310/south
HP-642	3443040772100.1	210	112-124 136-144 153-163 174-178 188-196	-- (2)	-- (2)	5,200/south

Notes: (1) Information obtained from "Assessment of Hydrogeologic and Hydraulic Data at Camp Lejeune Marine Corps Base, North Carolina," 1989.

(2) Information not available.

(3) Supply well currently not in service.

(4) Distance measured from closest boundary point at Site 9.

TABLE 3-~~11~~ (Continued)

SUMMARY OF WATER SUPPLY WELLS WITHIN A ONE-MILE RADIUS OF SITE 9(1)
REMEDIAL INVESTIGATION CTO-0133
MCB CAMP LEJEUNE, NORTH CAROLINA

Well No.	USGS Identification Number	Total Depth (feet)	Screen Interval (feet)	Specific Capacity (gal/min/foot)	Estimated Transmissivities (feet^2/day)	Approximate Distance/Direction from Site(4) (feet)
HP-635	3440550771933.1	215	65-75 93-108 122-127 136-146 150-155 170-175 185-190 210-215	-- (2)	-- (2)	800/east
HP-636	3441190771933.1	227	90-100 115-125 130-135 140-150 158-163 170-175 185-190 200-210 222-227	6.8	6,900	2,000/northeast
HP-637 (3)	3440390771954.1	172	90-98 102-114 120-128 140-148 156-172	-- (2)	-- (2)	1,000/southwest
HP-651 (3)	3442290771922.1	199	125-135 140-155 189-194	3.8	7,300	5,000/northeast

Notes:
(1) Information obtained from "Assessment of Hydrogeologic and Hydraulic Data at Camp Lejeune Marine Corps Base, North Carolina," 1989.
(2) Information not available.
(3) Supply well currently not in service.
(4) Distance measured from closest boundary point at Site 9.

to being shut down) indicated 18,000 micrograms per liter (µg/l) of trichloroethane (TCE), 1,580 µg/l of 1,2-dichloroethene (DCE), and 400 µg/l of tetrachloroethene (PCE). Recent data from HP-651 (ESE, 1991) indicated positive detections of vinyl chloride (70 µg/l), DCE (75 µg/l), TCE (13 µg/l), and PCE (53 µg/l). Groundwater quality data from January 1985 indicated TCE levels of 9.0 µg/l in well HP-652. The source of the contamination impacting these wells was not identified by Camp Lejeune personnel.

Eight wells were identified within a one-mile radius of Site 9 (wells HP-635, HP-636, HP-637, and HP-651 were also within a one-mile radius of Sites 6 and 82), as shown on Figure 3-16. Three of these supply wells including HP-601, HP-602, and HP-634 have been shut down since 1984 due to organic contamination. The source of the contamination impacting these wells was also not identified by Camp Lejeune personnel, but it is believed that the source may be related to waste handling, disposal activities at the Hadnot Point Industrial Area (HPIA). The following contaminant levels were detected:

- HP-601 - DCE (8.8 to 99 µg/l)
  - TCE (26 to 230 µg/l)
  - PCE (1.5 to 5.0 µg/l)

- HP-602 - DCE (110 to 630 µg/l)
  - TCE (300 to 1,600 µg/l)
  - PCE (24 µg/l)
  - toluene (5.4 to 12 µg/l)
  - vinyl chloride (18 µg/l)

- HP-634 - DCE (2.3 to 700 µg/l)
  - TCE (10 µg/l)
  - vinyl chloride (6.8 µg/l)

Well HP-635 is the closest active supply well to Site 9. This well is located approximately 400 feet up gradient (east)

FINAL

OPERABLE UNIT EVALUATION REPORT
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

CONTRACT TASK ORDER 0086

Prepared For:

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

Under the:

LANTDIV CLEAN Program
Contract N62470-89-D-4814

Prepared By:

BAKER ENVIRONMENTAL, INC.
Coraopolis, Pennsylvania

SEPTEMBER 18, 1992

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1.0 INTRODUCTION

This report presents the results of the prioritization of 18 current sites at Marine Corps Base, Camp Lejeune, North Carolina into Operable Units (OU). Remedial Investigations and Feasibility Studies are currently, or will be performed at these 18 sites under the Department of Navy's Installation Restoration Program. This report has been prepared by Baker Environmental, Inc. (Baker) in response to the Request for Proposal for Contract Task Order 0086 (CTO 0086) by the Atlantic Division, Navel Facilities Engineering Command (LANTDIV), dated November 21, 1991.

The 18 current RI/FS sites are identified in the "Final Site Management Plan For Marine Corps Base Camp Lejeune, North Carolina, Fiscal Year 1993" prepared for LANTDIV in September 1992 by Baker. Figure 1-1 shows the locations of the sites.

As defined in the National Contingency Plan (NCP), an "Operable Unit means a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site. Operable units may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site."

Site No. 78, the Hadnot Point Industrial Area (HPIA), has already been designated as Operable Unit No. 1, and an Interim Remedial Action (IRA) RI/FS for the shallow aquifer is being conducted at present. The remaining RI/FS sites have not been prioritized into OUs. The objective of this task is to evaluate these remaining sites and determine the most appropriate methods to determine the OUs.

1.1 Scope of Work

In order to complete the task objective, the following activities were conducted:

- Discussions were held with EPA Region IV, N.C. DEHNR and LANTDIV to review possible methods of categorizing sites into OUs.

Baker

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September 17, 1992

Commanding Officer
Atlantic Division
Naval Facilities Engineering Command
Norfolk, Virginia 23511-6287

Attn: Mr. Byron Brant, P.E.
Code 1822

Re: Contract N62470-89-D-4814
Contract Task Order (CTO) 0086
Final Operable Unit Evaluation Report
MCB Camp Lejeune, North Carolina

Dear Mr. Brant:

Enclosed please find three (3) copies of the above-referenced report. Baker has revised the report to include Site 86 per your direction. Based on our discussion on September 14, 1992, no other changes were necessary since neither EPA nor the North Carolina DEHNR had any comments to the draft version of the report.

Copies of the Final Operable Unit Evaluation Report have been forwarded to Mr. George Radford (EMD, Camp Lejeune), Ms. Michelle Glenn (EPA Region IV), and Mr. Jack Butler (North Carolina DEHNR).

If you have any questions, please do not hesitate to contact me at (412) 269-2016.

Sincerely,

BAKER ENVIRONMENTAL, INC.

Raymond P Wattras

Raymond P. Wattras
Project Manager

RPW/lmn
Enclosures (3)

cc: Mr. Marc Lambert, P.E. (w/o enclosures)
Mr. Keith Simmons (w/o enclosures)
[redacted]

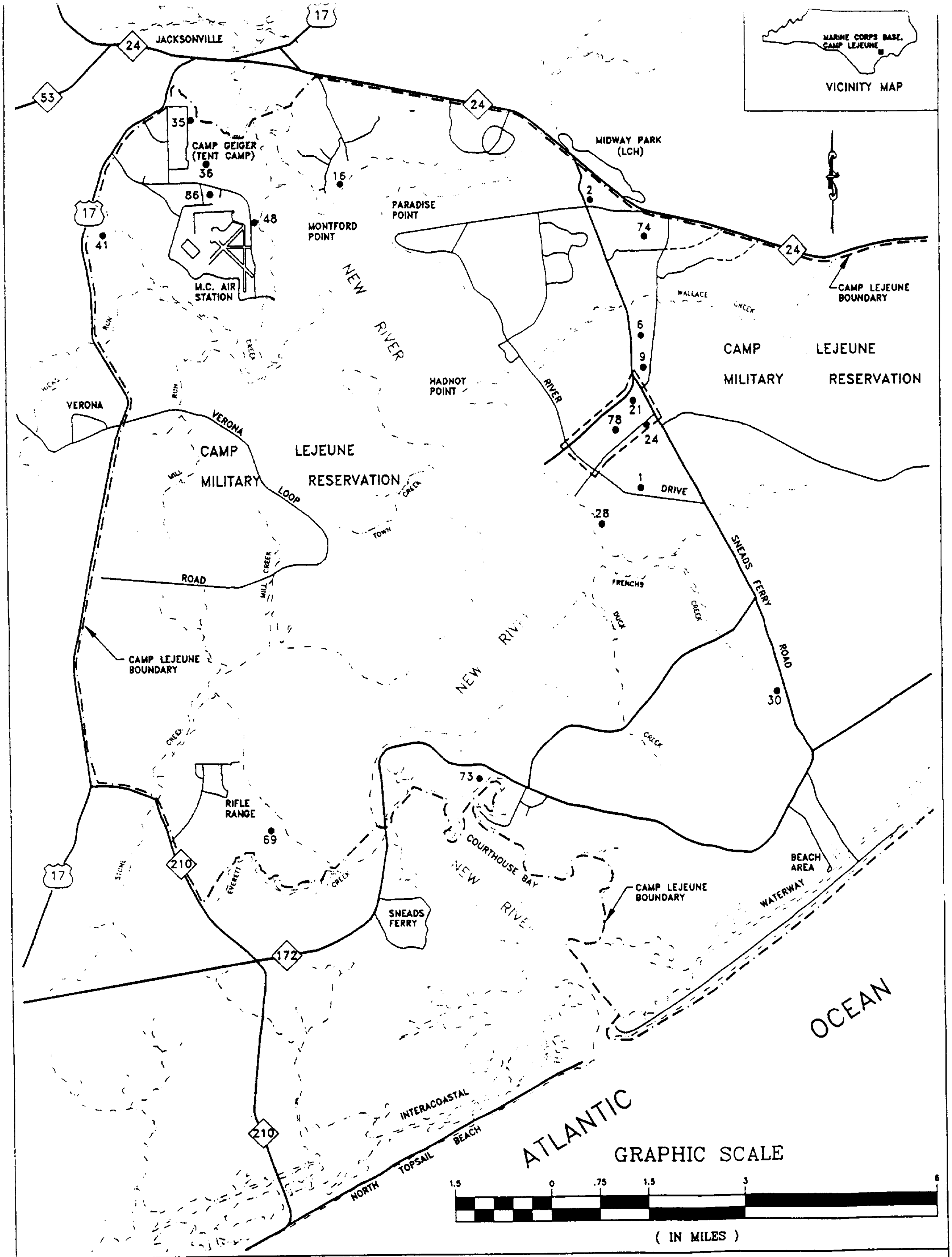

FIGURE 1-1
DISPOSAL SITES REQUIRING RI/FS ACTIVITIES
AT MCB CAMP LEJEUNE, NORTH CAROLINA

- Previous documents prepared as a result of site investigations were reviewed to determine the types of wastes disposed at each site and the types of contaminants detected at the site. These documents are referenced at the end of this report.

- Site locations were plotted and evaluated to determine any geographical relationships (i.e., sites within a common area) between the sites.

- Matrices were developed to compare the various sites to the types of wastes disposed and the contaminants detected. These matrices were used to determine if there were any similarities among the sites in terms of materials and contaminants.

- Sites were evaluated to determine any common watershed/drainage patterns/ ecological relationships between the sites.

Based on the above activities, preliminary OUs were developed based on common components observed in the matrices, site locations, or noted in the previous site investigations.

The preliminary list of OUs was reviewed to determine if there needed to be any modifications based on the geographic location of the sites.

1.2 Format of Report

The remainder of this report is divided into four sections. Section 2 reviews previous documents which have been prepared addressing hazardous waste disposal practices at the base. In Section 3, four different methods of grouping the sites into OUs are presented. Section 4 prioritizes the sites into the recommended OUs. Section 5 lists the references used in this report.

2.0 DOCUMENT REVIEW

In order to determine the characteristics of the current RI/FS sites, Baker reviewed site assessment documents of Camp Lejeune which were completed in 1983 by Water and Air Research, Inc. (Initial Assessment Study) and in 1990 by Environmental Science & Engineering, Inc. (Site Summary Report). In addition, the Fiscal Year 1992 Site Management Plan prepared by Halliburton NUS was reviewed. This section summarizes the information gathered during the document review.

2.1 Initial Assessment Study

The Initial Assessment Study (IAS) completed in 1983 identified 22 sites that were recommended for further investigation. The IAS determined that Petroleum, Oil and Lubricants (POL) were used or disposed at 10 of the 22 sites. The IAS briefly described the history of each of the sites, and listed the materials or wastes that were understood to be disposed at each site.

In addition, the IAS noted that although there were sites located throughout the base, three areas, Hadnot Point Industrial Area, Camp Geiger, and the Marine Corps Air Station at New River (MCAS New River) had the highest number of sites.

Finally, the IAS noted particular sites where contaminants might pose a threat to public health, including Site Nos. 69 and 41. Site No. 69, the Rifle Range Chemical Dump, was used to dispose chemical wastes. Site No. 41, the Camp Geiger Dump, had evidence suggesting that ordnance had been disposed at the site.

2.2 Site Summary Report

The Site Summary Report completed in 1990 presented the results of sampling conducted at the 22 sites. Sampling of groundwater monitoring wells, soils, surface water and sediments was started in 1984. Additional sampling events took place in 1986 and 1987. The data collected from the site sampling was used make a preliminary determination of the rate and direction of groundwater flow and the extent of environmental contamination at the 22 sites.

The Site Summary Report included a description of each site and a history of the disposal activities conducted at the site.

2.3 Site Management Plan

The Fiscal Year 1992 Site Management Plan (SMP) was developed in response to the Federal Facility Agreement (FFA), dated February 13, 1991. The FFA listed 23 sites that were required to complete a site investigation. The HPIA, which was not noted as a site in the FFA, was designated in the SMP as Site No.78 (and also as Operable Unit No. 1). Five of these sites have been dropped from the FFA list, leaving 17 sites in the SMP. Table 2-1 lists the 17 sites, the dates they were in use, and the material deposited at each site. Figure 1-1 shows the location of the sites.

2.4 Other

Site 86 (Tank Area AS419 - AS421 at Marine Corps Air Station) was added by the Navy/Marine Corps to the IRP Program in August 1992. This site, which is newly-identified, is not included in any of the studies/reports mentioned previously in this section.

TABLE 2-1

DISPOSAL SITES REQUIRING RI/FS ACTIVITIES
MARINE CORP BASE CAMP LEJEUNE, NORTH CAROLINA

Site No.	Site Description	Dates Used	Material Deposited
1	French Creek Liquids Disposal Area	Late 1940s to mid-1970s	Waste battery acid, POL
2	Former Nursery/Day-Care Center	1945 - 1958	Various pesticides
6	Storage Lots 201 and 203	1940s - Present	Metals, DDT, PCBs
9	Firefighting Training Pit at Piney Green Road	1960s - Present	JP-4, JP-5, solvents
16	Montford Point Burn Dump (1958-1972)	1958 - 1972	Garbage, waste oils, asbestos
21	Transformer Storage Lot 140	1950 - 1977	PCB spill, DDT, transformer oil
24	Industrial Area Fly Ash Dump	1940s - 1980	Fly ash and cinders, WTP sludge, STP sludge, construction debris
28	Hadnot Point Burn Dump	1946 - 1971	Solid wastes, industrial wastes, garbage, trash, oil-based paint
30	Sneads Ferry Road - Fuel Tank Sludge Area	1970	Sludge from fuel storage tank, tetraethyl lead and related compounds
35	Camp Geiger Area Fuel Farm	1957 - 1958	MOGAS (Spill)
36	Camp Geiger Area Dump Near Sewage Treatment Plant	Late 1940s - late 1950s	Mixed industrial and municipal solid waste
41	Camp Geiger Dump Near Former Trailer Park	Approximately 1946 - 1970	Mixed industrial and municipal wastes, POL, solvents, old batteries, Mirex, ordnance
48	MCAS New River Mercury Dump Site	1956 - 1966	Dumping of approximately 1 gallon mercury yearly for approximately 10 years
69	Rifle Range Chemical Dump	Mid 1950s - 1976	Chemical agent test kits, Malathion, DDT, PCBs
73	Courthouse Bay Liquids Disposal Area	1946 - 1977	Waste battery acid, POL
74	Mess Hall Grease Disposal Area	Early 1950s - 1960s	Pesticides, PCBs
78 (1)	Hadnot Point (Industrial Area)	1940s - 1981	Fuel, solvents
86	Tank Area AS419 - AS421 at Marine Corps Air Station	1970s - 1980s	Former above-ground storage tank area for petroleum product and wastes. Groundwater is contaminated with TCE.

(1) Operable Unit No. 1 - Not specifically mentioned as a site in the IAS, but included for completeness.

Source: Fiscal Year 1992 Site Management Plan, Halliburton NUS, 1992.

3.0 DEVELOPMENT OF POSSIBLE OPERABLE UNITS

After reviewing the documents noted in Section 2, Baker considered four methods of prioritizing the 18 RI/FS sites into OUs: geography, materials disposed and contaminants detected, individual sites, and common watersheds. This section presents these prioritizing methods.

3.1 Geography Based Operable Units

The first proposed method of determining OUs for the 17 RI/FS sites is based on the locations of the sites. Sites located near each other have been grouped together into an OU. This method of grouping resulted in the 17 sites being arranged into 8 OUs.

Table 3-1 lists the 8 proposed OUs. Note that Site Nos. 21, 24, and 78 have already been designated as OU No.1. Figure 3-1 shows the location of the 8 proposed OUs.

3.1.1 Advantages of Geography Based Operable Units

The following items are considered as advantages to geography based OUs:

- The RI/FS process would address definitive geographic portions of the base for remediation and cleanup. For example, all sites in the Camp Geiger area may be investigated as a group.

- Sites impacting a common watershed are more likely to be considered for remediation as a group.

- Work performed at the sites, such as field investigations, sampling, and remediation activities, may be managed and coordinated easier if the sites are located relatively near each other.

TABLE 3-1

POTENTIAL OPERABLE UNITS BASED ON GEOGRAPHY

Operable Unit No.	Site No(s).	Name
1*	21	Transformer Storage Lot 140
	24	Industrial Area Fly Ash Dump
	78	Hadnot Point Industrial Area
2	6	Storage Lots 201 and 203
	9	Firefighting Training Pit at Piney Green Road
3	69	Rifle Range Chemical Dump
4	1	French Creek Liquids Disposal Area
	28	Hadnot Point Burn Dump
5	2	Former Nursery/Day Care Center
	74	Mess Hall Grease Disposal Area
6	16	Montford Point Burn Dump
	35	Camp Geiger Area Fuel Farm
	36	Camp Geiger Area Dump Near Sewage Treatment Plant
	41	Camp Geiger Dump Near Former Trailer Park
	48	MCAS New River Mercury Dump Site
	86	Tank Area AS419 - AS421
7	30	Sneads Ferry Road Fuel Tank Sludge Area
8	73	Courthouse Bay Liquids Disposal Area

* Previously designated as Operable Unit No. 1

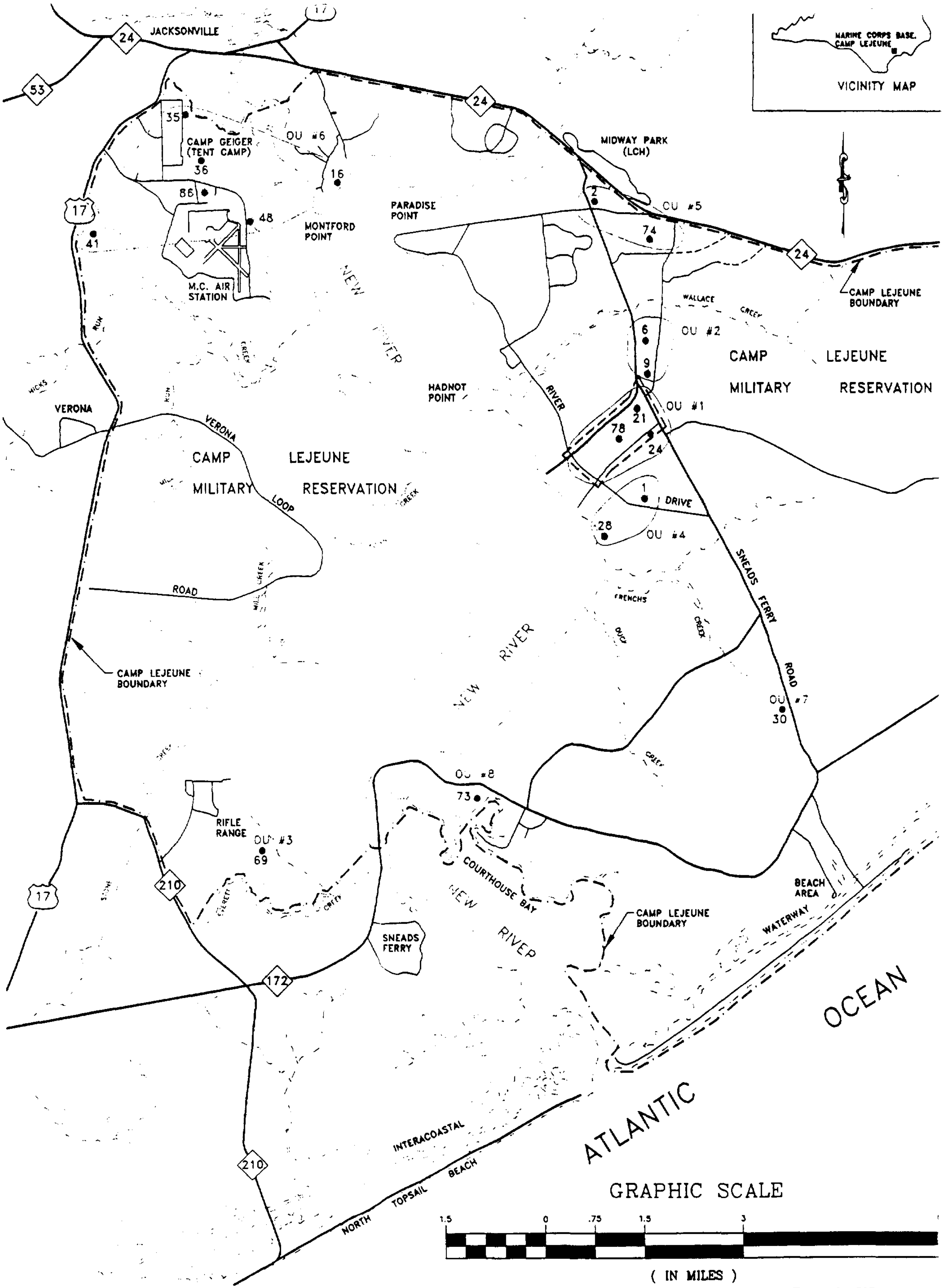

FIGURE 3-1
POTENTIAL OPERABLE UNITS BASED ON GEOGRAPHY

3.1.2 Disadvantages of Geography Based Operable Units

The following items are considered as disadvantages to geography based OUs:

- Some sites within an area may not have common waste or contaminant characteristics with other sites. For example, Site 48, MCAS New River Mercury Dump Site, does not have common waste or contaminant characteristics with the other sites in the area (proposed OU No. 6).

- Although some sites are in the same general area, they may still be a mile or more away from each other, such as Site Nos. 1 and 28 (see Figure 3-1). Site problems would not likely overlap from a geographical standpoint.

3.2 Disposed Material and Detected Contaminants Operable Units

The second proposed method of determining OUs for the 18 RI/FS sites is based on comparing the materials disposed and the contaminants detected at each site. Baker developed a series of matrices (Appendix A) which compared the characteristics of the wastes and detected contaminants at the 18 sites. Appendix A-1 shows that the most common materials disposed at the base included POL, waste oils, and solvents. Most of this waste material was the result of the use and maintenance of vehicles around the base. According to the Site Summary Report, it was common procedure to dispose of these materials by dumping them on the ground, burying them, or pouring them down the storm drains.

Appendices A-2 through A-5 show that most of the sites show evidence of groundwater contamination, and at least 12 of the sites have signs of surface water and sediment contamination.

Based on these matrices, Baker developed a list of 5 potential OUs, which are presented in Table 3-2. Figure 3-2 shows the locations of these potential OUs.

TABLE 3-2

POTENTIAL OPERABLE UNITS BASED ON MATERIALS DISPOSED AND CONTAMINANTS DETECTED AT SITES

Operable Unit No.	Site No(s).	Name	Materials Disposed	Contaminants Detected			
				Groundwater	Surface Water	Soil	Sediment
1*	21	**Transformer Storage Lot 140**	Pesticides, PCBs, Transformer Oil	O&G, Herbicides	–	Pesticides, Herbicides	–
	24	Industrial Area Fly Ash Dump	Solvents, WTP-STP Sludge	Cr, Pb, Benzene, Chloroform	Pb	--	As, Cd, Cr, Cu, Pb, Ni, Zn
	78	**Hadnot Point Industrial Area**	Solvents	Benzene, VOC Toluene, Cr, Fe, Pb, Mn O&G	–	--	--
2	1	**French Creek Liquids Disposal Area**	Waste Battery Acid, POL	Cd, Cr, Pb, O&G	Cr, O&G, Phenol	--	Cr, O&G, Phenol
	73	**Courthouse Bay Liquids Disposal Area**	Waste Battery Acid, POL, Waste Oils	Cd, Cr, Pb, O&G, Phenol	Cu	--	Cd, Cr, Pb
3	2	**Former Nursery/Day Care Center**	Pesticides, DDT	VOC, Pesticides	Pesticides	Pesticides	Pesticides
	6	**Storage Lots 201 and 203**	DDT, PCBs	VOC	–	Pesticides	Pesticides
	69	**Rifle Range Chemical Dump**	Pesticides, DDT, PCBs	VOC	VOC, BHC	--	Pesticides
	74	**Mess Hall Grease Disposal Area**	Pesticides, PCBs	Aldrin	–	Pesticides	–
4	9	**Firefighting Training Pit at Piney Green Road**	JP-4, JP-5, Waste Oils	Cr, Pb	–	–	–
	16	**Montford Point Burn Dump**	Waste Oils, Solid Waste	–	–	--	–
	28	**Hadnot Point Burn Dump**	Solid Waste, Industrial Waste	As, Cr (+6), Cr, Pb, Ni, VOC, Pesticides, O&G	BHC	–	As, Cd, Cr, Ni, Se, Zn, Pesticides, O&G
	30	**Sneads Ferry Road Fuel Tank Sludge Area**	POL, Solvents, Fuel Tank Sludges	Pb, O&G	--	--	O&G
	35	**Camp Geiger Area Fuel Farm**	POL, Mogas	Pb, VOC, O&G, TCE	–	Pb, O&G	Pb, O&G
	36	**Camp Geiger Area Dump Near Sewage Treatment Plant**	Waste Oils, Solvents, Industrial Waste	Cd, Cr, Pb, O&G, Phenol	Pb	--	Cr, Pb, O&G, Phenol
	41	**Camp Geiger Dump Near Former Trailer Park**	POL, Waste Oils, Solvents, Solid Waste, Industrial Waste	Cd, Cr(+6), Cr, Pb, O&G, Phenol	VOC, Aldrin, O&G, Phenol	--	Cr(+6), Cr, Pb, 2,4,6-TNT, O&G, Phenol
	86	**Tank Area AS419 - AS421**	POL, Waste Oils, Solvents	TCE	–	–	–
5	48	**MCAS New River Mercury Dump Site**	Mercury	–	–	Mercury	–

*Previously designated as Operable Unit No. 1.

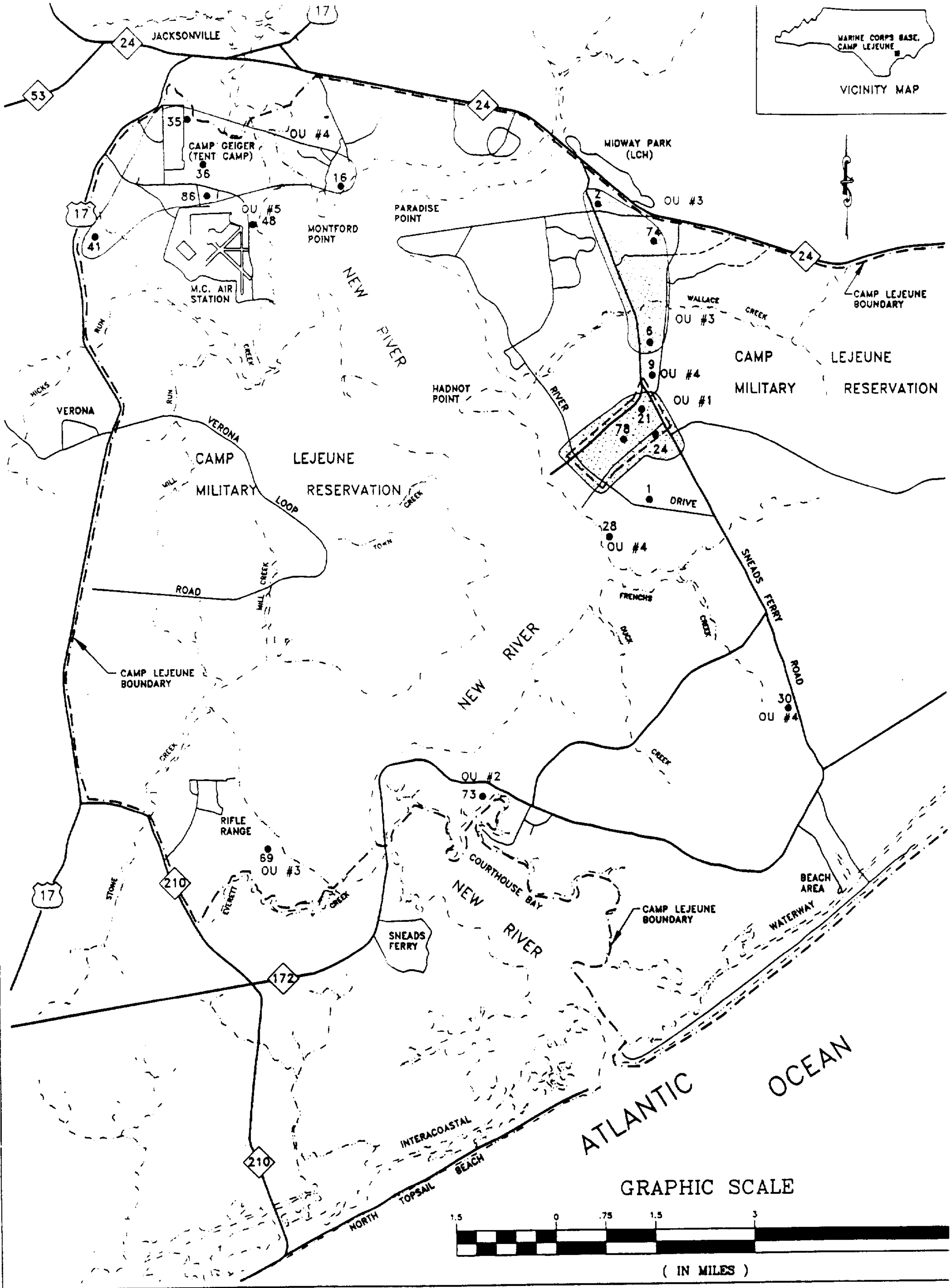

FIGURE 3-2
POTENTIAL OPERABLE UNITS BASED ON MATERIALS
DISPOSED AND CONTAMINANTS DETECTED AT SITES

3.2.1 Advantages of Operable Units Based on Material Disposed and Contaminants Detected

Operable units based on this method would have the following advantages:

- Sites with potentially similar waste/contaminant characteristics could be investigated concurrently.
- Sites could be remediated concurrently.
- Sites could potentially be remediated with similar treatment technologies.

3.2.2 Disadvantages of Operable Units Based on Material Disposed and Contaminants Detected

Operable units based on this method would have the following disadvantages:

- Sites could be located far from each other and in different drainage basins. For example, Site Nos. 1 and 73, which were used for similar disposal activities, and have similar contaminants, are located approximately five miles apart.
- The determination of the OUs would be based on available information on waste and contaminant characteristics which may not be entirely accurate. It is possible that two or more sites do not exhibit similar types of environmental problems even though they are reported to have similar waste histories. This could defeat the purpose of studying these sites together in an attempt to use similar treatment methods and technologies.

3.3 Individual Site Operable Units

The third proposed method of determining OUs for the 18 RI/FS sites is based on assigning each site as an individual OU. Using this method, each site would be designated as a separate OU, with the exception of Site Nos. 21, 24 and 78, which have already been designated as OU No. 1, and Site Nos. 6 and 9, which are being studied together at present.

This proposed method of determining OUs resulted in a list of 15 potential OUs, which are presented in Table 3-3. Figure 3-3 shows the location of these potential OUs.

3.3.1 Advantages of Individual Site Operable Units

Operable units based on this method would have the following advantages:

- Separate RODs could be issued for each site, resulting in remedial action being implemented at more sensitive or problematic sites on a fast-track basis.

- It may be easier to prioritize the sites in terms of specific requirements, such as environmental impacts, budget constraints, etc.

- Concurrent RI/FS activities could be conducted at multiple sites, even though they are considered or listed as two separate OUs.

3.3.2 Disadvantages of Individual Site Operable Units

Operable units based on this method would have the following disadvantage:

- The larger number of OUs, when compared to other proposed prioritization methods, may result in increased engineering and program administration costs associated with the greater number of documents which would be required (RI/FS studies, RODs, remedial design packages), and the amount of coordination, number of meetings, etc. that would be required.

- Site Nos. 21, 24, and 78 have already been grouped together and designated as OU No. 1.

3.4 Watershed Based Operable Units

The last proposed method of determining OUs for the 18 RI/FS sites is based on determining common watersheds. Sites on which surface water drainage discharges to the same drainage basin or stream would be grouped together as on OU.

TABLE 3-3

POTENTIAL INDIVIDUAL SITE OPERABLE UNITS

Operable Unit No.	Site No.	Site Description
1*	21	Transformer Storage Lot 140
	24	Industrial Area Fly Ash Dump
	78	Hadnot Point Industrial Area
2	6	Storage Lots 201 and 203
	9	Firefighting Training Pit at Piney Green Road
3	1	French Creek Liquids Disposal Area
4	2	Former Nursery/Day-care Center
5	16	Montford Point Burn Dump (1958-1972)
6	28	Hadnot Point Burn Dump
7	30	Sneads Ferry Road - Fuel Tank Sludge Area
8	35	Camp Geiger Area Fuel Farm
9	36	Camp Geiger Area Dump Near Sewage Treatment Plant
10	41	Camp Geiger Dump Near Former Trailer Park
11	48	MCAS New River Mercury Dump Site
12	69	Rifle Range Chemical Dump
13	73	Courthouse Bay Liquids Disposal Area
14	74	Mess Hall Grease Disposal Area
15	86	Tank Area AS419 - AS421

* Previously designated as Operable Unit No. 1

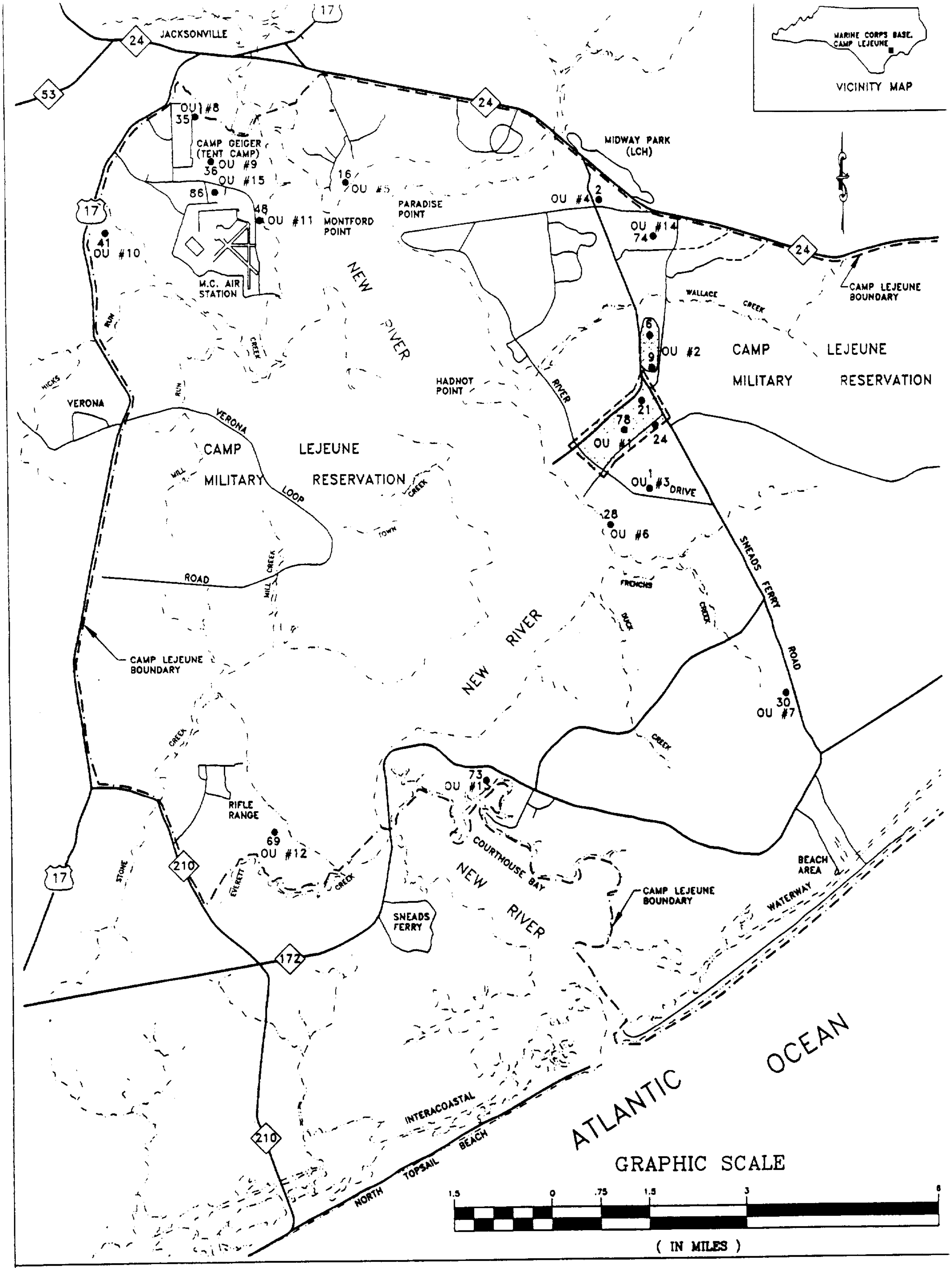

FIGURE 3-3
POTENTIAL INDIVIDUAL SITE OPERABLE UNITS

Using this proposed method to determine OUs, a list of nine potential OUs was developed, which are presented in Table 3-4. Figure 3-4 shows the locations of these potential OUs.

3.4.1 Advantages of Watershed Based Operable Units

Operable units based on this method would have the following advantages:

- Sites could be investigated concurrently, since contaminant migration may impact common aquifers or surface waters.

- Sites with contamination affecting the same local groundwater aquifer or stream could potentially be remediated together, thereby potentially minimizing costs and time.

3.4.2 Disadvantages of Watershed Based Operable Units

Operable units based on this method would have the following disadvantages:

- Some sites within the same drainage basin may not have common waste or contaminant characteristics with other sites. This may make it more difficult to remediate the OU because multiple remediation techniques may be necessary.

- Sites within the same drainage basin could still be located far from each other, which may make remediation activities more difficult to plan and implement. For example, Site Nos. 16 and 48, which are both located near the New River, are separated by the river and are more than four miles apart by road.

TABLE 3-4

POTENTIAL WATERSHED BASED OPERABLE UNITS

Operable Unit No.	Site No(s).	Name	Watershed
1	21 24 78	Transformer Storage Lot 140 Industrial Area Fly Ash Dump Hadnot Point Industrial Area	Gogdels Creek to French Creek to New River
2	1 28	French Creek Liquids Disposal Area Hadnot Point Burn Dump	Gogdels Creek to French Creek to New River
3	2	Former Nursery/Day Care Center	Overs Creek to Northeast Creek
4	6 9 74	Storage Lots 201 & 203 Firefighting Training Pit at Piney Green Road Mess Hall Grease Disposal Area	Wallace Creek Bearhead Creek
5	16 48	Montford Point Burn Dump MCAS New River Mercury Dump Site	New River
6	35 36 41 86	Camp Geiger Area Fuel Farm Camp Geiger Area Dump near Sewage Treatment Plant Camp Geiger Dump near Former Trailer Park Tank Areas AS419 - AS421	Brinson Creek Tank Creek
7	30	Sneads Ferry Road Fuel Tank Sludge Area	French Creek
8	69	Rifle Range Chemical Dump	New River
9	73	Courthouse Bay Liquids Disposal Area	New River

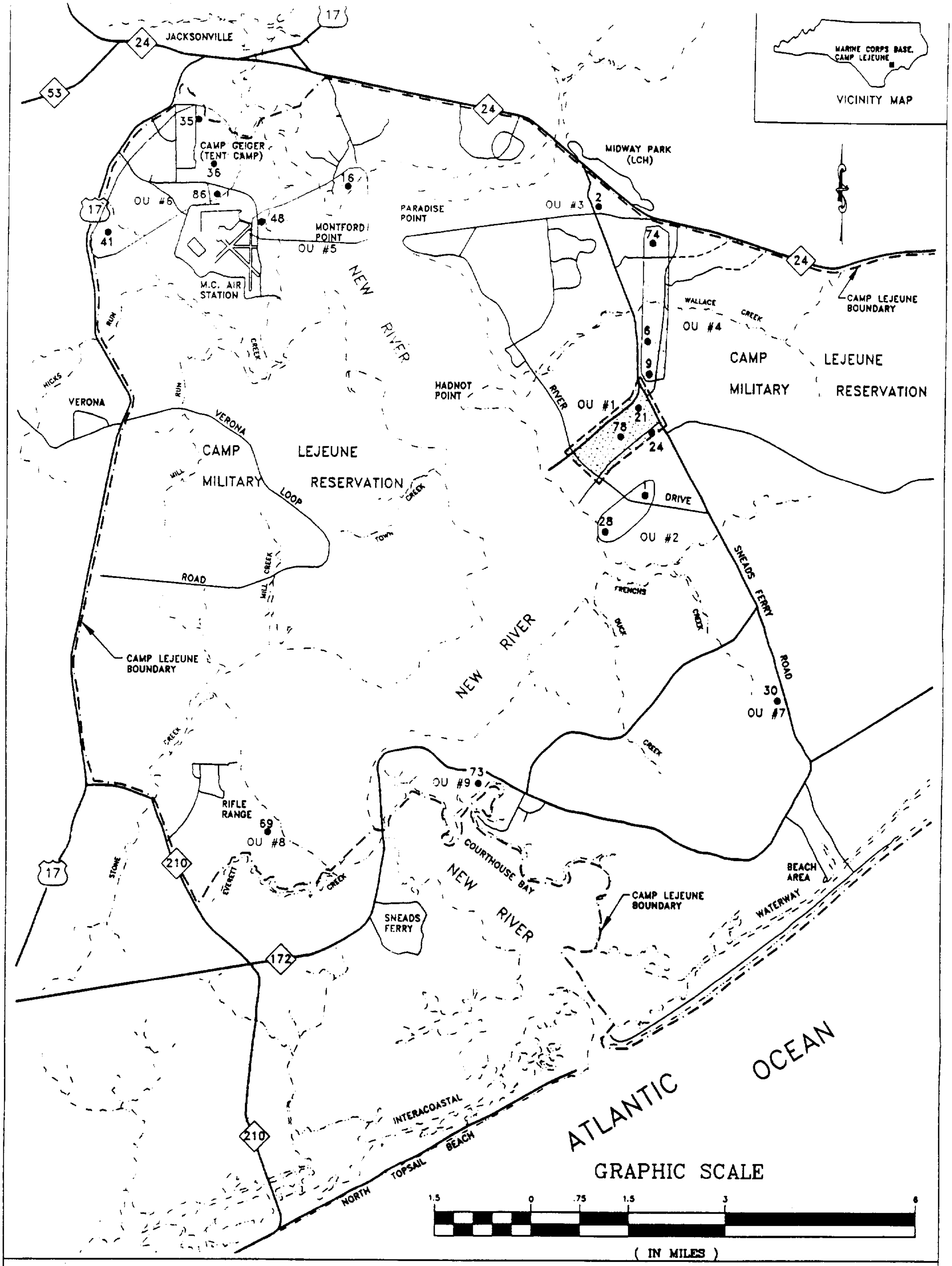

FIGURE 3-4
POTENTIAL WATERSHED BASED ON OPERABLE UNITS

4.0 SUMMARY OF SELECTED OF OPERABLE UNITS

In accordance with Task 8 of CTO 0086, issued by LANTDIV, Baker has made a preliminary prioritization of the OUs for the 18 RI/FS sites at Marine Corps Base Camp Lejeune, North Carolina. This prioritization was based on a review of existing information on the sites and is intended to fulfill USEPA's requirements for remediating sites in terms of Operable Units.

Baker accomplished this task by initially considering four options for prioritizing the sites: 1) geography (relative locations of the sites), 2) materials disposed and contaminants detected at the sites, 3) separate OU for each site, and 4) sites in common drainage areas.

After developing and reviewing the various matrices and tables developed by examining the four proposed prioritizing options, Baker has determined that there are significant disadvantages associated with each of the options which precludes any one of them as being the clearly superior prioritization option. However, we did note some similarities in the four potential prioritization methods. Most obvious is that some of the sites which are located near each other are also in the same drainage basin, and in one case (Site Nos. 35, 36, 41, and 86) have common waste and contaminant characteristics. In addition, this prioritization method confirmed that a number of the sites have unique waste characteristics, or other factors, which warrant individual investigation. Finally, Site Nos. 21, 24, and 78 have already been designed as OU No. 1, and RI/FS Project Plans are being developed for Site Nos. 6, 9, 48, and 69.

Based on our review of these items, Baker has concluded that a more viable alternative is to base the OU prioritization on a set of criteria which take into account the similarities of some of the sites, and the unique characteristics of other sites. This method of prioritization would allow more flexibility in defining the OU's based on a number of criteria, as opposed to trying to group sites according to one criteria.

Therefore, the recommended OUs are based on prioritizing the sites according to the following criteria:

- Sites previously designated as OUs by LANTDIV and/or USEPA.
- Sites which are currently being considered for immediate RI/FS activities.
- Sites which are remotely located and/or have unique site characteristics.

- Sites which are located near each other and have one or more common waste or contaminant characteristics.

- Sites which are located in the same watershed and/or have the same ecology.

Table 4-1 presents the recommended OUs based the above criteria. The prioritization resulted in nine potential OUs. As additional information on the sites becomes available, the listed criteria for determining the OUs can be modified. The recommended OUs are shown on Figure 4-1.

TABLE 4-1

RECOMMENDED OPERABLE UNITS FOR MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA

Operable Unit No.	Site No(s).	Name	Primary Reasons for OU Selection
1	21, 24, 78	Hadnot Point Industrial Area	Previously designated as Operable Unit No. 1.
2	6	Storage Lots 201 and 203	Sites are located near each other.
	9	Firefighting Training Pit at Piney Green Road	Sites are currently undergoing RI/FS activities (development of RI/FS Project Plans).
3	48	MCAS New River Mercury Dump Site	Unique characteristics of the site involving the disposal of mercury, which is highly toxic and bioaccumulates.
4	69	Rifle Range Chemical Dump	Unique characteristics of the site involving the disposal of chemical wastes generated on the base.
5	2	Former Nursery/Day Care Center	Similar characteristics of materials disposed (pesticides).
	74	Mess Hall Grease Disposal Area	Sites are located near each other.
6	35	Camp Geiger Area Fuel Farm	Similar characteristics of materials disposed (POL, waste oils, solvents) and contaminants detected (metals, VOCs, O&G). Sites are located in the Brinson Creek and Tank Creek watershed.
	36	Camp Geiger Area Dump near Sewage Treatment Plant	
	41	Camp Geiger Dump near Former Trailer Park	
	86	Tank Area AS419 - AS421	
7	1	French Creek Liquids Disposal Area	Sites are located near each other and are located in the French Creek watershed. Similar contaminants detected (metals, O&G).
	28	Hadnot Point Burn Dump	
	30	Sneads Ferry Road Fuel Tank Sludge Area	
8	16	Montford Point Burn Dump	Isolated site which requires additional site investigation.
9	73	Courthouse Bay Liquids Disposal Area	Isolated site.

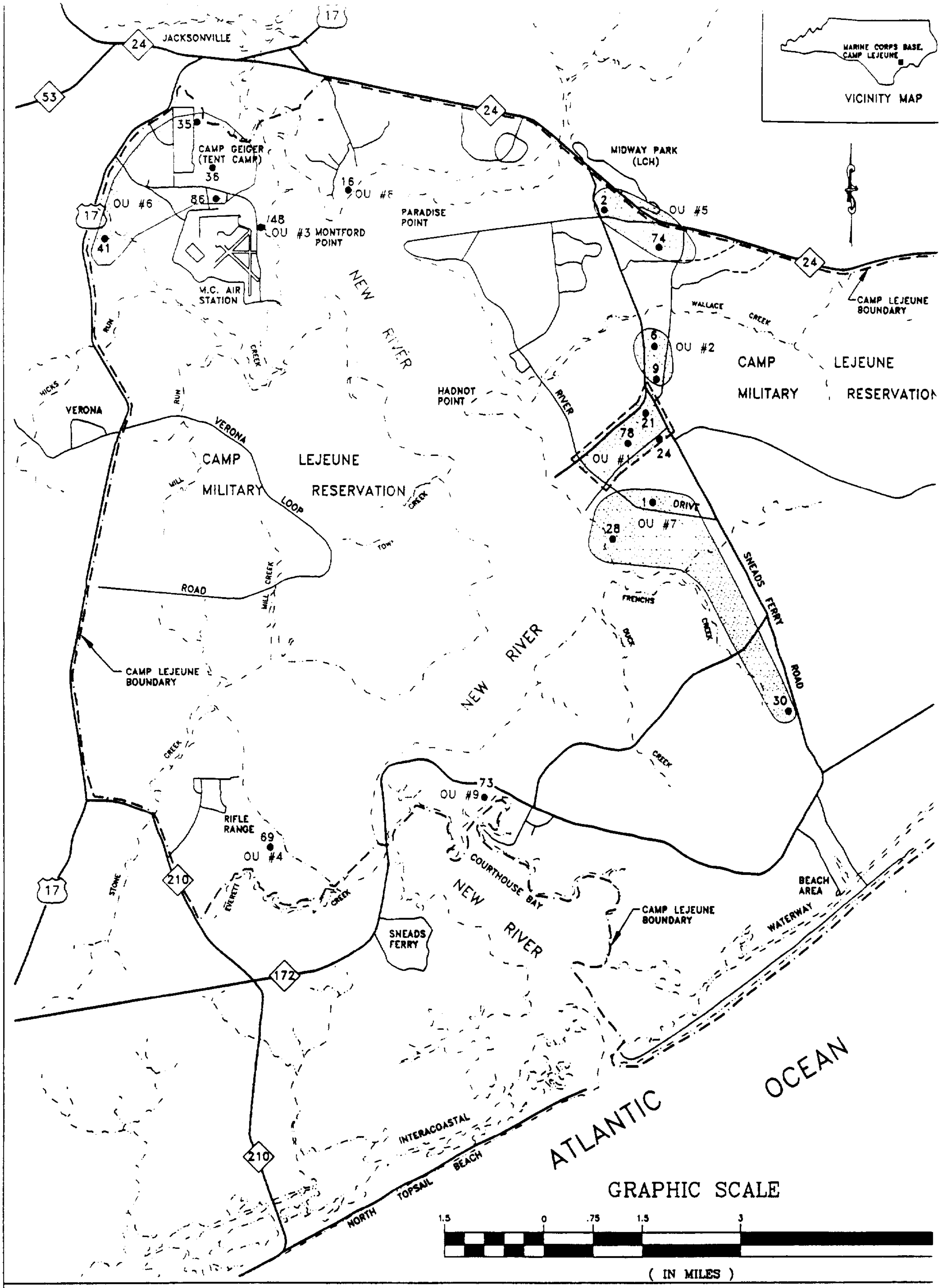

FIGURE 4-1
RECOMMENDED OPERABLE UNITS FOR RI/FS ACTIVITIES
MCB CAMP LEJEUNE, NORTH CAROLINA

lo. 19086
t: CAMP LeJeune - OPERABLE UNITS
ATERIALS DISPOSED AT
EACH SITE
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Drawing No. ______
uted by DPJ Checked By RPW Date 3·16·92

S.O. No. ______
Subject: ______
Sheet No. ______ of ______
Drawing No. ______
Computed by ______ Checked By ______ Date ______

APPENDIX A-

SITE	LOCATION		MATERIALS DISPOSED																					
DESCRIPTION	S→N	W→E	WASTE BATTERY ACID	POL	PESTICIDES	METALS	DDT	PCB	JP-4 JP-5	WASTE OILS	ASBESTOS	TRANSFORMER OIL	SOLVENTS	WTP STP SLUDGE	SOLID WASTE GARBAGE	INDUS. WASTE	FUEL TANK SLUDGES	MOGAS	MIREX	ORDNANCE	MERCURY	CHEM AGENT TEST KITS	FLY ASH & CINDERS	MA TH
FRENCH CREEK LIQUIDS DISPOSAL AREA	37	87	X	X		X																		
FORMER NURSERY DAY-CARE CENTER	44	85			X		X																	X
STORAGE LOTS 201 & 203	41	87				X	X	X																
FIREFIGHTING TRAINING PIT AT PINEY GREEN RD	40	87				X			X	X			X											
MONTFORD POINT BURN DUMP	45	79								X	X				X									
TRANSFORMER STORAGE LOT 140	39	86					X	X				X												
INDUSTRIAL AREA FLY ASH DUMP	38	87				X							X	X									X	
HADNOT POINT BURN DUMP	36	85				X									X	X								
SNEADS FERRY ROAD - FUEL TANK SLUDGE AREA	32	90		X									X				X							
CAMP GEIGER AREA FUEL FARM	46	76		X														X						
CAMP GEIGER AREA DUMP NEAR STP	46	76								X			X	X	X	X								
CAMP GEIGER DUMP NEAR FORMER TRAILER ~~PK~~	44	73		X						X			X		X	X			X	X				
MCAS NEW RIVER MERCURY DUMP SITE	44	77																			X			
RIFLE RANGE CHEMICAL DUMP	29	77			X		X	X					X									X		X
COURTHOUSE BAY LIQUIDS DISPOSAL	30	82	X	X						X														
MESS HALL GREASE DISPOSAL AREA	43	86			X			X							X									
HADNOT POINT INDUSTRIAL AREA #9, 21, 24	39	86											X											

'86 -56
·Lejeune - Operable Units Sheet No. ______ of ______
(DWATER
NTS DETECTED Drawing No. ______
DPS Checked By RPW Date 3·18·92

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Subject: ______
Sheet No. ______ of ______
Drawing No. ______
Computed by ______ Checked By ______ Date ______

APPENDIX A-2

E	METALS									VOC				①	②	③	④	⑤		⑥		ORGANOCHLORINE PESTICIDES (OCP)											ORGANO HERBI	CHI CID
IPTION	As	Cd	Cr+6	Cr T	Cu	Pb	Ni	Se	Zn	ACROLEIN	BENZENE	CHLOROBENZENE	CHLOROFORM	1,2 DCE	1,1 DCE	T,1,2 DCE	1,2 DCP	ETHYL B	Methylene Chloride	1,1,1 TCE	TOLUENE	ALDRIN	BHC	CHLORDANE	DDD	DDE	DDT	DIELDRIN	ENDRIN	HEPTACHLOR	O&G	TOTAL PHENOLS	2,4,D	2,4,5-T
CREEK XSPOSAL AREA		X		X		X																									X			
NURSERY ZE CENTER																		X							X	X	X							
GE LOTS 203											X																							
NTING PIT AT REEN RD				X		X																									X	X		
ORD POINT DUMP																																		
FORMER E LOT 140																															X		X	
TRIAL AREA H DUMP				X		X					X		X																					
T POINT DUMP	X		X	X		X	X									X									X	X		X			X			
S FERRY EL TANK SE AREA						X																									X			
GEIGER UEL FARM						X					X																				X			
GEIGER DUMP NEAR STP		X		X		X																									X	X		
GEIGER NEAR TRAILER PK		X	X	X		X																									X	X		
NEW RIVER Y DUMP SITE																																		
RANGE AL DUMP											X	X	X	X	X	X			X															
OUSE BAY DISPOSAL		X		X		X																									X	X		
ALL GREASE AL AREA																						X												
T POINT TRIAL AREA 1,24)																																		

① 1,2 DICHLOROETHANE
② 1,1 DICHLOROETHYLENE
③ T-1,2 DICHLOROETHENE
④ 1,2 DICHLOROPROPANE
⑤ ETHYLBENZENE
⑥ 1,1,1 TRICHLOROETHANE

MP LEJEUNE - OPERABLE UNITS
FACE WATER
INANTS DETECTED

DPJ Checked By RPW

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Drawing No. ______
Date 3·18·92

Baker

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Subject: ______

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Drawing No. ______
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Baker

APPENDIX A-3

TE	METALS									VOC				①	②	③	④	⑤		⑥		ORGANOCHLORINE PESTICIDES (OCP)									O&G	TOTAL PHE-NOLS	ORGANIC HERBI	
CRIPTION	As	Cd	Cr^{+6}	Cr^T	Cu	Pb	Ni	Se	Zn	ACRO-LEIN	BEN-ZENE	CHLORO BENZENE	CHLORO FORM	1,2 DCE	1,1 DCE	T, 1,2 DCE	1,2 DCP	ETHYL B	Methylene Chloride	1,1,1 TCE	TOLU ENE	ALD-RIN	BHC	CHLOR DANE	DDD	DDE	DDT	DIEL DRIN	ENDRIN	HEP TA CHLOR			2,4,D	2,4
KN CREEK S DISPOSAL AREA				X																											X	X		
ER NURSERY ARE CENTER																									X		X							
AGE LOTS & 203																																		
FIGHTING NG PIT AT GREEN RD																																		
FORD POINT N. DUMP																																		
SFORMER AGE LOT 140																																		
USTRIAL AREA ASH DUMP						X																												
IOT POINT N DUMP																							X											
DS FERRY EL TANK DGE AREA																																		
P GEIGER FUEL FARM																																		
P GEIGER DUMP NEAR STP						X																												
P GEIGER NEAR R TRAILER PK																				X			X									X	X		
NEW RIVER LEY DUMP SITE																																		
E RANGE ICAL DUMP																X			X				X											
HOUSE BAY S DISPOSAL					X																													
HALL GREASE SAL AREA																																		
OT POINT STRIAL AREA 21, 24)																																		

① 1,2 DICHLOROETHANE
② 1,1 DICHLOROETHYLENE
③ T-1,2 DICHLOROETHENE
④ 1,2 DICHLOROPROPANE
⑤ ETHYLBENZENE
⑥ 1,1,1 TRICHLOROETHANE

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ject: CAMP LEJEUNE - OPERABLE UNITS
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NTAMINANTS DETECTED Drawing No. ____
nputed by DPJ Checked By RPW Date 3·18·92

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Subject: ____
Sheet No. ____ of ____
Drawing No. ____
Computed by ____ Checked By ____ Date ____

Baker

APPENDIX /

SITE	METALS									VOC				①	②	③	④	⑤		⑥		ORGANOCHLORINE PESTICIDES (OCP)										
DESCRIPTION	As	Cd	Cr^{+6}	Cr^{T}	Cu	Pb	Ni	Se	Zn	ACROLEIN	BENZENE	CHLOROBENZENE	CHLOROFORM	1,2 DCE	1,1 DCE	T,1,2 DCE	1,2 DCP	ETHYL B	Methylene Chloride	1,1,1 TCE	TOLUENE	ALDRIN	BHC	CHLORDANE	DDD	DDE	DDT	DIELDRIN	ENDRIN	HEPTACHLOR	O&G	TOTAL PHENOLS
FRENCH CREEK LIQUIDS DISPOSAL AREA				X																											X	X
FORMER NURSERY DAY-CARE CENTER																									X	X	X					
STORAGE LOTS 201 & 203																										X	X					
FIREFIGHTING TRAINING PIT AT PINEY GREEN RD																																
MONTFORD POINT BURN DUMP																																
TRANSFORMER STORAGE LOT 140																																
INDUSTRIAL AREA FLY ASH DUMP	X	X		X	X	X	X		X																							
HADNOT POINT BURN DUMP	X	X		X			X	X	X															X	X	X					X	
SNEADS FERRY RD FUEL TANK SLUDGE AREA																															X	
CAMP GEIGER AREA FUEL FARM						X																									X	
CAMP GEIGER AREA DUMP NEAR STP				X		X																									X	X
CAMP GEIGER DUMP NEAR FORMER TRAILER PK			X	X		X		& 2.4, 6 TNT																							X	X
MCAS NEW RIVER MERCURY DUMP SITE		MERCURY																														
RIFLE RANGE CHEMICAL DUMP																									X	X						
COURTHOUSE BAY LIQUIDS DISPOSAL		X		X		X																									X	X
MESS HALL GREASE DISPOSAL AREA																																
HADNOT POINT INDUSTRIAL AREA (9, 21, 24)																																

① 1,2 DICHLOROETHANE
② 1,1 DICHLOROETHYLENE
③ T-1,2 DICHLOROETHENE
④ 1,2 DICHLOROPROPANE
⑤ ETHYLBENZENE
⑥ 1,1,1 TRICHLOROETHANE

INVENTORY OF STORM DRAIN BYPASSES, OIL WATER SEPARATORS & GRIT CHAMBERS

12 85

LOCATION	STRUCTURE	NOM	QUA	COMMENTS
AS-114	NO #	1-G C & O W S	1	OLD TYPE
AS-118	NO #	G C & O W S	1	OLD TYPE REMOVED
AS-118	NO #	G C	1	
AS-118	NO #	S D B	1	
AS-119	NO #	G C & O W S	1	OLD TYPE
AS-121/AS-129	NO #	G C	1	WASH RACK
AS-123	NO #	S D B	1	SPEC SERV/WASH RACK
AS-123	NO #	O W S	1	SPEC SERV/WASH RACK
AS-123	NO #	G C	4	SPEC SERV/WASH RACK
AS-143	NO #	G C	1	NEW BLDG/BY FUEL FAR
AS-143	NO #	O W S	1	NEW BLDG/BY FUEL FAR
AS-143	NO #	O W S	1	REFUELER AREA
AS-4158	NO #	G C	1	
AS-4158	NO #	O W S	1	OLD TYPE
AS-4159	NO #	O W S	1	OLD TYPE
AS-4135	NO #	G C	1	

MORE?

INVENTORY OF STORM DRAIN BYPASSES, OIL WATER SEPARATORS & GRIT CHAMBERS

8 93

LOCATION	STRUCTURE	NOM	QUA	COMMENTS
AS-4135	NO #	O W S	1	
AS-4108	NO #	G C	1	
AS-4108	NO #	O W S	1	
AS-4108	NO #	S D B	1	
-4105	NO #	G C	2	
[illegible]	NO #	S D B	1	
	NO #	O W S	1	

LOCATION	STRUCTURE	NOM	QUA	COMMENTS
AS-504/SAS-558	NO #	O W S	1	2 95
AS-3504	NO #	G C	2	
AS-3504	NO #	S D B	1	
AS-3504	NO #	O W S	1	
AS-509	NO #	O W S	1	
AS-3504	NO #	SWST	1	
			===	
			45	

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TC 173 o/w/s

2/14/89

PAGE 1

INVENTORY OF STORM DRAIN BYPASSES, OIL WATER SEPARATORS & GRIT CHAMBERS

LOCATION	STRUCTURE	NOM	QUA	COMMENTS
NH-118	NO #	G C	1	1 96
NH-118	NO #	S D B	1	
NH-118	NO #	O W S	1	
			===	
			3	

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LOCATION              STRUCTURE           NOM                 QUA   COMMENTS

GOLF C-1916           S-657               G C                   1           47        D
GOLF C-1916           S-658               O W S                 1
                                                              ===
                                                                2

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 2/14/89                                                                           PAGE    1

                        INVENTORY OF STORM DRAIN BYPASSES, OIL WATER SEPARATORS &
                                               GRIT CHAMBERS

LOCATION              STRUCTURE           NOM                 QUA   COMMENTS

A-2                   NO #                G C                   2       17     114
A-2                   NO #                S D B                 1
A-2                   NO #                O W S                 1
A-8                   NO #                G C                   1
A-8                   NO #                O W S                 1
A-11 & 9              NO #                G C                   2
A-11 & 9              NO #                O W S                 1
A-47                  NO #                G C                  10
A-47                  NO #                S D B                 1
A-47/A-42             NO #                O W S                 2   1-W/O# 1-A-42
A-47                  NO #                G C                   2   FRONT END LOADER ✓
A-3                   NO #                SWST                  2
A-47                  NO #                SWST                  1
                                                              ===
                                                               27

ENTER COMMAND >
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INVENTORY OF STORM DRAIN BYPASSES, OIL WATER SEPARATORS & GRIT CHAMBERS

7

LOCATION	STRUCTURE	NOM	QUA	COMMENTS
✓ FC-100 (ON LEFT SIDE)	SFC-104	G C	1	FRONT END LOAD
✓ FC-100 (ON LEFT SIDE)	SFC-104	O W S	1	
✓ FC-100 (ON LEFT SIDE)	SFC-104	S D B (NEW TYPE)	1	
✓ FC-100 (ON RIGHT SIDE)	SFC-110	G C	1	
✓ FC-100 (ON RIGHT SIDE)	SFC-108	O W S	1	
✓ FC-100 (ON RIGHT SIDE)	NO #	S D B	1	
✓ FC-120	SFC-123	G C	1	
✓ FC-120	SFC-121	O W S	1	
✓ FC-120	NO #	S D B (MAN HOLE)	1	
✓ FC-200 (L SIDE)	SFC-219	G C	1	
✓ FC-200 (R SIDE OF BLDG)	SFC-220	G C	1	
✓ FC-200 (R SIDE OF BLDG)	SFC-215	O W S	1	
✓ FC-200 (R SIDE OF BLDG)	NO #	S D B	1	
✓ FC-241	SFC-244	G C	1	
✓ FC-241	SFC-242	O W S (MAN HOLE)	1	
✓ FC-251	NO #	G C	1	
✓ FC-251	NO #	O W S (MAN HOLE)	1	
✓ MORE?				
✓ FC-253	No #	OWS	7	

INVENTORY OF STORM DRAIN BYPASSES, OIL WATER SEPARATORS & GRIT CHAMBERS

9

LOCATION	STRUCTURE	NOM	QUA	COMMENTS
✓ FC 45	No #	OWS	1	
✓ FC-255	NO #	G C	1	
✓ FC-255	NO #	O W S	1	
✓ FC-263	NO #	G C	1	
✓ FC-263	SFC-268	O W S	1	
✓ FC-270	NO #	G C	1	
✓ FC-270	NO#	O W S	1	
✓ FC-40	NO# VISIBLE	G C	1	
✓ FC-40	SFC-43	O W S	1	SKIM #2
✓ FC-739	S-808	G C	1	
✓ FC-739	NO #	S D B	1	
✓ FC-739 (BEHIND BLDG 816)	SGP-29	G C	1	
✓ FC-739 (BEHIND BLDG 816)	SGP-27	O W S	1	
✓ FC-739 (BEHIND BLDG 816)	SGP-30	O W S	1	

68 dwy
8 SWS
96 GC
34 SDB

SDB - Storm
GC - Grit

LOCATION	STRUCTURE	NOM	QUA	COMMENTS
HP-100	SHP-103	G C	4	
HP-100	NO #	O W S (MAN HOLE)	1	
HP-904 (BEHIND 913)	S-946	G C	6	
HP-904 (BEHIND 913)	NO #	S D B	1	
HP-904 (BEHIND 913)	S-948	O W S	1	
HP-1104 (BEHIND 1114)	S-1129	G C	1	
HP-1104 (BEHIND 1114)	NO #	S D B	1	
HP-1104 (BEHIND 1114)	S-1132	O W S	1	
HP-1104 (BEHIND 1105)	S-1126	G C	1	
HP-1104 (BEHIND 1105)	NO #	S D B	1	
HP-1104 (BEHIND 1105)	S-1133	O W S	1	
HP-1106 (BEHIND 1107)	S-1125	G C	2	
HP-1106 (BEHIND 1107)	NO #	S D B	1	
HP-1106 (BEHIND 1107)	S-1128	O W S	1	
HP-1203 (BEHIND 1204)	S-1216	G C	1	
HP-1203 (BEHIND 1204)	NO #	S D B	1	
HP-1203 (BEHIND 1204)	S-1218	O W S	1	
HP-1205 (BEHIND 1206)	S-1221	G C	1	

MORE?

16
6
22

INVENTORY OF STORM DRAIN BYPASSES, OIL WATER SEPARATORS & GRIT CHAMBERS

LOCATION	STRUCTURE	NOM	QUA	COMMENTS
HP-1205 (BEHIND 1206)	NO #	S D B	1	
HP-1205 (BEHIND 1206)	S-1217	O W S	1	
HP-1309 (BEHIND 1310)	S-1313	G C	1	
HP-1309 (BEHIND 1310)	NO #	S D B	1	
HP-1322	S-1322	O W S	1	
HP-1405 (BEHIND 1406)	S-1422	G C	1	
HP-1405 (BEHIND 1406)	NO #	S D B	1	
HP-1405 (BEHIND 1406)	S-1426	O W S	1	
HP-1407 (BEHIND 1408)	S-1421	G C	1	
HP-1407 (BEHIND 1408)	NO #	S D B	1	
HP-1407 (BEHIND 1408)	S-1424	O W S	1	
HP-1450	NO #	G C	1	
HP-1450	NO #	O W S (MAN HOLE)	1	
HP-1450 (BEHIND 1425)	NO #	G C (FRONT END LOADER)	1	
HP-1450 (BEHIND 1425)	NO #	O W S (NEW TYPE)	1	
HP-1502	S-1510	G C	1	
HP-1502	NO #	O W S (OLD)	1	FOR DRAIN IN BLDG

6

			QUA	COMMENTS
HP-1505 (BEHIND 1506)	S-1521	G C	1	
HP-1505 (BEHIND 1506)	NO #	S D B	1	
HP-1505 (BEHIND 1506)	S-1520	O W S	1	
HP-1601 (BEHIND 1607)	S-1608	G C	1	
HP-1601 (BEHIND 1607)	NO #	S D B	1	
HP-1601 (BEHIND 1607)	S-1622	O W S	1	
HP-1604 (BEHIND 1605)	S-1618	G C	1	
HP-1604 (BEHIND 1605)	NO #	S D B	1	
HP-1604 (BEHIND 1605)	S-1619	O W S	1	
HP-1703 (BEHIND 1704)	S-1754	G C	1	
HP-1703 (BEHIND 1709)	NO #	S D B	1	
HP-1703 (BEHIND 1709)	S-1753	O W S	1	
HP-1711	S-1740	G C	2	
HP-1711	NO #	S D B	1	
HP-1711	S-1745	O W S	1	
HP-1755	S-1759	G C	1	
HP-1755	NO #	S D B	1	
HP-1755	S-1768	O W S	1	

MORE?

7
16
23

Storm Water Storage Tank

2/13/89

INVENTORY OF STORM DRAIN BYPASSES, OIL WATER SEPARATORS & GRIT CHAMBERS

LOCATION	STRUCTURE	NOM	QUA	COMMENTS
HP-1750	NO #	G C	3	
HP-1750	NO #	S D B	1	
HP-1750	S-1723	O W S	1	
HP-1775	S-1763	O W S	1	
HP-1775	S-1763	W/G C	1	
HP-1780	S-1782	G C	1	
HP-1780	NO #	S D B	1	
HP-1780	S-1783	O W S	1	
HP-1780	NO #	O W S	2	OLD TYPE
HP-1880	S-1857	G C	8	
HP-1880	S-1857	S D B	1	
HP-1880	S-1859	O W S	1	
HP-1817	NO #	G C /W	1	OLD TYPE
HP-1817	NO #	O W S	1	
HP-1841	S-1843	G C	1	
HP-1854	S-1877	G C	1	FRONT END LOADER ✓
HP-1854	S-1874	O W S	1	BACK OF BLDG
HP-1854	NO #	G C	1	FRONT END LOADER

16

MORE?

```
LOCATIO               STRUCTURE            NOM                     QUA    COMMENTS

HP-1854               NO #                 O W S                     1    FRONT OF BLDG               1)
HP-1750               NO #                 SWST                      1
HP-913                NO #                 SWST                      1
HP-1804               NO #                 SWST                      1
HP 1829                                                            ===
HP 1323                                                             96                          SWST    2)
ENTER COMMAND >
INVALID COMMAND

ENTER COMMAND >
```

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                                                                            QUA     COMMENTS

SPT 32                          SPT-34                    GC                 1
SPT-32                          NO #                      OWS                5
                                                                           ===
                                                                             6

ENTER COMMAND >
```

1

73

WASTE OIL TANK LOCATIONS - MCB CLNC

LOCATION	STRUCTURE	CAPACITY	QTY	AB/BELOW	#/OF/GAL	COMMENTS
CAMP GEIGER	TC 773	500	1	ABOVE	500	6TH MARINES MOTOR T TANK HAS GROUND CONTAMINATION TANK IS NOT BURMED
CAMP GEIGER	TC 774	550	1	BELOW	300	2ND BATTALION 6TH MARINES POC= GYSGT WALLACE EXT 0188/0434 #8
CAMP GEIGER	TC 862 ? 868 Lube Rack	550	1	BELOW	1050	OLD SSS SCHOOL SEE INSP RPT #8 14 UST MOTOR TO TO CAMP J LEVEL INDICATOR DOES NOT WORK NO SPILL SIGN TANK NEED PUMPING
CAMP GEIGER	TC 942	550	1	BELOW	0	SPECIAL SERVICES #8 14 UST TANK NOT USED BLDG USE TO BE MOTOR POOL LEVEL INDICATOR DEFECTIVE
CAMP JOHNSON	M 119/SM 93	274	2	ABOVE	2045	MAINT SEC MOTOR T COMPANY SCHOOLS COMPANY POC SGT MOORE EXT 0710 HW ACCUM SITE CONCRETE PAD WITH BERM
Camp Johnson	M107	550	1	Above		
CAMP JOHNSON	M 171	1000	1	BELOW	0	S4 MAINT OLD SERV STA UST NEEDS SAMPLING #8 14 UST
CAMP JOHNSON	M 202	274	1	ABOVE	725	MCSSS MOTOR SCH COMPANY BESIDE M 256
CAMP JOHNSON	M 326/327	274	1	ABOVE	0	#8 14 UST/TANK IS LOCATED INSIDE FENCE TANK NEEDS TO BE AB OLD KEROSENE TANK
CAMP JOHNSON	M 90	550	1	BELOW	1900	MOTOR T SCH COMPANY #8 14 UST/MAINT SHOP SCHOOLS BN/NEEDS LARGER TANK/POC SSGT HARRIS EXT 0813
COURT HOUSE BAY	A 10	550	1	BELOW	0	AMTRAC SA-26 OIL RACK #8 14 UST/LEVEL INDICATOR BROKE/NEEDS SAMPLING/WORK ORDER TO REMOVE CONTAMINED

MORE?

WASTE OIL TANK LOCATIONS - MCB CLNC

LOCATION	STRUCTURE	CAPACITY	QTY	AB/BELOW	#/OF/GAL	COMMENTS
COURT HOUSE BAY	A 2	550	1	BELOW	0	SOIL MOTOR POOL/TANK BEHIND A 13 STORAGE SHED/#8 14 UST
COURT HOUSE BAY	A 47	1000	1	BELOW	0	AMTRAC BY LUBE RACK #8 14 UST
COURT HOUSE BAY	BB 293	600	1	BELOW	210	5-55 GAL/1 UST/NOT IN USE #8 14 UST/WASTE LEVEL UNK CAN´T OPEN TANK/WORK ORDER NEW CAMP SWEAT/WATER PURI AREA 5 (55) GAL DRUMS
COURT HOUSE BAY	BB 51	600	2	BELOW	3200	ENGINEERING MAINT SHOP HMDO GYSGT LONG/EXT 7233/7528 #8 14 UST/2 UST NEED TO BE AB WITH CONCRETE PAD
COURT HOUSE BAY	BB 71	500	1	BELOW	0	BEHIND AUTO HOBBY SHOP #8 14 UST/TANK NEED REMOVAL REPLACED WITH SMALL AB TANK
FRENCH CREEK	FC 100	600	2	BELOW	1800	SFC-103 LUBE RACK/MSSG 26 #8 14 UST/ TANKS LOCATED AT HW SITE/NEED P & E NEEDS ESTIMATE FOR GRAVEL
FRENCH CREEK	FC 120	600	1	BELOW	1200	#8 14 UST/TANK IS BEHIND SHOP/ LSB 2ND FSSG/NO SPILL SIGN POSTED/EXT 3105
FRENCH CREEK	FC 128	DRUM	5	DRUM	0	NO SIGN POSTED 8TH ENG BULK FUEL OPER 2ND FSSG/LOCATED BY HW SITE
FRENCH CREEK	FC 200	600	2	BELOW	2500	BESIDE WASH RACK SFC-204 SFC-205/8TH ENGR SPT BN/2ND FSSG/LEVEL IDICATOR BROKEN #8 14 UST/2 UST REPLACED WITH 1000 GAL/OR/1 PRIMARY TANK
FRENCH CREEK	FC 230 FC 241	274	1	ABOVE	1100	2ND RADIO BN MOTOR T 2ND FSSR/TANK LOCATED AT HW SITE/CONTAMINATED SOIL NEEDS

MORE?

WASTE OIL TANK LOCATIONS - MCB CLNC

LOCATION	STRUCTURE	CAPACITY		QTY AB/BELOW	#/OF/GAL	COMMENTS
						REMOVAL/WORK ORDER
FRENCH CREEK	FC 251	600	✓	1 BELOW	200	2ND ANGLICO/2ND FORCE RECON/2ND FSSG/DRUM LOCATED HW SITE/#8 14 UST
FRENCH CREEK	FC 255	~~274~~ [illegible]	✓	1 ABOVE	380	H&S BN MOTOR T/2ND FSSG TANK STORED AT HW SITE
FRENCH CREEK	FC 263	600	✓	1 BELOW	0	BEHIND 2ND MED BN GARAGE #8 14 UST/2 UNITS SHARE TANK 2ND SUPPLY BN MT & 2ND MED BN MOTOR T
FRENCH CREEK	FC 270	3000	✓	2 BELOW	2320	LOC FC 270/IN FRONT OF BLDG #8 14 UST
	FC 285			1 [illegible]		
FRENCH CREEK	FC 40	550	✓	1 BELOW	200	LOCATED BY FUEL PUMPS 2ND MAINT BN H&S CO MOTOR T 2ND FSSG/#8 14 UST POC M/GYSGT CREDE/EXT 3945
	FC 45	~~[illegible]~~	✓	1 Below		
GUN POINT	GP 739	~~270~~ 550	✓	1 BELOW	0	SGP-16 LUBE RACK 8TH ENGR SPT BN/2ND FSSG #8 14 UST/LEVEL INDICATOR BROKEN/HMDO SGT RAYSEY EXT 1450
GUN POINT	~~SGP 816~~	~~DRUM~~		~~8 DRUM~~	300	BRIDGE COMPANY 2ND FSSG DRUMS STORED AT HW ACC SITE HMDO SGT THORNELL EXT 3616
HADNOT POINT	HP 100	550	✓	1 BELOW	800	TANK LOCATED AT FUEL ISLAND 8TH MARINES/2ND MARDIV MOTOR T HMDO CAPT ADAMS EXT 3404/3460
	HP 250	[illegible]	1 [illegible]			
HADNOT POINT	HP 1106/1107	550	1 [illegible]	1 BELOW	500	SPECIAL SVCS/#8 14 UST TANK BY WASH RACK HMDO MR SCHMITT EXT 5519
HADNOT POINT	HP 1111	~~DRUM~~		~~1 DRUM~~	100	RSU MOTOR TRANSP SECTION RSU IS A RESERVE UNIT ONLY

MORE?

WASTE OIL TANK LOCATIONS - MCB CLNC

LOCATION	STRUCTURE	CAPACITY	QTY	AB/BELOW	#/OF/GAL	COMMENTS
HADNOT POINT	HP 1114	274	1	ABOVE	0	HERE DURING SUMMER MONTHS DRUM LOCATED BY LUBE RACK HP 1100/DIV REPRO RDS & GDS S-1130 POC MR SWAIN EXT 2636
HADNOT POINT	HP 1205/1206	550	1	BELOW	500	2ND MARINES MOTOR T/2ND MARDIV/LOCATED BY WASH RACK #8 14 UST/EXT 3400
HADNOT POINT	HP 1300	55	2	DRUMS	100	SHOP 53 COLD STORAGE POC MR BECKER EXT 3567 TANKS NOT BERMED/NO SPILL SIGN POSTED
HADNOT POINT	HP 1310	600	1	BELOW	0	2ND FORCE RECON/2ND MARDIV BOAT LOCKER/TANK LOCATED BY WASH RACK/#8 14 UST
	HP 1323		✓ 1	[illegible]		POC SSGT NOUGHTON EXT 3112
HADNOT POINT	HP 1405/1406	600	? 1	BELOW	0	WASH RACK S-1422 HAMMOND ST/#8 14 UST LEVEL INDICATOR BROKEN BLDG IS VACANT/NO SPILL SIGN POSTED
HADNOT POINT	HP 1450	274/500	3	BELOW	1950	(2)=274 & (1) 500 TANKS LOCATED ACROSS FROM FUEL PUMPS/5TH BN 10TH MARINES 2ND MARDIV/#8 14 UST
HADNOT POINT	HP 1502	600	1	BELOW	1900	BASE MT/ELM STREET #8 14 UST/POC MR. CARTER EXT 5375
HADNOT POINT	HP 1506	550	? 1	BELOW	600	TANK LOCATED BY WASH RACK S 1508/3RD BN 2ND MARINES/2ND MARDIV/#8 14 UST POC SGT ROTHERMAL EXT 1052
HADNOT POINT	HP 1601	1000	1	BELOW	2845	"
HADNOT POINT MORE?	HP 1604/1605	550	? 1	BELOW	0	TANK LOCATED BY WASH RACK

WASTE OIL TANK LOCATIONS - MCB CLNC

LOCATION	STRUCTURE	CAPACITY		QTY AB/BELOW	#/OF/GAL	COMMENTS
						S 1618/8TH COM BN/A CO RADIO 2ND FSSG/#8 14 UST/EXT 1764 THIS UNIT DOES NOT HAVE OR GENERATE WASTE OIL
HADNOT POINT	HP 1709	550 ~~150~~		1 ABOVE	700	10TH MARINES REGIMENTAL ENGR/2ND MARDIV/TANK LOCATED BY WASH RACK/S 1154 EXT 2921
~~HADNOT POINT~~	~~HP 1750~~	~~274~~		~~2 BELOW~~	2400	BY LUBE RACK S-1772/3 MAINT PLT/2ND LAV BN/2ND MARDIV/#8 14 UST/ NO SPILL SIGN POSTED
~~HADNOT POINT~~	~~HP 1755~~	~~600~~		~~1 BELOW~~	400	2ND LAV BN MOTOR T 2ND MARDIV/LOCATED BY LUBE RACK S 1758 #8 14 UST
HADNOT POINT	HP 1775	1000		✓3 BELOW	5450	10TH MARINES DIRECT SPT GUN PARK/2ND MAR DIV #8 14 UST/TANKS LOCATED IN OF BLDG
HADNOT POINT	HP 1780	600	ok	✓1 BELOW	1600	LOCATED IN PARKING LOT OF MOTOR POOL/TRUCK CO HQ BN 2ND MARDIV/#8 14 UST
HADNOT POINT	HP 1817	~~274~~		~~1~~ ABOVE	550	TANK IS EMPTY BLDG UNOCCUPIED/LOCATED BY ELECTRICAL DISTRIB. BLDG HP 1816/NO BUNGS; DIKES; SPILL SIGN
HADNOT POINT	HP 1826	274		1 ABOVE	1376	TANK IS BEING REMOVED UNIT BEING RELOCATED 2ND SURVEILLANCE RECON INTELL MOTOR T II MEF POC MSGT SCOTT EXT 2679
Hadnot Point	HP 1829			1 Below		
HADNOT POINT	HP 1841	550/150	[illegible]	2 BELOW	1320	LOCATED BY WASH RACK MOTOR T ORD 4TH BN 10TH MARINES/#8 14 UST/TANKS LOCATED IN HW SITE (1) 550/ (1) 150
HADNOT POINT	HP 1854	1000/550		✓2 BELOW	3800	(1) 1000/ (1) 550 #8 14 UST/1000 ON TANK SIDE 550 ON MOTOR T SIDE POC SGT ONOFRIO EXT 3417

WASTE OIL TANK LOCATIONS - MCB CLNC

LOCATION	STRUCTURE	CAPACITY		QTY AB/BELOW	#/OF/GAL	COMMENTS
HADNOT POINT	HP 1860	600	✓	1 (	1100	HQBN MOTOR T COMM CO 2ND MARDIV/#8 14 UST
HADNOT POINT	HP 1880	600		1 BELOW	2500	LOCATED BY ELECTRICAL TRANSFORMER AND BATTERY SHOP/2ND COMBAT ENGR BN 2ND MARDIV/#8 14 UST
HADNOT POINT	HP 738	274	✓	1 ABOVE	0	HEAVY EQ LOT POC BOB HUFFMAN EXT 5909
HADNOT POINT	~~HP 901~~	~~2000~~		~~1 ABOVE~~	1000	BEHIND BLDG 901 RR TRACKS ORDANCE MAINT CO/2ND MAINT BN 2ND FSSG/EXT 1484
HADNOT POINT	HP 902	600	OK ✓	1 ABOVE	3100	ENGR MAINT CO/2ND MAINT BN/2ND FSSG
HADNOT POINT	~~HP 909~~	~~274~~		2 ~~ABOVE~~	0	TWO WASTE OIL TANKS IN HW STORAGE AREA/LOCATION OF TANK IS SW CORNER OF ORF./OPER READINESS FLOAT/2ND MAINT BN 2ND FSSG/EXT 1356
HADNOT POINT	~~HP 913~~	~~DRUM~~ 500	✓	1 ~~DRUM~~ Above	150	TEMP STORAGE AREA FOR 2ND FSSG GROUPS/PRESENTLY MWSS-24/POC 2ND FSSG/G-4 FAC IS USED FOR DEPLOYABLE UNITS
HADNOT POINT	~~HP 954~~	~~165~~		~~3 DRUM~~	55	8TH MOTOR T BN BRAVO CO 2ND FSSG FMF LANT MOTOR POOL (DRAGON WAGONS) POC SGT LIGHTFOOT EXT 1485 1898/DRUMS IN HW ACCUM AREA
MIDWAY PARK	BLDG 45	600	1 above	1 BELOW	750	LUBE RACK S-937 #8 14 UST
NEW HOSPITAL	NH 118	274	✓	1 BELOW	50	FACILITIES MGMT NAV HOS LOCATED IN PARKING LOT BY WASTE OIL SHED/#8 14 UST GND CONTAMINATION NEEDS WORK

MORE?

WASTE OIL TANK LOCATIONS - MCB CLNC

LOCATION	STRUCTURE	CAPACITY	QTY	AB/BELOW	#/OF/GAL	COMMENTS
OLD HOSPITAL	H 36	DRUM	1	DRUM	50	ORDER/POC MR POTTER EXT 4392 6TH MEB MOTOR T HMDO SSGT WYNN/EXT 8377
ONSLOW BEACH	BA 130	600	~~1~~	BELOW	0	2ND RECON BN MOTOR T UNIT HAS 2 TANKS BOTH 600 GAL #8 14 UST/ LEVEL INDICATOR BROKE/1 TANK BY SBA-131 WASH RACK/1 TANK BY BA 130
RIFLE RANGE	RR 13	600	✓ 1	BELOW	0	#8 14 UST/TANK IS LOCATED BY RACK/BEHIND MOTOR POOL RR 13
HADNOT POINT	HP 1409	274	✓ 1	ABOVE	0	RANGE CONTROL MCB NAVY BOAT CREW/POC PO1 DAIL TANK BY WASH RACK
HADNOT POINT	HP 1804	600	ok 6	BELOW	0	FACILITY BEHIND UTILITIES BLDG 1804/2ND COMBAT ENGR BN S-1856 LUBE RACKS/#8 14 UST LEVEL INDICATORS BROKE/NO SPILL SIGNS
HADNOT POINT	HP 1815	274	? 1	ABOVE	0	LOCATED BY GAS PUMPS BLDG-& AREA VACANT OWNER UNKNOWN/TANK NEEDS SAMPLING/CONTENTS UNK NO SPILL SIGN/DIKE
			97		55,576	

ENTER COMMAND > HP 575 600 ✓ 3 Below

458 - 6- 1 [illegible]

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SAFETY KLEEN LISTING

MARINE CORPS ENGINEER SCHOOL, COURTHSE BAY

BLDG	QTY
BB12	2
BB49	1
BB50	2
BB51	3
BB52	1
BB297	1

MARINE CORPS SERVICE SUPPORT SCHOOL, CAMP JOHNSON

BLDG	QTY
M90	9
M107	9
M112	1
M119	3
M122	2
M202	4
M203	1
M255	2
M308	4

ARMORY, RIFLE RANGE, MCB

BLDG	QTY
RR1	1

SCHOOL OF INFANTRY, CAMP GEIGER

BLDG	QTY
TC817	1
TC820	15
TC822	16

PROVOST MARSHALL OFFICE, HADNOT POINT AREA, MCB

BLDG	QTY
3	1

FIELD MEDICAL SERVICE SCHOOL, CAMP JOHNSON

BLDG	QTY
M308	1

HQ AND SUPPORT BN, INDUSTRIAL AREA, MCB

BLDG	QTY
1117	1

2D MARINE DIVISION

BLDG	QTY
145	1
303	1
328	1
428	1
504	1
575	7
1323	3
1450	1
1707	1
1709	2
1775	3
1780	3
1804	1
1829	4
1854	2
1860	1
1880	2
A2	2
A47	6
BB6	1
BA130	1
HP100	4
HP250	3

II MARINE EXPEDITIONARY FORCE

BLDG	QTY
1771	1

2D SURVEILLANCE. RECONNAISSANCE. INTELLIGENCE GROUP

BLDG	QTY
1310	2
1311	1
FC241	1
FC230	2
FC251	2
FC302	2
FC365	1

ARMORY. 8TH MOTOR TRANSPORT BN

BLDG	QTY
FC302	1

2D FORCE SERVICE SUPPORT GROUP

BLDG	QTY
FC128	1
816	1
902	5
1601	5
FC40	2
FC45	2
FC120	2
FC255	2
FC263	1
FC270	4
FC280	8
FC281	1
FC285	2
FC299	4

BASE MOTOR TRANSPORT, INDUSTRIAL AREA AND MCAS

BLDG	QTY
1502	8
AS118	1

BASE MAINTENANCE

BLDG	QTY
45	1
780	1

DEPENDENT SCHOOLS

BLDG	QTY
835	1

TRAINING SUPPORT CENTER. INDUSTRIAL AREA

BLDG	QTY
1409	1

CAMP LEJEUNE
UNDERGROUND STORAGE TANK
SURVEY REPORT

VOLUME 1

April 1992

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Prepared for
Headquarters, United States Marine Corps
Washington, D.C.

TABLE 2-5. Oil/Water Separators (102 total)

	System ID. No.	Facility Name	Operator Organization	Drawing Numbers
1	1002-O/W-1	Fuel Farm	AC/S Logistics	4052510
2	1002-O/W-2	Fuel Farm	AC/S Logistics	4052510
3	1053-O/W	Car Wash	MWR	Unavailable
4	1105-O/W	Maintenance and Warehouse	Base Utilities	Unavailable
5	1107-O/W	Auto Hobby Shop	MWR	4052526
6	1114-O/W	Maintenance and Warehouse	Base Utilities	Unavailable
7	1203-O/W	Base Maintenance Motor Transport	Base Maintenance	Unavailable
8	1205/S-1217-O/W	Motor Transport	CG 2nd Marine Division	4020698, 4052525
9	1310-O/W	Motor Transport	2nd SRIG	4052523
10	1323-O/W	HQ Battery 10th Marines	2nd Marine Division	Unavailable
11	1406/S-1416-O/W	Lube Rack	MWR	4052523
12	1408/S-1424-O/W	Grease Rack	Base Motor Transport	4020699
13	1450-O/W	Maintenance Shop	2nd FAG	4050101
14	1502-O/W-1	Motor Transport Shop	Base Motor Transport	Unavailable
15	1505/S-1508-O/W	Auto Shop	2nd Marine Division	4052524
16	1601-O/W	Maintenance Facility	AC/S Logistics	4126671
17	1604/S-1616-O/W	Maintenance Shop	2nd SRIG	4052521
18	1607/S-1622-O/W	Maintenance Shop	2nd FSSG	4052524
19	1612-O/W	PCX	MWR	11432, 11453

TABLE 2-5. Oil/Water Separators (continued)

	System ID. No.	Facility Name	Operator Organization	Drawing Numbers
20	1700-O/W-1	Central Heating Plant	Base Utilities	13372
21	1700-O/W-2	Central Heating Plant	Base Utilities	13372
22	1704-O/W	Communication Warehouse	2nd Marine Division	Unavailable
23	1711/S-1745-O/W	Motor Pool	2nd Marine Division	Unavailable
24	1747-O/W	Remote Piloted Vehicles	2nd MEF	Unavailable
25	1775-O/W	Maintenance Shop, 10th Regiment Mar	2nd Marine Division	4035358
26	1780-O/W-1	Motor T Maintenance Facility	2nd Marine Division	1339344, 1339313, 4052519
27	1780-O/W-2	Motor T Maintenance Facility	2nd Marine Division	1339344, 1339313, 4052519
28	1780-O/W-3	Motor T Maintenance Facility	2nd Marine Division	4052519
29	1804/S-1856-O/W	Lube Rack	2nd Marine Division	Unavailable
30	1808/S-1859-O/W	Wash Rack	2nd Marine Division	Unavailable
31	1817/S-1821-O/W	Wash Rack	2nd FSSG	4020699
32	1829-O/W	HQ 6th Marine Regiment Maintenance	2nd Marine Division	Unavailable
33	1854-O/W	Tank & Auto Maintenance	2nd Marine Division	4061887, 4061940
34	1874-O/W	Tank & Auto Maintenance	2nd Marine Division	4061887, 4061940
35	1880-O/W	Radio Communications	2nd Marine Division	Unavailable
36	1916-O/W	Golf Maintenance Facility	Special Services	4052503
37	2615/S-2637-O/W	Officers Club	Base Maintenance	4052505, 4133273, 4133253, 4052504, 4133274, 4133254

TABLE 2-5. Oil/Water Separators (continued)

	System ID. No.	Facility Name	Operator Organization	Drawing Numbers	
38	45/S-792-O/W-1	Equipment Maintenance Shop	Base Utilities	4052498	— Removed
3	45/S-792-O/W-2	Equipment Maintenance Shop	Base Utilities	4052498	
40	575-O/W	Lt. Armored Vehicle Shop	2nd Marine Division	Unavailable	
41	739/SGP-28-O/W	Grease Rack	2nd FSSG	4052515, 4052640	
42	816/SGP-30-O/W	Wash Rack	2nd FSSG	4052512, 4052640	
43	913/S-947-O/W	Wash Rack	Base Maintenance	4052536	
44	961-O/W	Fuel Farm	AC/S Logistics	4190864	
45	A-10/SA-16-O/W	Grease Rack	2nd Marine Division	4052564	
46	A-47-O/W-1	Maintenance Shop	2nd Marine Division	4098890, 4098889	
47	A-47-O/W-2	Maintenance Shop	2nd Marine Division	4098890, 4098889	
48	A-47-O/W-3	Maintenance Shop	2nd Marine Division	4098890, 4098889	
49	A-47-O/W-4	Maintenance Shop	2nd Marine Division	4098890, 4098889	
50	A-47-O/W-5	Maintenance Shop	2nd Marine Division	4098890, 4098889	
51	BA-134-O/W	Boat Shop	2nd Marine Division	4210695	
52	BB-293-O/W	Warehouse	Marine Corps Base	4089008-C1, 4089008-C2	
53	BB-71-O/W	Auto Shop	Special Services	Unavailable	
54	BB-9-O/W-1	Boiler Plant	Base Utilities	13373, 4052570, 4100679, 4133252, 4203634	
55	BB-9-O/W-2	Boiler Plant	Base Utilities	13373, 4052570, 4100679, 4133252, 4203634	

TABLE 2-5. Oil/Water Separators (continued)

	System ID. No.	Facility Name	Operator Organization	Drawing Numbers
56	CG-1-0/W	BN. SQDRN. HQ.	MCAS	Unavailable
57	FC-101-0/W	Combat Vehicle Maintenance	2nd FSSG	4052551
58	FC-102-0/W	Wash Rack	2nd FSSG	4052551
59	FC-120-0/W	Auto Shop	2nd FSSG	Unavailable
60	FC-200-0/W	Lube Rack	2nd FSSG	4126684
61	FC-219-0/W	Maintenance Shop	2nd FSSG	4138889
62	FC-230-0/W	Maintenance Shop	2nd FSSG	4148867, 4148872
63	FC-241-0/W	Maintenance Shop	2nd FSSG	4046096
64	FC-251-0/W	Maintenance Shop	2nd FSSG	4020958
65	FC-253-0/W	Communications Platoon	2nd FSSG	Unavailable
66	FC-255-0/W	Maintenance Shop	2nd FSSG	Unavailable
67	FC-263-0/W	Maintenance Shop	2nd FSSG	Unavailable
68	FC-270-0/W	Maintenance Shop	2nd FSSG	4138889
69	FC-280-0/W	Maintenance Shop	2nd FSSG	Unavailable
70	FC-281-0/W	Auto Shop	Unavailable	4155687
71	FC-40-0/W	Maintenance Facility	2nd FSSG	Unavailable
72	FC-45-0/W	Maintenance Shop	2nd FSSG	Unavailable
7[illegible]	FC-[illegible]364-0/W	Fuel Farm	Base Utilities	Unavailable
74	G-650-0/W	Heating Plant	Base Utilities	4052553, 4207006

TABLE 2-5. Oil/Water Separators (continued)

System ID. No.	Facility Name	Operator Organization	Drawing Numbers
75 GP-19-0/W	Maintenance Shop	2nd FSSG	Unavailable
76 HP-100-0/W	Combat Vehicle Maintenance	2nd Marine Division	4076549, 4076548, 4076546
77 HP-250-0/W-1	Communication/Motor Transportation	Unavailable	4156930
78 HP-250-0/W-2	Communication/Motor Transportation	Unavailable	4156930
79 LCH-4015-0/W	Service Station	MWR	4052500
✓ 80 M-101-0/W-1	Applied Instruction Building	MCSSS	B4-2
✓ 81 M-101-0/W-2	Applied Instruction Building	MCSSS	B4-2
82 632 M-230-0/W	Boiler Room	Base Utilities	Unavailable
119 83 M-631 ~~M-625-0/W-1~~	Boiler Plant	Base Utilities	4052489, 4097051, 4097054, 1088092, 1088094, 4707006, 14239, 4024804
84 M-628 ~~M-625-0/W-2~~	Boiler Plant	Base Utilities	4052489, 4097051, 4097054, 1088092, 1088094, 4707006, 14239, 4024804
6 [illegible]H-118-4-0/W	Hospital Maintenance	Navy Hospital	4043494, 4089206
86 PT-39-0/W	Pesticide Wash Rack	Base Maintenance	4080576, 4080579
✓ 87 RR-14-0/W	Lube Rack	Rifle Range Detachment	Unavailable M2-2
✓ 88 RR-15-0/W-1	Boiler House	Base Utilities	4024804, 4052557, 4133251 M2-2
✓ 89 RR-15-0/W-2	Heating Plant	Base Utilities	13375, 4024804, 4052557 M2-2
90 SA-22-0/W	Fueling Pad	2nd Marine Division	Unavailable
91 SA-43-0/W	Wash Apron	2nd Marine Division	Unavailable

TABLE 2-5. Oil/Water Separators (continued)

	System ID. No.	Facility Name	Operator Organization	Drawing Numbers	
92	SBA-131-0/W	Auto Shop	2nd Reconnaissance Battalion	4052626	
93	SBB-169-0/W	Instruction Building	Marine Corps Engineering School	4020699	
94	SFC-419-0/W	Car Wash	Unavailable	Unavailable	
	[redacted]	Wash Rack-Drum Storage	Motor Transport	Unavailable	
96	SM-92-0/W	Wash Rack	Motor Transport	Unavailable	
97	[redacted]	~~Animal Shelter~~	Special Services	Unavailable	
✓ 98	[redacted]	Lube Rack/Wash Apron	2nd Marine Division	4052556	— B2-2
99	[redacted]	Fire Training Pit	Fire Department	Unavailable	
✓ 100	[redacted]	Motor T Wash Apron	2nd Marine Division	4020699	— B2-2
✓ 101	[redacted]	Motor T Lube Rack	2nd Marine Division	4052554	— B2-2
✓ 102	[redacted]	Instruction Facility	School of Infantry	Unavailable	B2-1

STORM WATER DISCHARGE STUDY

Final Phase 1 Report

Industrial Activity Inventory

Marine Corps Base

Camp Lejeune, North Carolina

Contract N62470-92-C-7483

Sirrine Job No. R-3873

PREPARED BY:

SIRRINE ENVIRONMENTAL CONSULTANTS
3500-B REGENCY PARKWAY
CARY, NORTH CAROLINA 27511

March 1993
Volume 1

SPILL CONTAINMENT BASIN INVENTORY

STRUCTURE NUMBER	ADJACENT STRUCTURE	OUTFALL NUMBER	MAP SECTOR	DISCHARGE LOCATION SANITARY/STORM
STC 369	TC362	Sheet Flow	A2-4	Storm
SM 631	M625	OMP-012B	A5-3	Storm
SM 269	SM20	OMP-020	B4-4	Storm
SLCH 785	45	OHE-004	B7-2	Storm
	AS4154	OAS-025	C2-2	Storm
SAS 137	AS154	OAS-025	C2-2	Storm
SAS 158	AS149	OAS-025	C2-2	Storm
S 1001	S1007	OHP-004	F8-2	Storm
SRR 55	RR15	ORR-006	M2-2	Storm
SA 22	A11	OBB-001	M6-2	Storm
SBB 29	BB9	OBB-005	N7-1	Storm
SG 649	G650	OCG-006	B2-2	Storm
S 1721	1700	OHP-026	F8-3	Storm
S 2637	2615	N/A	N/A	N/A
SLCH 4035	4015	N/A	N/A	N/A
S1697	S1735	OHP-008	F8-3	Storm

STORMWATER DETENTION BASIN INVENTORY					
STRUCTURE NUMBER	ADJACENT STRUCTURE	OUTFALL NUMBER	MAP SECTOR	DISCHARGE LOCATION SANITARY/ SEWER	OVERFLOW TO STORM SEWER
	913	OHP-004	F8-2	Sanitary	Beaver Dam Creek
	S1857	OHP-032	G8-1	Sanitary	None
	EMD060	OAS-019	D3-1	Sanitary	Southwest Creek
	A47	OBB-010	M6-2	Sanitary	Courthouse Bay
	A47	OBB-013	M6-2	Sanitary	Courthouse Bay
	A47	OBB-013A	M6-4	Sanitary	Courthouse Bay

NOTE: Stormwater Detention Basins are designed to detain the first flush stormwater volume of a two-year storm.

OIL WATER SEPARATOR INVENTORY					
STRUCTURE NUMBER	ADJACENT STRUCTURE	OUTFALL NUMBER	MAP SECTOR	DISCHARGE LOCATION SANITARY/STORM	OVERFLOW TO STORM SEWER
	S1754	OHP-032	F8-3	SANITARY	No
	1502	OHP-028	F8-3	SANITARY	No
	1502	OHP-028	F8-3	SANITARY	No
	1502	OHP-028	F8-3	SANITARY	No
	1506	OHP-028	F8-4	SANITARY	Yes
	S1857	OHP-032	G8-1	SANITARY	No
	1829	OHP-032	G8-1	SANITARY	No
	1747	OHP-032	G8-1	SANITARY	No
	1711	OHP-032	G8-1	SANITARY	No
	1860	OHP-007	G8-1	SANITARY	No
	1854	OHP-032	G8-2	SANITARY	No
	1854	OHP-033	G8-2	SANITARY	No
	1829	OHP-030A	G8-2	SANITARY	No
	S1426	OHP-034	G8-2	SANITARY	No
	575	OHP-039	G8-3	SANITARY	Yes
	FC120	SHEET FLOW	G8-4	SANITARY	No
	FC134	SHEET FLOW	G8-4	SANITARY	No

OIL WATER SEPARATOR INVENTORY

STRUCTURE NUMBER	ADJACENT STRUCTURE	OUTFALL NUMBER	MAP SECTOR	DISCHARGE LOCATION SANITARY/STORM	OVERFLOW TO STORM SEWER
	FC230	OFC-016	G9-3	SANITARY	No
	FC230	OFC-016	G9-3	SANITARY	No
	FC281	OFC-013	G9-3	SANITARY	No
	FC285	OFC-015	G9-3	SANITARY	No
	FC270	OFC-014	G9-3	SANITARY	No
	FC280	OFC-015	G9-3	SANITARY	No
	FC251	OFC-016	G9-3	SANITARY	No
	FC253	OFC-016	G9-3	SANITARY	No
	M107	OMP-019	A4-4	SANITARY	No
	M107	OMP-019	A4-4	SANITARY	No
M628	M625	OMP-012B	A5-3	STORM	Yes
	STC777	OCG-006	B2-2	SANITARY	No
	TC773	OCG-006	B2-2	SANITARY	No
	AS119	OAS-025	B2-4	SANITARY	No
	SAS98	OAS-003	B2-4	SANITARY	Yes
	M144	OMP-006	B5-1	SANITARY	No
	NH118	ONH-004	B7-4	SANITARY	No
	AS3905	OAS-025	C2-2	SANITARY	No

OIL WATER SEPARATOR INVENTORY					
STRUCTURE NUMBER	ADJACENT STRUCTURE	OUTFALL NUMBER	MAP SECTOR	DISCHARGE LOCATION SANITARY/STORM	OVERFLOW TO STORM SEWER
	AS4146	OAS-025	C2-2	SANITARY	No
	AS148	OAS-025	C2-2	SANITARY	No
	AS592	OAS-024	C2-4	STORM	No
	AS4104	OAS-024	C2-4	STORM	No
	AS4135	OAS-025	C2-4	SANITARY	Yes
	AS546	OAS-007	C3-3	STORM	Yes
	AS509	OAS-007	C3-3	STORM	Yes
	SAS3613	OAS-023	D2-2	STORM	No
	EMD060	OAS-019	D3-1	STORM	Yes
	STP447	OHP-009	E8-4	SANITARY	No
	HP104	OHP-067	F7-1	SANITARY	No
	S1053	OHP-004	F8-2	SANITARY	No
	S946	OHP-004	F8-2	SANITARY	Yes
	FC45	OFC-014	G9-4	SANITARY	No
	FC51	OFC-012	G9-4	SANITARY	No
	FC263	OFC-016	H9-1	SANITARY	No
	BB51	OBB-004	M7-3	SANITARY	No
	SBB1	OBB-005	N7-1	SANITARY	No

OIL WATER SEPARATOR INVENTORY					
STRUCTURE NUMBER	ADJACENT STRUCTURE	OUTFALL NUMBER	MAP SECTOR	DISCHARGE LOCATION SANITARY/STORM	OVERFLOW TO STORM SEWER
	SBB198	OBB-005	N7-1	SANITARY	No
SFC 108	FC100	SHEET FLOW	G9-3	SANITARY	Yes
SFC 215	FC200	OFC-015	G9-3	SANITARY	No
SFC 242	FC241	OFC-016	G9-3	SANITARY	No
SGP 30	816	OFC-018	G8-4	SANITARY	Yes
SRR 73	SRR80	SHEET FLOW	M2-2	SANITARY	No
STC 874	STC868	OCG-006	B2-2	SANITARY	No
S 948	45	OHE-004	B7-2	STORM	Yes
S 1128	1107	OHP-006	F8-4	SANITARY	Yes
S 1132	1114	OHP-004	F8-4	SANITARY	Yes
S 1133	1105	OHP-006	F8-4	SANITARY	Yes
S 1217	1206	OHP-006	F8-4	SANITARY	Yes
S 1218	1203	OHP-028	F8-4	SANITARY	Yes
S 1322	1309	OHP-028	F8-4	SANITARY	Yes
S 1424	1408	OHP-028	F8-4	SANITARY	Yes
S 1511	1502	OHP-028	F8-3	SANITARY	Yes
S 1619	S1605	OHP-028	F8-3	SANITARY	Yes

OIL WATER SEPARATOR INVENTORY					
STRUCTURE NUMBER	ADJACENT STRUCTURE	OUTFALL NUMBER	MAP SECTOR	DISCHARGE LOCATION SANITARY/STORM	OVERFLOW TO STORM SEWER
S 1622	1607	OHP-028	F8-3	SANITARY	No
S 1763	1775	OHP-030	G8-2	SANITARY	No
S 1783	1780	OHP-032	G8-2	SANITARY	No
SA 16	A10	OBB-011	M6-2	SANITARY	Yes
SA 43	A8	OBB-011	M6-2	SANITARY	No
SA 45	A47	OBB-010	M6-2	SANITARY	No
SM 91	SM93	OMP-006	B4-2	SANITARY	No
SM 98	M101	OMP-004	B4-2	SANITARY	No
SM 162	SM 173	OMP-005	B4-4	SANITARY	No
SM 632	M625	OMP-012B	A5-3	SANITARY	Yes
SAS 159	SAS135	OAS-025	B2-4	SANITARY	Yes
SBA 133	BA130	SHEET FLOW	P11-1	SANITARY	Yes
SFC 43	FC40	OFC-013	G9-4	SANITARY	No

HAZARDOUS WASTE ACCUMULATION POINT STUDY

FOR

MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA

AND

MARINE CORPS AIR STATION, NEW RIVER, NORTH CAROLINA

FIRST DRAFT REPORT

NOVEMBER 1993

IQC CONTRACT NO. N62470-91-D-7511

DELIVERY ORDER NO. 0001

RUST E&I PROJECT NO. 84063.100

RUST ENVIRONMENT & INFRASTRUCTURE
RALEIGH, NORTH CAROLINA

EXECUTIVE SUMMARY

MCB, Camp Lejeune and MCAS, New River (collectively the Installation) maintain numerous temporary hazardous waste accumulation facilities, otherwise known as satellite accumulation areas (SAAs) and less than (<) 90-day storage areas. The following table indicates the distribution of temporary storage facilities at the Installation.

Command/Organization	SAAs	<90-Day Storage Areas
2D FSSG	35	19
2D Marine Division	64	19
2D MEF	3	2
2D SRIG	14	12
MCB	24	16
MAG 26	30	8
MAG 29	16	7
MCAS & Misc. Squadrons	5	3
Total	191	86

In the past, the MCB and the MCAS have been in violation of applicable hazardous waste regulations associated with management of these types of facilities. The MCB and the MCAS also dispose a significant quantity of discarded commercial chemical products and off-specification (off-spec) materials as hazardous waste. The Installation is seeking to standardize hazardous waste management procedures and facilities in order to facilitate compliance at the Installation. RUST Environment & Infrastructure (RUST E&I), formerly SEC Donohue, has been contracted to evaluate the current hazardous waste facilities and management procedures and to develop designs for improved facilities and to offer specific recommendations that will help the MCB and the MCAS comply with hazardous waste regulatory requirements. The resulting scope of work included the following primary objectives associated with these temporary accumulation facilities:

1. Identification of minimum regulatory requirements and "Best Management Practices" (BMPs) for these facilities.

2. Evaluation of the extent to which the existing facilities meet minimum regulatory requirements and BMPs.

3. Identification of existing facility deficiencies presenting impediments to the proper management of hazardous waste.

4. Assisting the MCB staff in selecting construction actions necessary to achieve regulatory requirements and/or BMPs.

5. Evaluation of current hazardous waste collection, transfer of accountability, and temporary storage procedures.

6. Recommendation of management actions and procedures necessary to most efficiently handle hazardous waste and discarded hazardous materials in accordance with applicable regulatory requirements.

7. Development of methods to reduce the amount of hazardous waste generated by identifying and evaluating options or opportunities to reduce the generation of discarded commercial chemical product and off-specification material wastestreams.

To meet these objectives, the following tasks were performed: review of current hazardous waste management procedures, inspections of the existing facilities, interviews with cognizant site personnel, review of hazardous waste generation data, and review of existing facility designs. Performance of these tasks yielded the following conclusions with general hazardous waste management procedures:

1. Most facilities at the Installation meet the minimum regulatory requirements.

2. The Installation needs to develop uniform procedures for handling each of the routine hazardous wastestreams to help ensure compliance with regulatory and Installation hazardous waste management requirements.

3. The Installation needs to streamline the current turn-in/pick-up procedures for routine hazardous wastestreams to reduce the labor associated with transfer of hazardous waste.

4. Because of the high turnover rate in personnel responsible for hazardous waste management and the assignment of hazardous waste management responsibility as a collateral duty, units at the MCB and squadrons at the MCAS have difficulty maintaining compliance with regulatory and Installation hazardous waste management requirements.

5. Almost all SAAs and the majority of the <90-day storage areas meet the minimum regulatory requirements. Areas that do not meet the minimum regulatory requirements generally need improved segregation of incompatible wastes, additional access control/security, emergency internal communication or alarm systems, spill control equipment, and additional decontamination equipment.

6. Several organizations store hazardous waste outdoors with little to no protection from climatic influences and no secondary containment, resulting in increased environmental exposure for the Installation.

Project plans have been developed for 63 sites at the Installation, each site including one or more SAAs and <90-day storage areas, to meet minimum regulatory requirements and BMP criteria. The majority of the sites selected for improvement are <90-day storage areas. Most of the plans specify only modifications to the existing facilities to meet minimum regulatory requirements. Many of the BMP plans specify new permanent structures for <90-day storage areas based on the MCB's standard hazardous waste storage structure design. Prefabricated structures are specified to meet BMP requirements at most of the SAAs and the <90-day storage areas that normally have small inventories.

The large volume of discarded commercial chemical product and off-specification materials that have to be disposed as hazardous waste can be attributed to the following:

- excess products ordered from supply
- unused products returned from on-site and off-site activities
- excess/unnecessary products maintained in the supply system
- expired shelf life
- improper labeling or unidentified material
- unacceptable container
- changes in the physical or chemical composition of the material

The following recommendations apply to reducing the amount of discarded products and off-specification materials that are disposed as hazardous waste:

1. Substitute non-hazardous products for hazardous products whenever practicable.

2. Revise hazardous materials procurement procedures by using an Authorized Use List.

3. Revise hazardous materials management procedures by conducting routine inspections of hazardous material inventories.

4. Lower order points for hazardous materials in the main supply systems.

5. Revise procedures for returning unused or off-specification hazardous materials.

6. Create consolidated hazardous material issue points (warehouses) that dispense only the minimum quantities needed to perform a function within a week. Unused hazardous materials that are not used within the week would be returned to the supply warehouse.

7. Consolidate <90-day storage areas with the consolidated hazardous material warehouses.

8. Improve hazardous materials tracking by using a bar coding system.

9. Improve existing hazardous materials storage facilities to protect materials from the damaging effects of heat, cold, and rain.

Construction of the proposed improvements and implementation of the recommended procedural changes at the Installation should: 1) improve overall compliance with regulatory requirements, 2) reduce the volume of hazardous waste, 3) reduce the costs associated with hazardous waste management, and 4) minimize both corporate and individual liabilities associated with hazardous waste management.

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1.0 INTRODUCTION

1.1 STUDY OBJECTIVES

RUST Environment & Infrastructure (RUST E & I), formerly SEC Donohue has been contracted by the Marine Corps Base (MCB) at Camp Lejeune, North Carolina to conduct a study of hazardous waste accumulation point facilities at the MCB (which includes Camp Johnson, Camp Geiger, and the Naval Hospital) and the Marine Corps Air Station (MCAS), New River in Jacksonville, North Carolina. Hazardous waste accumulation point facilities include less than (<) 90-day storage areas and satellite accumulation areas (SAAs).

The primary objectives of this study are to:

1) identify minimum regulatory requirements and "Best Management Practices" (BMPs) for managing hazardous waste SAAs and <90-day storage areas at the MCB and the MCAS.

2) evaluate the extent to which the existing facilities meet minimum regulatory requirements and BMPs;

3) identify existing facility deficiencies presenting impediments to the proper management of hazardous waste; and

4) assist the MCB staff in selecting construction actions necessary to achieve regulatory requirements and/or BMPs.

The secondary objectives of the study are to:

1) evaluate current hazardous waste collection, transfer of accountability, and temporary storage procedures;

2) recommend management actions and procedures necessary to most efficiently handle hazardous waste and discarded hazardous materials in accordance with federal, state, and local regulatory requirements for environmental protection and for the safety and welfare of personnel; and

3) develop methods to reduce the amount of hazardous waste generated by identifying and evaluating options or opportunities to reduce the generation of "discarded commercial chemical product" wastestreams.

1.2 BACKGROUND

The MCB (EPA ID No. NC6 170 022 580) and the MCAS (EPA ID No. NC8 170 022 570) are considered separate facilities with respect to hazardous waste generation. Both the MCB and the MCAS (hereinafter referred to collectively as the Installation) are classified as Large Quantity Generators (LQGs) of hazardous waste according to the North Carolina hazardous waste management regulations, 15 NCAC 13A .0007, and the federal hazardous waste management rules pursuant to the Resource Conservation and Recovery Act (RCRA), 40 CFR 262. The requirements for generators of hazardous waste place strict rules pertaining to the length of time and the amount of waste that can be kept at a SAA and a <90-day storage area. The Installation generated over 500,000 pounds of a variety of characteristic and listed hazardous wastes in FY 1991 and approximately 443,000 pounds in FY 1992. In FY 1992 approximately 18 percent of the total hazardous wastes generated (over 78,000 pounds) was discarded commercial chemical products and off-specification materials.

The MCB also has a permitted hazardous waste storage facility (TP-451 complex), operated by the Defense Reutilization Marketing Office (DRMO) of the Defense Logistics Agency (DLA) for the Department of the Defense (DOD), that is located in the Old Piney Green Trailer Park. All organizations at the MCB and the MCAS send their hazardous wastes to the permitted facility for storage prior to off-site disposal. Off-site disposal is coordinated by the DRMO.

In the past the MCB has received several notices of deficiencies (NODs) and notices of violation (NOVs) concerning hazardous waste management practices at <90-day areas and SAAs from the North Carolina Department of Environmental Health and Natural Resources, Division of Solid Waste, Hazardous Waste Section (NCHWS). The MCB desires to construct and/or modify the hazardous waste sites and develop improved management practices, wherever warranted and practical, to ensure compliance with hazardous waste regulations; to provide adequate protection to the environment; and to follow generally accepted environmental management practices.

1.3 STUDY TASKS

1.3.1 Scope of Tasks

RUST E&I has been tasked to evaluate each <90-day storage area and each SAA (originally estimated to be 136 sites) used to manage hazardous waste at the Installation to determine if each site is operating in accordance with applicable federal and state hazardous waste regulations (i.e., minimum regulatory requirements) and BMPs. Site investigations were to include visits to each site and interviews with cognizant personnel at each location. RUST E&I has also been tasked to assist the Installation in determining which of these sites need to be upgraded (up to a maximum of 65 sites) to meet current minimum hazardous waste regulations and/or BMPs.

This study requires the following activities:

1. Evaluation of alternatives and development of (up to 65) project plans to correct site deficiencies to meet minimum regulatory requirements and BMPs. Each project plan is to include a brief narrative and AutoCad drawings of the general arrangements of the existing site and conceptual designs for the minimum and BMP approach.

2. Performance of a life cycle cost analysis of each of the potential projects (minimum and BMP improvements for up to 65 sites) using the U.S. Army Corps of Engineers software program PC-ECONPACK.

3. Recommendation of up to 65 project plans for subsequent development of "Scopes of Work" and project groupings for developing DD-1391 documentation for the proposed projects.

4. Development of an Installation Complex Map depicting the locations of existing SAAs and <90-day storage areas.

5. Development of an inventory of existing facilities listing the facility type, designation (SAA or <90-day storage area), square footage, waste type(s), waste stream generation points, maximum waste quantity, typical quantity of waste stored/accumulated, typical amount of time waste is kept at a site, and site age.

6. Evaluation of management practices regarding transport, temporary storage and transfer of accountability from moment of generation to disposition at SAAs or <90-day storage areas.

7. Estimation of the quantities of "discarded commercial chemical products" (i.e., P- and U-listed hazardous wastes).

8. Identification of changes in practices that reduce the generation of P- and U-listed wastes.

9. Identification of opportunities to eliminate or consolidate existing <90-day storage areas and/or establish new SAAs to improve hazardous waste management practices, improve tracking efficiency, and to avoid NODs and NOVs.

1.3.2 Methodology/Approach to Tasks

On 21 October 1992 a Kick-Off Meeting was held at the MCB with Environmental Management Department (EMD) representatives and the Hazardous Material Disposal Coordinators (HMDCs) to review the scope of this study and to become more familiar with hazardous waste programs at the Installation. An In-Brief Meeting was conducted on 12 November 1992 to describe the scope of the study and to describe the field work to the Hazardous Materials Disposal Officers (HMDOs). A grounds tour was conducted 16-20 November 1993 to meet the key contacts for this study (i.e., the HMDCs and the HMDOs), to obtain information on the locations of existing facilities, and to become familiar with hazardous waste management procedures at the MCB and the MCAS. RUST E&I developed a list of minimum regulatory criteria and BMP criteria for both SAAs and <90-day storage areas. This list was discussed with EMD personnel on 27 May 1993 to obtain input prior to conducting the field work and developing potential project plans. Hazardous waste site visits were conducted in June 1993 following delays experienced in starting field work for a concurrent hazardous materials study.

Another meeting was held on 2 June 1993 to prepare the HMDCs and the HMDOs for the site visits. RUST E&I contacted each of the HMDCs and HMDOs at the MCB and the MCAS to schedule visits to the sites. Based on information collected in the field, a database of information on the SAAs and the <90-day storage areas was developed.

On 16 June 1993 a meeting was held at the MCB with representatives of the NCHWS, EMD, and RUST E&I to discuss the scope of this study and to share some of RUST E&I's findings from the field work. Potential improvements to typical accumulation sites were discussed, as well as, various regulatory interpretations concerning hazardous waste generator standards.

RUST E&I conducted a preliminary evaluation of sites and developed a draft list of 65 sites identified for development of project plans to meet minimum regulatory criteria and BMP criteria. This draft list was submitted to the EMD on 3 August 1993 for review. A meeting was held with EMD representatives on 5 August 1993 to obtain input on selection of sites for improvements. A teleconference was held with MCAS representatives on 1 September 1993 concerning the MCAS sites on the draft list. A final list of sites for development of project plans was submitted on 2 September 1993.

Existing AutoCad drawings of the Installation (obtained from NAVFAC during RUST E&I work under a different contract) were used as the basis of conceptual design improvements for each site and for the Installation Complex Map. Existing design drawings were also obtained from the Base Public Works Office and Base Maintenance for use in the development of conceptual designs.

2.0 HAZARDOUS WASTE STREAMS

2.1 INTRODUCTION

Below are brief descriptions of the primary hazardous waste streams generated at the Installation. A listing of hazardous wastes generated by the various units/organizations at the MCB is included in Tables B-1.1 and B-1.2 in Appendix B. A listing of hazardous wastes generated by the various squadrons/organizations at the MCAS is included in Tables B-2.1 and B-2.2 in Appendix B.

2.2 WASTE BATTERIES

2.2.1 Lithium Batteries

Lithium batteries are used in communications equipment and high-tech weaponry. Spent lithium batteries are characteristically hazardous waste due to the presence of lithium as a reactive compound (Hazardous Waste Code D003). A new type of lithium battery has come into use that are designed to be manually deactivated by a switch before discarding, thus eliminating the characteristic of reactivity and rendering them non-hazardous. The majority of spent lithium batteries currently being generated are of the new style. The Installation has experienced problems with the deactivation of the new style lithium batteries. Thus, the Installation has taken a conservative approach with disposal of these batteries by considering all spent lithium batteries to be hazardous waste.

2.2.2 Magnesium Batteries

Magnesium batteries are used in communications equipment. Some spent magnesium batteries are characteristically hazardous waste due to their leachable chromium content (Hazardous Waste Code D007). The Installation has not found a reliable method of determining how to segregate magnesium batteries with and without chromium. Thus, the Installation has taken a conservative approach with disposal of these batteries by considering all spent magnesium batteries to be hazardous waste.

2.2.3 Mercury Batteries

Mercury batteries are used in communications equipment. Spent mercury batteries are characteristically hazardous waste due to their leachable mercury content (Hazardous Waste Code D009).

2.2.4 Nickel-Cadmium Batteries

Wet cell nickel-cadmium batteries are used to power avionics equipment, while the dry cell form is used in communications equipment. Spent nickel-cadmium batteries are characteristically hazardous waste due to their leachable cadmium content (Hazardous Waste Code D006). Spent wet cell nickel-cadmium batteries are also characteristically corrosive hazardous waste (Hazardous Waste Code D002).

2.2.5 Battery Electrolyte

Waste battery electrolyte is generated from two sources. One source is the draining of electrolyte, sulfuric acid, from cracked or broken lead/acid batteries (Hazardous Waste Codes D002 and D008). The other source is waste electrolyte, potassium hydroxide, generated in the use of wet cell nickel-cadmium batteries (Hazardous Waste Codes D002 and D006). The MCB has conducted a pilot study to neutralize spent battery acid on site. According to EMD personnel, analyses of samples from neutralized battery acid have indicated that the waste did not exhibit hazardous waste characteristics. However, neutralization is not currently being performed at the Installation and the waste battery acid is being disposed off site as a hazardous waste.

2.3 WASTE OIL FILTERS

Waste oil filters from ground vehicles and air craft maintenance are generated on a routine basis. These oil filter have either terne-plated or non-terne-plated casings. The terne-plated waste oil filters are hazardous waste due to their leachable lead content (Hazardous Waste Code D008). The Installation has not found a reliable method of determining how to segregate filters with and without lead. Thus, the Installation has taken a conservative approach with disposal of oil filters by considering all used oil filters to be hazardous waste.

2.4 PATCH TEST FLUID

Waste "patch test fluid" is a mixture of hydraulic fluid and freon. This waste is generated from performing daily tests on the hydraulic systems of helicopters. Waste "patch test fluid" is considered to be hazardous waste because of the presence of freon (Hazardous Waste Code F002). This waste is recycled at AS-605 in a batch distillation process to recover the freon for reuse. PD-680, or Stoddard solvent, may be used in place of freon, but is inferior in performance to the freon.

2.5 WASTE SOLVENT

2.5.1 Miscellaneous Solvents

Various solvents, such as methyl ethyl ketone, toluene, xylene, and methylene chloride, are used in air craft maintenance. In general, these waste solvents are considered to be hazardous waste because of ignitability (Hazardous Waste Code D001), specific organic concentration (Hazardous Waste Codes D018-D043), or listing as a hazardous waste (e.g., Hazardous Waste Codes F001-F005).

2.5.2 PD-680

PD-680, or Stoddard solvent, is used in parts washing. It may also be substituted in the patch test on hydraulic fluid, but produces inferior results when compared to freon. PD-680 is recycled at the MCAS in the same batch distillation unit used for reclaiming freon from the waste "patch test fluid." Waste PD-680 is characteristically hazardous waste because of ignitability (Hazardous Waste Code D001).

2.5.3 Solvent Rags

Rags used in applying the solvents discussed above are collected and disposed of as hazardous waste due to the presence of listed wastes (Hazardous Waste Codes F001-F005).

2.6 WASTE NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) GEAR

2.6.1 Decontamination Kits

Personal decontamination kits containing components such as DS2 and super tropical bleach are periodically purged from storage as shelf-life expires. These kits may contain materials that are ignitable (Hazardous Waste Code D001), corrosive (Hazardous Waste Code D002), or reactive (Hazardous Waste Code D003) hazardous waste. Most generators discard these expired kits unopened.

2.6.2 Face Mask Filters

Face mask filters for personal NBC gear contain leachable lead (Hazardous Waste Code D008) in the casing. This type of filter is being phased out and replaced with filters having a longer shelf life and no lead.

2.7 WASTE PAINT

Waste paint is generated from maintenance on air craft and from consolidation of off-spec materials during housecleaning operations. There are two broad categories of waste paint generated at the Installation: enamel paint and carcinogenic (CARC) paint. In the past these categories of waste paint have been segregated and disposed separately. However, units have been given approval to collect these waste paints in the same container. Waste paints are usually considered hazardous waste because of the characteristic of ignitability (Hazardous Waste Code D001), the presence of solvents (Hazardous Waste Codes D018-D043 or F001-F005), and/or the presence of leachable metals such as chromium or lead (Hazardous Waste Codes D007 or D008).

2.8 DISCARDED COMMERCIAL CHEMICAL PRODUCTS

A complete discussion of discarded commercial chemical products and off-specification materials at the Installation that are disposed as hazardous wastes is presented in Chapter 5.0 of this report.

2.9 OTHER HAZARDOUS WASTES

Other types of hazardous wastes are generated at the Installation, but are usually associated with very few units/organizations. A listing of these hazardous wastes is included in Tables B-1.1, B-1.2, B-2.1, and B-2.2, located in Appendix B.

3.0 HAZARDOUS WASTE MANAGEMENT PROCEDURES

3.1 PROCEDURES AT MCB, CAMP LEJEUNE

3.1.1 Accumulation of Waste

Before an organization can begin accumulating a hazardous waste, a SAA Permit must be obtained from the EMD. Each SAA Permit specifies the following:

- the location of the SAA;
- the specific hazardous waste;
- the unit/organization responsible for the hazardous waste;
- the maximum quantity of waste to be collected at the site (not to exceed 55 gallons); and
- the designation of the <90-day storage area to receive a container of the waste when filled.

Wastes generated at the MCB are generally accumulated at or near the point of generation. The SAA site usually is defined by a red-painted square on the floor, and copies of the SAA Permit and the Contingency Plan are posted at the site. A container is placed in the designated SAA for accumulation of a specific hazardous waste by the Hazardous Materials Site Handler (HMSH). Units generally do not share containers for the accumulation of hazardous waste. This protocol has been established to keep each hazardous waste stream from being mixed with other solid or hazardous wastes, thus ensuring the consistency of the composition of the hazardous waste stream.

Units generating hazardous waste are responsible for obtaining a container suitable for accumulating and storing hazardous waste. Containers accumulating waste are marked with the words "hazardous waste" and the name of the contents. When a container is full, the HMSH seals the container, enters the date on the container, and transfers the container to the appropriate <90-day storage area.

3.1.2 Transportation of Waste

Containers are usually transferred to the designated <90-day storage area by the HMSH within 24 hours (but no later than 72 hours) of being filled. At this time, the HMSH notifies the Hazardous Material Disposal Officer (HMDO) that a container is being transferred to the <90-day storage area. The HMDO inspects the drum for compliance with hazardous waste pre-transportation requirements (i.e., proper packaging, labeling, and marking) and submits a DD Form 1348-1 to the EMD for processing to authorize subsequent transfer of hazardous waste from the <90-day storage area to the permitted facility operated by the DRMO.

Containers are transported from SAAs to <90-day storage areas by the HMSH via forklift or barrel dolly. Containers with capacities of five gallons or less (e.g., waste electrolyte) and small boxes (e.g., spent batteries) are usually transported by hand from the SAA to the <90-day storage area. After receiving the DD Form 1348-1 from the HMDO, EMD personnel go to the <90-day storage area to inspect the container of hazardous waste to ensure compliance with hazardous waste pre-transportation requirements (i.e., proper packaging, labeling, and marking) and certify that the container is ready for transport. According to generators interviewed during the site visits, EMD personnel usually inspect the containers within two to four weeks of submittal of the DD Form 1348-1. The Resource Conservation and Recovery Branch (RCRB) Transportation Section of the EMD subsequently schedules pick-up of the container during a "milk run" when there are containers of hazardous wastes to be collected at other <90-day storage areas. According to generators interviewed during the site visits, EMD personnel usually transfer the containers from the <90-day storage areas within eight to ten weeks of submittal of the DD Form 1348-1. Occasionally, time before transfer approaches the 90-day limit. If the waste is a new (one-time) hazardous waste, the EMD will also obtain a sample prior to scheduling pick-up of the container.

The RCRB Transportation personnel transport containers from the on-site <90-day storage areas to the permitted facility at the MCB using an open flat-bed truck with side gates and a Tommy-lift. Hazardous wastes generated by MCB organizations working at the MCAS (e.g., Morale, Welfare, and Recreation (MWR) and Logistics) are transported to the MCB's permitted facility along with wastes generated by the MCAS as described in Section 3.2.2 below. For other hazardous wastes generated off-site (e.g., Camp Geiger, Camp Johnson, the Rifle Range), arrangements are made with the Traffic Management Office (TMO) to have a licensed hazardous waste transporter transport wastes to the MCB's permitted facility. Wastes transported by RCRB Transportation personnel are taken to S-962 at the Recycling Center to be weighed prior to delivery to the permitted facility.

The DRMO takes custody of the waste upon receipt at the permitted facility after inspecting the shipment. Final disposal of the MCB's hazardous wastes is coordinated by the DRMO. For some hazardous wastes (e.g., many of the discarded products), DRMO personnel arrange for a contractor service to pick-up the waste at the <90-day storage area.

3.1.3 Recommendations

RUST E&I offers the following recommendations with respect to collection, transport, and transfer of accountability of hazardous waste:

1. Keep the containers properly closed whenever hazardous waste is not being transferred into the containers. During the site visits, several SAAs were observed to have open containers (i.e., caps or tops removed).

2. Ensure that all SAAs are appropriately set-up prior to accumulating any hazardous waste. During the site visits, several SAAs were observed in use that did not have a MCB SAA Permit and/or Contingency Plan posted, and the floor was not marked (i.e., red-painted square delineating the SAA).

3. Begin issuing permits for <90-day storage areas. During the site visits, several <90-day storage areas were observed to have non-regulated wastes, incompatible hazardous wastes, hazardous materials (both compatible and incompatible), and other materials in the <90-day storage area. As a result, there are problems with container inspections, access to the containers, availability of storage space, and potential safety hazards.

4. Use a vehicle that provides secondary containment for wastes and segregation of wastes during transport. The current truck does not have secondary containment and offers no means of segregating wastes during transport.

5. Streamline the process for inspecting and picking up containers of wastes at <90-day storage areas by having the RCRB Transportation personnel inspect containers of routinely generated hazardous waste during pick-up instead of having EMD inspectors make a separate trip. HMDO, EMD, and DRMO inspection of containers on routinely generated wastes (e.g., lithium batteries, battery electrolyte, oil filters) appears to be unnecessary and two separate trips to each <90-day storage area by EMD personnel appears to be inefficient.

   RCRB Transportation personnel should be capable of inspecting containers at the time of pick-up for those wastes that are routinely generated by the unit. Also, current hazardous waste training for generators should be sufficient for ensuring the appropriate packaging, labeling, and placarding prior to transfer. Handling these wastes in this manner should not pose problems with subsequent acceptability by DRMO personnel. New (or one-time) hazardous waste streams may need inspection and other special coordination by EMD personnel prior to arranging transport to the permitted facility or pick-up by a waste service contractor. These changes should significantly reduce labor associated with hazardous waste transfers.

6. Several generators indicated that the current hazardous waste training program is too broad in scope, is too generic, and does not properly prepare them for daily management of hazardous waste. The training program should be tailored to be as site-specific and/or waste-specific as possible to make compliance with regulations and protocols easier for the generator.

7. Many generators indicated that it was difficult keeping up with hazardous waste/hazardous materials management responsibility because of the high turnover in personnel and because this responsibility is generally considered as a collateral duty. Hazardous waste/hazardous materials management responsibility should be assigned to personnel within a unit/organization as the primary duty, instead of a collateral duty.

3.2 PROCEDURES AT MCAS, NEW RIVER

3.2.1 Accumulation of Waste

Before a squadron/organization can begin accumulating a hazardous waste, an authorization letter must be obtained from the Hazardous Material Disposal Manager (HMDM) in the Safety and Environmental Affairs Office (SEA). A single letter may authorize one or more SAAs and <90-day storage areas for a single squadron. The authorization letter specifies the following:

- the squadron/organization responsible for the hazardous waste;
- the hazardous waste(s) to be generated and/or stored; and
- the generator requirements for accumulation and storage of hazardous waste.

Wastes generated at the MCAS are usually accumulated at or near the point of generation. A container is placed in the designated SAA for accumulation of a specific hazardous waste. Squadrons generally do not share containers for the accumulation of hazardous waste. This protocol has been established to keep each hazardous waste stream from being mixed with other solid or hazardous wastes, thus ensuring the consistency of the composition of the hazardous waste stream.

Squadrons generating hazardous waste are responsible for obtaining a container suitable for accumulating and storing hazardous waste. Containers accumulating waste are marked with the words "hazardous waste" and have the contents displayed on the container. When a container is full, the generator seals the container, enters the accumulation start date on the container, and transfers the container to the appropriate <90-day storage area. Containers are generally transferred to the designated <90-day storage area within 24 hours (but no later than 72 hours) of being filled. However, containers with capacities of less than 55 gallons may remain in an SAA after being filled for up to two weeks before being transferred to the <90-day storage area, as long as the total quantity in the SAA does not exceed 55 gallons.

At this time the HMSH also submits a Hazardous Waste Disposal Worksheet to the HMDO. The HMDO inspects the container for proper packaging, labeling, and placarding. The HMDO hand carries the Hazardous Waste Disposal Worksheet to the HMDM. The HMDM prepares a DD Form 1348-1 to authorize subsequent transportation of the waste from the <90-day storage area to the main <90-day storage area at the MCAS located in AS-605.

3.2.2 Transportation of Waste

Containers are transported from SAAs to <90-day storage areas via forklift or barrel dolly. Containers with capacities of five gallons or less (e.g., waste patch test fluid, waste electrolyte) and small boxes (e.g., spent batteries) are usually transported by hand from the SAA to the <90-day storage area. The SEA subsequently schedules pick-up of the container during a "milk run" when there are containers of hazardous wastes to be collected at other <90-day storage areas in the vicinity. According to generators interviewed during the site visits, the SEA usually collects the containers from the <90-day storage areas within four to eight weeks of request for pick-up. Often the generator will transport wastes to the MCAS's main <90-day storage area at AS-605 if their <90-day storage area is filled to capacity or if the 90-day limit is close to expiring. Sometimes the generator uses a personal vehicle to transport the waste if a MCAS vehicle is not available.

The SEA transports containers from the <90-day storage areas to AS-605 using a step van. This van can transport only a few containers at a time and does not have a Tommy-lift for lifting heavy containers (e.g., 55-gallon drums filled with waste). Hazardous wastes generated by MCB organizations working at the MCAS (e.g., MWR and Base Logistics) are also transported to AS-605. Wastes are subsequently transported from AS-605 to the MCB's permitted facility. Arrangements are made with the TMO to have a licensed hazardous waste transporter haul wastes to the MCB's permitted facility. The DRMO takes custody of the waste upon receipt after inspecting the shipment. Final disposal of the MCAS's hazardous wastes is coordinated by the DRMO.

3.2.3 Recommendations

1. Locate SAAs as close to the point of generation as possible to minimize the potential of spills during transport and to reduce the time involved in handling waste during generation. Several SAAs are located a considerable distance from the point of generation. Often this occurs because of lack of available or suitable storage space in the vicinity of the generation point.

2. Keep the containers properly closed whenever hazardous waste is not being transferred into the containers. During the site visits, several SAAs were observed to have open containers (i.e., caps or tops removed).

3. Begin issuing MCAS permits for SAAs and <90-day storage areas instead of issuing authorization letters. The current authorization letters appeared to be vague and are not able to ensure that the generating squadron notifies the SEA prior to collecting or storing new hazardous wastes. During the site visits, several <90-day storage areas were observed to have non-regulated wastes, incompatible hazardous wastes, hazardous materials (both compatible and incompatible), and other materials in the <90-day storage area. As a result, there are problems with container inspections, access to the containers, availability of storage space, and potential safety hazards.

4. Stop use of personal vehicles for the transport of hazardous waste on-site. This practice represents a significant liability for the MCAS, the generating squadron, and the individual transporting the hazardous waste. Additional vehicles should be made available if necessary to stop this practice.

5. Use a vehicle that provides secondary containment for wastes and segregation of wastes during transport. The step van currently being used does not have secondary containment and offers no means of segregating wastes during transport. The vehicle should have a door or opening large enough to facilitate the loading and unloading of pallets. The transport vehicle should also be equipped with a Tommy-lift to facilitate easier loading and unloading of materials.

6. Streamline the process for inspecting and picking up containers of wastes at <90-day storage areas by having the HMDM (or other SEA personnel) inspect containers of routinely generated hazardous waste during pick-up instead of having the HMDM (or other SEA personnel) make a separate trip. HMDO, HMDM, and DRMO inspection of containers on routinely generated wastes (e.g., lithium batteries, battery electrolyte, oil filters) appears to be unnecessary and two separate trips to each <90-day storage area by the HMDM (or other SEA personnel) appears to be inefficient.

The HMDM (or other SEA personnel) should be capable of inspecting containers at the time of pick-up for those wastes that are routinely generated by the unit. Also, current hazardous waste training for generators should be sufficient for ensuring the appropriate packaging, labeling, and placarding prior to transfer. Handling these wastes in this manner should not pose problems with subsequent acceptability by DRMO personnel. New (or one-time) hazardous waste streams may need inspection and other special coordination by the HMDM prior to arranging transport to AS-605 or pick-up by a waste service contractor at the <90-day area. These changes should significantly reduce labor associated with hazardous waste transfers.

7. The MCAS should work with the DRMO to have hazardous waste contractors pick-up hazardous waste directly from the AS-605 instead of transporting the wastes to the MCB's permitted facility. This would reduce liabilities for the MCAS and the generating squadrons by minimizing the handling of hazardous waste and by reducing the amount of travel over public roads

8. Several generators indicated that the current hazardous waste training program is too broad in scope, is too generic, and does not properly prepare them for daily management of hazardous waste. The training program should be tailored to be as site-specific and/or waste-specific as possible to make compliance with regulations and protocols easier for the generator.

9. Many generators indicated that it was difficult keeping up with hazardous waste/hazardous materials management responsibility because of the high turnover in personnel and because this responsibility is generally considered as a collateral duty. Hazardous waste/hazardous materials management responsibility should be assigned to personnel within a squadron/organization as the primary duty, instead of a collateral duty.

4.0 HAZARDOUS WASTE FACILITIES

4.1 SATELLITE ACCUMULATION AREA (POINT) FACILITIES

The North Carolina Hazardous Waste Management Rules (15A NCAC 13A .0007) and the federal hazardous waste management rules (40 CFR 262) were reviewed to develop the minimum regulatory requirements for SAAs at the Installation. NOVs and NODs were reviewed to assist in understanding the NCHWS's expectations for hazardous waste SAAs. Regulations for <90-day storage areas and current standard industrial practices were used as a basis for developing BMPs for SAAs.

In May 1993 EMD personnel reviewed a draft set of criteria for SAAs to meet minimum regulatory requirements and BMPs and provided comments prior to use in field evaluations and project plan development. On 16 June 1993 a meeting was held at the MCB with representatives of the NCHWS to discuss regulatory requirements for SAAs, existing conditions of SAAs at the Installation, and potential improvements to these facilities.

4.1.1 Minimum Regulatory Requirements

Below are the minimum regulatory requirements for SAAs:

Container Management

1. No more than 55 gallons of a hazardous waste (or compatible hazardous wastes accumulated in the same container) or one quart of acutely hazardous waste may be accumulated at or near any point of generation where wastes initially accumulate, which is under the control of the operator of the process generating the waste (40 CFR 262.34(c)(1)).

2. Container(s) must be in good condition with no leakage (40 CFR 262.34(c)(1)(i) and 265.171).

3. Hazardous waste must be compatible with the materials of construction of the container(s) (40 CFR 262.34(c)(1)(i) and 265.172).

4. Container(s) must be closed at all times, except when adding or removing waste (40 CFR 262.34(c)(1)(i) and 265.173(a)).

5. Container(s) must be labeled with the words "Hazardous Waste" and with the contents of the container (40 CFR 262.34(c)(1)(ii)).

6. Remove any hazardous waste in excess of 55 gallons (or any acutely hazardous waste in excess of one quart) within three days of accumulation of the excess and transfer to a <90-day storage area or to a permitted hazardous waste treatment, storage, or disposal facility (40 CFR 262.34(c)(2)). [In general, this should entail removal of the filled container.]

Facility Structural Design

1. A copy of the SAA Permit obtained from EMD should be prominently displayed. [This is an EMD requirement.]

2. A copy of the "Hazardous Waste Contingency Plan" should be prominently displayed. [This is an EMD requirement.]

Facility Emergency Equipment

1. None.

Other Facility Management

1. None.

4.1.2 Best Management Practices

Below are the BMPs developed for SAAs:

Container Management

1. Follow the "Minimum Regulatory Requirements for SAAs: Container Management."

2. Container(s) should be labeled as to the specific contents of the container.

3. Incompatible wastes should not be placed in the same container. Hazardous wastes should not be placed in an unwashed container that previously held an incompatible waste.

Facility Structural Design

1. SAAs should have a base sufficiently impervious to contain leaks or spills and that is free of cracks or gaps.

2. SAAs for wastes with free liquids should be sloped or otherwise designed (e.g., container(s) stored on pallet) to prevent container contact with spilled or leaked material.

3. SAAs for wastes with free liquids should be designed with sufficient secondary containment capacity to hold the entire contents of the container(s). Examples include sumps, trench drains, curbs, and dikes.

4. Run-on into the secondary containment area should be prevented unless the capacity of the containment system can accommodate the run-on. Examples include sumps, trench drains, curbs, and dikes.

5. Diked or curbed areas equipped with valves for releasing collected liquids or rainwater should also be equipped with locks for the valves. Normally, the valve should remain closed and locked.

6. SAAs for wastes that do not contain free liquids should be sloped or otherwise designed (e.g., container(s) stored on pallet) to drain and remove liquid resulting from precipitation.

7. SAAs for the collection of hazardous wastes that are incompatible with any other wastes or materials stored nearby should be separated or protected from other wastes or materials by means of a dike, berm, wall, or other device.

8. Signs that prohibit smoking and open flames should be conspicuously placed if ignitable or reactive waste is being accumulated.

9. SAAs for ignitable or reactive wastes should be at least 50 feet from the Installation's property line.

10. The SAA permit issued by the MCB (or the authorization letter issued by the MCAS) should be prominently posted at the SAA.

Facility Emergency Equipment

1. The facility should be equipped with an internal communications or alarm system capable of immediate emergency instruction (voice or signal) to personnel at the facility. The equipment should be immediately available to all personnel handling hazardous waste.

2. The facility should be equipped with a device, such as a telephone (immediately available at the scene of operations) or a hand-held two-way radio, capable of summoning external emergency assistance. The equipment should be immediately available to all personnel handling hazardous waste.

3. A portable fire extinguisher and fire control equipment (including special extinguishing equipment such as that using foam, inert gas, or dry chemicals) should be readily available.

4. Water at adequate volume and pressure to supply water hose streams, or foam producing equipment, or automatic sprinklers, or water spray systems should be readily available.

5. Spill control equipment (e.g., absorbent pillows, shovels, brooms, over-pack drums, and personal protection equipment) should be readily available.

6. Decontamination equipment (e.g., emergency shower, eyewash station) should be readily available.

Other Facility Management

1. All communications and alarm equipment, spill control equipment, and decontamination equipment should be tested and maintained as necessary to assure its proper operation in time of emergency.

2. Adequate clearance should be maintained around the SAA (e.g., two to three feet on each side) to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency.

4.2 LESS THAN 90-DAY STORAGE FACILITIES

The North Carolina Hazardous Waste Management Rules (15A NCAC 13A .0007) and the federal hazardous waste management rules (40 CFR 262) were reviewed to develop the minimum regulatory requirements for <90-day storage areas at the Installation. NOVs and NODs were reviewed to assist in understanding the NCHWS's expectations for hazardous waste <90-day storage areas. Regulations for permitted container storage areas and current standard industrial practices were used as a basis for developing BMPs for <90-day storage areas.

In May 1993 EMD personnel reviewed a draft set of criteria for <90-day storage areas to meet minimum regulatory requirements and BMPs and provided comments prior to use in field evaluations and project plan development. On 16 June 1993 a meeting was held at the MCB with representatives of the NCHWS to discuss regulatory requirements for <90-day storage areas, existing conditions of <90-day storage areas at the Installation, and potential improvements to these facilities.

4.2.1 Minimum Regulatory Requirements

Below are the minimum regulatory requirements for <90-day storage areas:

Container Management

1. Containers must not be stored greater than 90 days at the site (40 CFR 262.34(a)).
2. Containers must be in good condition with no leakage (40 CFR 262.34(a)(1)(i) and 265.171).
3. Hazardous waste must be compatible with the materials of construction of the containers (40 CFR 262.34(a)(1)(i) and 265.172).
4. Containers must be closed at all times, except when adding or removing waste (40 CFR 262.34(a)(1)(i) and 265.173(a)).
5. Containers must not be opened, handled, or stored in a manner which may cause a leak or rupture (40 CFR 262.34(a)(1)(i) and 265.173(b)).
6. Incompatible wastes should not be placed in the same container. Hazardous wastes must not be placed in an unwashed container that previously held an incompatible waste (40 CFR 262.34(a)(4) and 265.177(a,b)).

7. The storage area must be inspected weekly for evidence of leakage (40 CFR 262.34(a)(4) and 265.174).

8. Containers must be clearly marked and visible with the date accumulation begins (40 CFR 262.34(a)(2)).

9. Containers must be labeled with the words "Hazardous Waste" (40 CFR 262.34(a)(3)).

10. Containers holding ignitable or reactive waste must be at least 50 feet from the property line (40 CFR 262.34(a)(1) and 265.176).

Facility Structural Design

1. Storage areas for the collection of hazardous wastes that are incompatible with any other wastes or materials stored nearby must be separated or protected from them by means of a dike, berm, wall, or other device (40 CFR 262.34(a)(4) and 265.177(c)).

2. "No Smoking" signs must be conspicuously posted and other necessary precautions observed to prevent the accidental ignition or reaction of the waste (40 CFR 262.34(a)(1), 265.176, and 265.17(a)).

3. Storage areas should be equipped with access control such as fencing or locking doors/gates. [This is an EMD requirement.]

4. Signs should be prominently displayed that read "Keep Out-Authorized Personnel Only," or equivalent wording. [This is an EMD requirement.]

5. A copy of the "Hazardous Waste Contingency Plan" should be prominently displayed. [This is an EMD requirement.]

Facility Emergency Equipment

1. The facility must be equipped with an internal communications or alarm system capable of immediate emergency instruction (voice or signal) to facility personnel. The equipment should be immediately available to all personnel handling hazardous waste (40 CFR 262.34(a)(4), 265.32(a), and 265.34(a)).

2. A device, such as a telephone (immediately available at the scene of operations) or a hand-held two-way radio, capable of summoning external emergency assistance, must be readily available to personnel handling hazardous wastes. The equipment should be immediately available to all personnel handling hazardous waste (40 CFR 262.34(a)(4), 265.32(b), and 265.34(b)).

3. Portable fire extinguishers and fire control equipment (including special extinguishing equipment such as that using foam, inert gas, or dry chemicals) must be readily available (40 CFR 262.34(a)(4) and 265.32(c)).

4. Water at adequate volume and pressure to supply water hose streams, or foam producing equipment, or automatic sprinklers, or water spray systems must be readily available (40 CFR 262.34(a)(4) and 265.32(d)).

5. Spill control equipment (e.g., absorbent pillows, shovels, brooms, over-pack drums, and personal protection equipment) must be readily available (40 CFR 262.34(a)(4) and 265.32(c)).

6. Decontamination equipment (e.g., emergency shower, eyewash station) must be readily available (40 CFR 262.34(a)(4) and 265.32(c)).

Other Facility Management

1. All communications and alarm equipment, spill control equipment, and decontamination equipment must be tested and maintained as necessary to assure its proper operation in time of emergency (40 CFR 262.34(a)(4) and 265.33).

2. Adequate aisle space must be maintained (in the storage area) to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency (40 CFR 262.34(a)(4) and 265.35).

4.2.2 Best Management Practices

Below are the BMPs developed for <90-day storage areas:

Container Management

1. Follow the "Minimum Regulatory Requirements for <90-day Storage Areas: Container Management."

2. Container(s) should be labeled as to the specific contents of the container.

3. Containers should be positioned so that labels are clearly visible from the side for inspection and emergency identification purposes.

4. Containers (or pallets of containers) should not be stacked more than two high unless stored on racks.

5. Containers should not be stacked more than four containers (or two pallets) wide.

Facility Structural Design

1. Follow the "Minimum Regulatory Requirements for <90-day Storage Areas: Facility Structural Design."

2. The storage area should have a base that is sufficiently impervious to contain leaks or spills and that is free of cracks or gaps.

3. Storage areas for wastes with free liquids should be sloped or otherwise designed (e.g., container(s) stored on pallet) to prevent container contact with spilled or leaked material.

4. Storage areas for wastes with free liquids should be designed with sufficient secondary containment capacity to hold the entire contents of the container(s). Examples include sumps, trench drains, curbs, and dikes.

5. Run-on into the containment area should be prevented unless the capacity of the secondary containment system can accommodate the run-on. Examples include sumps, trench drains, curbs, and dikes.

6. Diked or curbed areas equipped with valves for releasing collected liquids or rainwater should also be equipped with locks for the valves. Normally, the valve should remain closed and locked.

7. Storage areas should be provided with adequate roofs or covers to minimize (or eliminate) potential contact with precipitation.

8. Signs that prohibit open flames should be conspicuously placed in areas where ignitable or reactive wastes are being handled.

9. Storage areas for ignitable or reactive wastes should be at least 50 feet from the Installation's property line.

10. Storage areas should have a sign or placard prominently displayed that reads "<90-day Hazardous Waste Storage Area".

Facility Emergency Equipment

1. Follow the "Minimum Regulatory Requirements for <90-day Storage Areas: Facility Emergency Equipment."

Other Facility Management

1. Follow the "Minimum Regulatory Requirements for <90-day Storage Areas: Other Facility Management."

2. A telephone should be immediately available at the scene of each operation where hazardous wastes are handled or stored.

3. A hand-held two-way radio, capable of summoning external emergency assistance, should be carried at all times by each individual handling hazardous waste.

4. A minimum of three feet of aisle space should be maintained in the storage area to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency.

4.3 EXISTING SITE CONDITIONS AND OVERALL COMPLIANCE

The locations of the SAAs and <90-day storage areas at the Installation are noted on the location maps, L-0 through L-10, in the drawing set developed for this study. Tables B-1.1, B-1.2, B-2.1, and B-2.2 in Appendix B provide the following information for the SAAs and <90-day storage areas at the Installation:

- Command/Unit responsible for the site
- Site location (building number)
- Type of waste accumulated/stored
- Waste generation point
- Square footage of the hazardous waste area
- Average time waste remains at the site

- Average quantity accumulated prior to transfer
- Maximum quantity stored at the site
- Age of the site
- Site conditions (refer to Table 4.3-1)

4.3.1 Sites at MCB, Camp Lejeune

A synopsis of information for SAAs at the MCB is presented in Table B-1.1 in Appendix B. A synopsis of information for <90-day storage areas at the MCB is presented in Table B-1.2 in Appendix B.

4.3.2 Sites at MCAS, New River

A synopsis of information for SAAs at the MCAS is presented in Table B-2.1 in Appendix B. A synopsis of information for <90-day storage areas at the MCAS is presented in Table B-2.2 in Appendix B.

4.4 EVALUATION OF FACILITIES

4.4.1 Criteria for Selection of Sites for Improvements

Utilizing the information gathered during the site visits and the evaluation of overall compliance with minimum regulatory requirements and BMPs as discussed earlier, each <90-day storage area and SAA was individually reviewed as a potential candidate for facility or structural improvements. The inventory forms were reviewed, photographs of sites were studied, and conferences were conducted between field personnel and RUST E&I hazardous waste specialists to discuss observations. Criteria were developed based on the hazardous waste management procedures of the Installation, current regulatory requirements and guidelines, and generally accepted methods and facilities being used in industry. The criteria were then used to select potential sites for improvements by comparing site information and conditions with the requirements and practices. Following are the criteria utilized in this study:

- Overall compliance with minimum regulatory requirements
- Overall compliance with best management practices
- Type of storage facility (<90-day or SAA)
- Type of deficiencies, especially structural
- Severity of deficiencies
- Number of deficiencies
- Type of hazardous waste stored

TABLE 4.3-1
LEGEND OF SITE CONDITIONS
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune/MCAS, New River

SYMBOL	DESCRIPTION
a	Inappropriate labelling of container.
b	No accumulation date listed on container.
c	More than one waste stream in a single SAA.
d	No separation of SAAs (example - 4 battery SAA's on one pallet).
e	No two-way communication equipment.
f	No contingency plan posted.
g	No MCB/MCAS SAA/< 90-day permit obtained.
h	No pallet-containers on ground/floor.
i	No secondary containment.
j	Inadequate or no warning signs.
k	No shelter.
l	Site not clearly delineated.
m	Unpaved surfaces.
n	Inadequate aisle space maintained.
o	Inadequate fire control system/equipment.
p	No eyewash.
q	No spill control equipment.
r	Insufficient access control.
s	No decontamination equipment/materials.
t	Inadequate ventilation.
u	Condition of floor/base inadequate.
v	No weekly inspections.
w	Access ramp/curb too steep.
x	No fire extinguisher.

TABLE 4.3-1
LEGEND OF SITE CONDITIONS
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune/MCAS, New River

SYMBOL	DESCRIPTION
y	Structure location inadequate.
z	Old inadequate structure.
aa	More than one drum placed in SAA, but total quantity less than 55 gallons.
ab	MCB/MCAS permit not posted.
ac	"No Smoking" sign not posted.
ad	"Two-Man Rule" not posted or enforced.
ae	Containment wall cracked.
af	Ignitables present.
ag	Incompatibles or reactives present.
ah	Container open.
ai	Visible evidence of past container leakage or overfilling.
aj	Visible evidence of stormwater currently or previously in containment system.
ak	No hazardous waste present during visit.
al	Quantity of waste in SAA exceeds 55 gallons.
am	Waste stored for more than 90 days in < 90-day storage.
an	Container not compatible with waste.
ao	Phone interview - site not visited.
ap	Phone interview - no hazardous waste sites.

- Impact of other materials stored contiguous to waste site
- Quantity of hazardous waste stored
- Adequacy of existing floor space for storing hazardous waste
- Existence and/or adequacy of secondary containment system
- Proximity of site to generation point
- Location of site
- Potential for elimination of site
- Potential for waste being considered non-hazardous or non-regulated in the future

RUST E&I also used the following general parameters in developing the initial list of 65 sites:

- <90-day storage areas not currently located within a permanent building or structure were automatically included
- SAAs currently located outdoors in an uncovered area were automatically included
- <90-day storage areas were given preference over SAAs
- sites accumulating or storing waste oil filters were not included
- NBC sites were not included unless special problems were observed
- sites with liquid hazardous wastes were given preference over sites with dry hazardous wastes

Deficiencies observed at the SAAs and <90-day storage areas are included in the tables in Appendix B under "Site Conditions." Refer also to Table 4.3-1.

4.4.2 Selection of Sites for Improvements

Utilizing the criteria noted above, RUST E&I made an initial selection of 65 sites for the development of project plans and conceptual designs to bring the sites into compliance with minimum regulatory requirements and BMPs. Sites were selected through an iterative process where an initial list was developed, which then went through a quality control review to validate the selection process. The initial list of 65 sites was amended through addition and deletion of individual sites based on the comments of the reviewer. The process was repeated until a consensus was reached. The initial list of 65 sites recommended for improvements was finalized and submitted to EMD personnel on 3 August 1993.

A meeting was held at the EMD offices to discuss the initial list of selected sites. EMD personnel made comments on both individual sites and the list of sites as a whole. EMD personnel indicated that a program already exists to reconstruct sites at the MCB that are of the standard three-bay design to meet the MCB's recently revised standard design for hazardous waste storage structures. This revised design includes installation of improved access ramps and security gates and painting the structures. EMD personnel requested that these sites be taken off the list unless the structure would be significantly deficient in meeting the minimum regulatory requirements or BMPs after reconstruction. EMD personnel also requested that the sites on the final list be classified by the general extent of improvements proposed for the site. RUST E&I finalized the list of sites by adding and deleting sites based on the EMD's comments. The final list of selected sites was submitted to EMD personnel on 2 September 1993.

The final listing of sites recommended for improvements is shown in Tables 4.4-1 through 4.4-3. Table 4.4-4 lists those sites initially recommended by RUST E&I for improvement that are already scheduled for upgrade by the MCB. One of the sites already scheduled for upgrade, site S-1762, was left on the final list of selected sites to serve as an example of additional improvements that could be made to the MCB's standard design.

4.5 PROJECT PLANS AND LIFE CYCLE COST ANALYSIS

4.5.1 Conceptual Designs

Each site on the final list was re-examined in detail by reviewing the inventory forms, photographs, and discussing observations with field personnel. In particular, the deficiencies and overall compliance with minimum regulatory requirements and BMPs were noted in preparation for developing conceptual designs for improvements.

After analyzing the deficiencies for the selected sites, generic approaches were developed for improvements to bring facilities into compliance with minimum regulatory requirements and BMPs. Since there are minimal structural and equipment requirements associated with the minimum regulatory requirements for SAAs, very few conceptual designs were developed to meet these requirements. Of the <90-day storage areas on the final list of sites, conceptual improvements for compliance with minimum regulatory requirements and BMPs were designed for all but two sites. These two <90-day storage areas, HP-104 and AS-605, were already in compliance with minimum regulatory requirements.

New facilities are proposed for several <90-day storage areas under both the minimum regulatory and the BMPs alternatives because of the following:

1. There are no permanent structures provided at the site for storing hazardous waste.

TABLE 4.4-1

LIST OF SITES RECOMMENDED FOR IMPROVEMENTS AT MCB, CAMP LEJEUNE, NORTH CAROLINA

HAZARDOUS WASTE ACCUMULATION POINT STUDY

					NUMBER OF SITES			IMPROVEMENT CLASS	
#	COMMAND	REG/BN/ORGANIZATION	UNIT	LOCATION	<90-DAY	SAA	SITE CONDITIONS**	MINIMUM	BMP
1	2D FSSG	2D LANDING SUPT BN	COMM SEC	FC-140	1		e,h,p,q,ad	MINOR MOD	MINOR MOD
1	2D FSSG	2D LANDING SUPT BN	H&S NBC WAREHOUSE	1871 (NEW)	1		e,f,h,i,j,l,m,o,p,q,s,t,u,x,z,ac,ak	MINOR MOD	MINOR MOD
1	2D FSSG	2D MAINT BN	ELMACO	FC-50		1	l,ad	NONE	MINOR MOD
1	2D FSSG	2D MAINT BN	RADIO (ELMACO)	FC-51(NEW)	1		e,f,g,i,j,p,q,s,t,x,	NEW	NEW
1	2D FSSG	2D SUPPLY BN	H&S CO PP&P	915	1		e,i,r,x,ad,af	NEW	NEW
1	2D FSSG	2D SUPPLY BN	MEDLOG	907	1		e,f,l,r,v,al	NEW	NEW
1	2D FSSG	2D SUPPLY BN	SMU-FLAMMS	TP-466	1		e,f,p,ad,af,ag	MINOR MOD	NEW
1	2D FSSG	8TH ENGR SUPPT BN	COMM	FC-200		1	f,i,k,l,q,u,ad	NONE	MINOR MOD
1	2D MAR DIV	2D ASLTPHIB BN		A-47 (NEW)	1		e,m,p	MINOR MOD	MAJOR MOD
1	2D MAR DIV	2D ASLTPHIB BN		A-47		1	h,i,p,af	NONE	NEW
1	2D MAR DIV	2D COMBAT ENGR BN		1883		1	e,h,q,af	NONE	MINOR MOD
1	2D MAR DIV	2D COMBAT ENGR BN		1884		1	e,l,i,n,p,q,x,af	NONE	MINOR MOD
1	2D MAR DIV	2D COMBAT ENGR BN		S-1805	1		m,p	MINOR MOD	MAJOR MOD
1	2D MAR DIV	2D LT ARM INF BN	MOTOR-T	575	1		e,m,o,p,af,ag	NEW	NEW
1	2D MAR DIV	2D LT ARM INF BN	MOTOR-T	575		1	p,q,y,af,ag	NONE	MINOR MOD
0	2D MAR DIV	2D LT ARM INF BN	MOTOR-T	[575]		1	l,m,p,q,y,af,aj	NONE	MINOR MOD
1	2D MAR DIV	2D LT ARM INF BN	NBC WAREHOUSE	445		1	i,p,af	NONE	MINOR MOD
1	2D MAR DIV	2D MAR REGT	NBC WAREHOUSE	HP-200		1	d,af	NONE	MINOR MOD
1	2D MAR DIV	2D RECON BN	MOTOR-T	BA-130	1		e,m,o,p	MINOR MOD	MAJOR MOD
1	2D MAR DIV	8TH MAR REGT	COMM	HP-104	1		h,i,z	NONE	NEW
1	2D MAR DIV	8TH MAR REGT	HQ CO-NBC WAREHOUSE	117		1	h,i,ag	NONE	MINOR MOD
1	2D MAR DIV	10TH MAR REGT	5TH BN-MAINT	1450	1		e,o,p,af	MINOR MOD	NEW
1	2D MEF	H&S CO	MOTOR-T SECTION	1205	1		b,e,f,j,k,n,p,q,r,s,u,af	NEW	NEW
1	2D SRIG	8TH COMM BN	BRAVO CO	1604	1		e,f,i,j,k,o,p,u,v	NEW	NEW
1	2D SRIG	HQ & SERVICE CO		1309/1310	1	1	i,j,k,u,ac	MINOR MOD	MAJOR MOD
1	MCB	BASE BRIG		1041		1	i,k,s,u,x,af	MAJOR MOD	MAJOR MOD
0	MCB	BASE BRIG		[1041]	1		e,f,i,m,r,s,,u,x,af	MAJOR MOD	MAJOR MOD
1	MCB	FAC-MAINTENANCE		1102	1		e,i,x,ad,af	MINOR MOD	NEW
1	MCB	FAC-MAINTENANCE		S-866	1		e,i,p,x,ad,af	MINOR MOD	MAJOR MOD
1	MCB	FAC-MAINTENANCE	PAINT SHOP	1202		1	l,ad,af	NONE	MINOR MOD
1	MCB	LOGISTICS		OUTSIDE 906	1		f,h,i,q,x,ad,af	MAJOR MOD	MAJOR MOD
1	MCB	MC SERV SPT SCHOOL	MOTOR T	SM-93	1		p,r,ad,af,ag,aj,am	MAJOR MOD	NEW
1	MCB	MORALE, WEL & REC	AUTO HOBBY SHOP(HP)	1106/1107		1	e,h,k,l,q,x,ad,af	NONE	MINOR MOD
1	MCB	MORALE, WEL & REC	PAINT LOCKER	1738		1	e,h,i,l,p,ad,af	NONE	MINOR MOD
1	MCB	MORALE, WEL & REC	MAINT	S-1762*	1		e,m,p,r,x,ad	MINOR MOD	MAJOR MOD
1	MCB	RESERVE SUPP UNIT	RESERVE AFFAIRS DEPT	1111	1		e,i,j,r,x,ak	NEW	NEW
1	MCB	RIFLE RANGE DETACH		RR-62	1		i,k,p,u,ad	MINOR MOD	MAJOR MOD
1	MCB	SCHOOL OF INFANTRY		TC-773(TC-611)	1		e,p,q,x,ad,aj	MINOR MOD	NEW
1	MCB	TRAINING & OPS		1410	1	_	e,h,j,k,n,p,r,u,v,x,ad,af	NEW	NEW
37					25	15			

LEGEND

\# - "1" INDICATES SITE PLAN DEVELOPED; "0" INDICATES IMPROVEMENTS INCLUDED IN ANOTHER SITE PLAN (I.E., DUPLICATE SITE).

[ ] - LOCATION IN BRACKETS INDICATES DUPLICATE SITE (E.G., [AS-3905]).

* - DENOTES STRUCTURE ALREADY BEING UPGRADED THROUGH PUBLIC WORKS PROJECT TO MEET MCB STANDARD DESIGN FOR A HAZARDOUS WASTE STORAGE STRUCTURE.

** - SEE TABLE 4.3-1 FOR LEGEND OF SITE CONDITIONS.

TABLE 4.4–2

LIST OF SITES RECOMMENDED FOR IMPROVEMENTS AT THE NAVAL HOSPITAL, CAMP LEJEUNE, NORTH CAROLINA

HAZARDOUS WASTE ACCUMULATION POINT STUDY

					NUMBER OF SITES			IMPROVEMENT CLASS	
#	COMMAND	ORGANIZATION	UNIT	LOCATION	<90–DAY	SAA	SITE CONDITIONS**	MINIMUM	BMP
1	MCB	NAVAL HOSPITAL		NH–100		2	c,f,h,i,l,af,ag	NONE	MINOR MOD
1	MCB	NAVAL HOSPITAL		NH–100		1	f,g,h,l,af,ag	NONE	MINOR MOD
1	MCB	NAVAL HOSPITAL		NH–118	1		e,f,l,p,af	MINOR MOD	NEW
3					1	3			

LEGEND

\# – "1" INDICATES SITE PLAN DEVELOPED; "0" INDICATES IMPROVEMENTS INCLUDED IN ANOTHER SITE PLAN (I.E., DUPLICATE SITE).

[ ] – LOCATION IN BRACKETS INDICATES DUPLICATE SITE (E.G., [AS–3905]).

* – DENOTES STRUCTURE ALREADY BEING UPGRADED THROUGH PUBLIC WORKS PROJECT TO MEET MCB STANDARD DESIGN FOR A HAZARDOUS WASTE STORAGE STRUCTURE.

** – SEE TABLE 4.3–1 FOR LEGEND OF SITE CONDITIONS.

TABLE 4.4-3

LIST OF SITES RECOMMENDED FOR IMPROVEMENTS AT THE MCAS, NEW RIVER, NORTH CAROLINA

HAZARDOUS WASTE ACCUMULATION POINT STUDY

					NUMBER OF SITES			IMPROVEMENT CLASS	
#	COMMAND	GROUP/ORGANIZATION	SQUADRON	LOCATION	<90-DAY	SAA	SITE CONDITIONS**	MINIMUM	BMP
1	2D MAW	MACG-28	MATCS 28	AS-3506(NEW)	1		e,f,i,j,o,p,q,s,x,	MINOR MOD	MINOR MOD
1	2D MAW	MAG-26	HMH 461	AS-3905	1		e,i,j,s	MAJOR MOD	MAJOR MOD
1	2D MAW	MAG-26	HMH 461	AS-3905		1	l,ab,af	NONE	MINOR MOD
0	2D MAW	MAG-26	HMH 461	[AS-3905]		1	a,s,ab	NONE	MINOR MOD
1	2D MAW	MAG-26	HMLA 167	AS-4115	1		a,b,e,l,n,v,af	NEW	NEW
1	2D MAW	MAG-26	HMM 261	AS-574	1		e,f,h,i,j,t,af	MAJOR MOD	MAJOR MOD
1	2D MAW	MAG-26	HMM 266	AS-528	1		e,h,i,ag	MINOR MOD	NEW
0	NONE	NONE	NONE	[AS-528]	1		a,e,h,i,s,af,ag	MINOR MOD	NEW
0	2D MAW	MAG-26	HMM 266	AS-530	1		e,i,s,af,ah	COMBINE WITH AS-528	
1	2D MAW	MAG-26	HMT 204	AS-504		1	af	NONE	MINOR MOD
1	2D MAW	MAG-26	HMT 204	AS-591	1		f,h,i,j,n,p,s,v,x,ac,al,ah	NEW	NEW
1	2D MAW	MAG-26	MALS 26 (AVIONICS)	AS-4141		1	f,h,i,l,ab	NONE	MINOR MOD
1	2D MAW	MAG-26	MALS 26 (GSE)	AS-4147		3	a,b,d,l,s,ab,af,ag	NONE	MINOR MOD
1	2D MAW	MAG-26	MALS 26 (MAINT)	AS-518		2	a,e,h,l,ab,af,ah	NONE	MAJOR MOD
1	2D MAW	MAG-26	MALS 26 (MAINT)	AS-525	1		l,n,p,s,y,af	MAJOR MOD	NEW
1	2D MAW	MAG-26	MALS 26 (MAINT)	AS-552		2	b,e,h,i,l,n,q,s,u,x,z,ab,ac,af	NONE	MAJOR MOD
1	2D MAW	MAG-29	HMH 464	AS-3905		1	h,i,l,af	NONE	MINOR MOD
1	2D MAW	MAG-29	HMM 162	AS-4117	1		a,b,e,f,h,i,j,p,s,q,af,al	NEW	NEW
0	2D MAW	MAG-29	HMM 162	[AS-4117]		1	a,e,i,l,p,s,t,ab,af,aj,an	NONE	MINOR MOD
1	2D MAW	MAG-29	HMM 365	AS-4100	1		s,ab,af	NEW	NEW
1	2D MAW	MAG-29	MALS 29 (GSE)	AS-4135	1		a,b,n,r,v,y,,ad,af,ag	MAJOR MOD	NEW
1	2D MAW	MAG-29	MALS 29 (MAINT)	AS-4114		1	e,g,i,s,af,ag,al	NONE	MINOR MOD
1	2D MAW	MAG-29	MALS 29 (MAINT)	AS-4134	1		e,g,i,l,n,ad,al	MINOR MOD	MAJOR MOD
1	2D MAW	MAG-29	NBC	AS-811		3	h,i,l,n,q,s,ab,ag	NONE	MAJOR MOD
1	?	?	FUTURE SQUADRON	AS-515	1		f,h,i,j,r,s,u	NEW	NEW
1	2D MAW	MWSG-27	MWSS272	AS-4158	1		b,k,p,r,s,u,af,ag	NEW	NEW
1	MCAS	HQ	HAZ WASTE WAREHOUSE	AS-605	1		u,y,af	NONE	NEW
23					16	17			

LEGEND

\# - "1" INDICATES SITE PLAN DEVELOPED; "0" INDICATES IMPROVEMENTS INCLUDED IN ANOTHER SITE PLAN (I.E., DUPLICATE SITE).

[ ] - LOCATION IN BRACKETS INDICATES DUPLICATE SITE (E.G., [AS-3905]).

* - DENOTES STRUCTURE ALREADY BEING UPGRADED THROUGH PUBLIC WORKS PROJECT TO MEET MCB STANDARD DESIGN FOR A HAZARDOUS WASTE STORAGE STRUCTURE.

** - SEE TABLE 4.3-1 FOR LEGEND OF SITE CONDITIONS.

TABLE 4.4-4

LIST OF SITES CURRENTLY SCHEDULED FOR IMPROVEMENTS AT THE MCB, CAMP LEJEUNE, NORTH CAROLINA

HAZARDOUS WASTE ACCUMULATION POINT STUDY

					NUMBER OF SITES			
#	COMMAND	REG/BN/ORGANIZATION	UNIT	LOCATION	<90-DAY	SAA	SITE CONDITIONS**	IMPROVEMENT CLASS
1	2D FSSG	2D LANDING SUPT BN		SFC-145*	1		e,r,x,ac	SCHEDULED FOR IMPROVEMENTS
1	2D FSSG	2D MAINT BN	GSM	SFC-282*	1		a,b,e,m,p,r,x,ad,ag,al,an	SCHEDULED FOR IMPROVEMENTS
1	2D FSSG	2D MAINT BN	H&S CO MOTOR-T	SFC-37*	1		e,r,x,ad	SCHEDULED FOR IMPROVEMENTS
1	2D FSSG	2D MAINT BN	OMC (ORD)	FC-285*	1		e,r,ad,af	SCHEDULED FOR IMPROVEMENTS
1	2D FSSG	2D MAINT BN	ORF	SFC-46*	1		e,j,r,x,ad	SCHEDULED FOR IMPROVEMENTS
1	2D FSSG	2D MEDICAL BN		SFC-234*	1		e,j,r,x	SCHEDULED FOR IMPROVEMENTS
1	2D FSSG	2D SUPPLY BN	MOTOR-T	SFC-233*	1		b,e,f,n,r,x,ad,af,ag	SCHEDULED FOR IMPROVEMENTS
1	2D FSSG	8TH MOTOR SUPPT BN		SFC-279*	1		e,r,am	SCHEDULED FOR IMPROVEMENTS
1	2D FSSG	HQ & SERVICE BN	COMM	SFC-238*	1		e,p,r,x,af,ag	SCHEDULED FOR IMPROVEMENTS
0	2D FSSG	HQ & SERVICE BN	MOTOR T	[SFC-238]*	1		e,p,r,x,af,ag	SCHEDULED FOR IMPROVEMENTS
1	2D FSSG	MSSG-22		SFC-97*	1		a,b,f,m,p,q,x	SCHEDULED FOR IMPROVEMENTS
1	2D MAR DIV	10TH MAR REGT	HQ BATTERY-MOTOR-T	1323*	1		e,p,r	SCHEDULED FOR IMPROVEMENTS
1	2D MAR DIV	2D MAR REGT		SHP-249*	1		e,q,r	SCHEDULED FOR IMPROVEMENTS
1	2D MAR DIV	2D TANK BN	MAINT	S1853*	1		m,r,w	SCHEDULED FOR IMPROVEMENTS
1	2D MAR DIV	6TH MAR REGT	MOTOR-T	S-1836*	1		e,p,r,s,w,ae	SCHEDULED FOR IMPROVEMENTS
1	2D MAR DIV	HQ BTN	COMM CO	1860*	1		p,r,ac	SCHEDULED FOR IMPROVEMENTS
1	2D MAR DIV	HQ BTN	TRUCK CO	1780*	1		m,p,w,aj	SCHEDULED FOR IMPROVEMENTS
1	2D SRIG	2ND ANGLICO CO	MOTOR-T	SFC-237*	1		a,b,e,m,r,af	SCHEDULED FOR IMPROVEMENTS
1	2D SRIG	REMOTE PILOT VEH CO		S1746*	1		e,m,p,r,x	SCHEDULED FOR IMPROVEMENTS
1	MCB	EMD/DRMO		TP-464	1		ao	SCHEDULED FOR IMPROVEMENTS
1	MCB	MC ENGR SCHOOL	MAINT PLANT	BB-51*	1		e,f,h,j,l,p,r,af,ag	SCHEDULED FOR IMPROVEMENTS
1	MCB	MC SERV SPT SCHOOL		M-178 (NEW)*	1		f,i,j,k,p,r,s,v,x	SCHEDULED FOR IMPROVEMENTS
21					22	0		

LEGEND

- "1" INDICATES SITE PLAN DEVELOPED; "0" INDICATES IMPROVEMENTS INCLUDED IN ANOTHER SITE PLAN (I.E., DUPLICATE SITE).

[ ] - LOCATION IN BRACKETS INDICATES DUPLICATE SITE (E.G., [AS-3905]).

* - DENOTES STRUCTURE ALREADY BEING UPGRADED THROUGH PUBLIC WORKS PROJECT TO MEET MCB STANDARD DESIGN FOR A HAZARDOUS WASTE STORAGE STRUCTURE.

** - SEE TABLE 4.3-1 FOR LEGEND OF SITE CONDITIONS.

2. The existing facilities were so lacking in amenities that any improvements to comply with minimum requirements would be so extensive as to be as costly as the BMP improvements.

3. There were major problems of adequate space that could not be solved by modifying the existing structure to comply with minimum requirements.

4. The existing structure could not be practically modified to solve problems with storage of incompatible wastes.

Conceptual designs have been developed to: 1) define the scope of work necessary at each site, and 2) provide enough information to prepare a cost estimate sufficient for a life cycle cost analysis and future funding requests. The conceptual designs are not intended to be used for construction. The conceptual design for each site provides information on individual improvement items and provides some definition of the extent of those improvement items. Construction practices that are normal to eastern North Carolina were considered in developing the conceptual designs.

EMD personnel requested that the sites on the final list of selected sites be classified by the general extent of improvements proposed for the site. The final list of selected sites submitted to the EMD on 2 September 1993 had the proposed improvement classification included for each site.

Proposed site improvements are classified as follows:

1. Minor modification: The addition of new ancillary equipment (e.g., fire extinguishers, signs), new prefabricated equipment (e.g., spill containment pallet, small fire-proof cabinet), or minor structural improvements to the existing facilities totaling less than $5,000.

2. Major modification: The addition of new ancillary equipment (e.g., telephones, alarm pull box) with significant installation costs, new prefabricated structures (e.g., 4-drum hazardous storage structure, 6-drum hazardous storage structure), or major structural improvements to the existing facilities totaling more than $5,000.

3. New structure: The construction of a new permanent storage structure.

Tables 4.4-1, 4.4-2, and 4.4-3 include the generic improvement class of the conceptual designs developed for each selected site to meet minimum regulatory requirements and BMP criteria.

Where appropriate, a design developed by the MCB for a hazardous waste storage facility was utilized to provide uniformity of structures. The standard MCB facility is a three-bay structure with containment and other appurtenances. This design was modified to also be used as a two-bay or four-bay structure, where necessary. Chemical-resistant coating, a telephone, and an emergency alarm pull box were also added to the MCB design to conform to BMPs.

In some special cases, a prefabricated structure is being proposed as the method to comply with requirements or practices. These special cases include sites where very small quantities of waste are generated, sites with a lack of available space for the MCB standard structure, and sites with special structural requirements. Many of the SAAs are proposed to be improved with prefabricated spill containment structures designed for 55-gallon drums. At several of the SAAs, fire-proof cabinets that include spill containment for small containers are being proposed. The BMP conceptual design for the Naval Hospital's <90-day site includes three prefabricated structures specially designed for medical waste.

The conceptual designs for the selected sites are presented on the site plans and the detail sheets in the drawing set developed for this study. Site plans are on S-1 through S-17 (Sheets 12 through 28), and detail sheets are on D-1 through D-5 (Sheets 29 through 33).

4.5.2 Life Cycle Cost Analysis

Cost estimates were prepared for site improvements for both minimum regulatory requirements and BMPs based on the conceptual designs. Information used to develop the estimates included design criteria, site plans, detail sheets, AutoCad files provided by NAVFAC personnel, inventory forms, photographs, and other information. Conceptual quantity take-offs were accomplished for the major construction disciplines, except for some small items for which allowances were utilized. The quantity take-offs are based on the assumption that the work will be performed by a third party contractor as a result of a competitively bid lump sum contract. Unit costs were taken from the 1993 Means Building Construction Cost Data and adjusted to the site and type of project. A ten percent contingency was included in the estimates.

Annual operation and maintenance (O&M) costs were developed based upon unit costs provided by MCB personnel. The only significant O&M costs identified pertained to telephone and fire alarm utility charges and general facility maintenance (e.g., regular general cleaning, periodic painting, minor facility repair, fire extinguisher recharging, spill kit stock replenishment).

The cost estimates were used to perform a life cycle cost analysis comparing the capital cost, the O&M cost, and the net present value (NPV) of the minimum regulatory requirements alternative and the BMP alternative. The life cycle cost analysis develops the costs for a specific improvement project over the estimated life of the facility, and then presents the information as a NPV. The life cycle cost analysis was performed using PC-ECONPACK Version 3.0 developed by the U.S. Army Corps of Engineers, and supplied by the Public Works Office at the MCB. To utilize this software and perform a valid comparison, it is necessary to make certain assumptions related to engineering economic analysis. The following assumptions were used in the life cycle cost analysis:

- Period of analysis, including construction period is 25 years.
- Start year and base year are both 1994.
- Discount rate is 8.20% (per MCB personnel instructions).
- Discount convention is middle-of-year.
- Inflation index is 3.30% for 1994 and 1995, and 3.20% thereafter (per MCB personnel instructions).
- No salvage value is assumed.
- Operating utility charge is $30 per month for telephone and fire alarm.
- Maintenance laborer cost is $14.52 per hour.
- Maintenance cost is $528 per year for a standard 3-bay structure based on 1/2 hour per week of laborer time plus $150 per year in materials.
- Replacement life for gates, fences, asphaltic pavement, electrical and alarm cable, eyewash, fire extinguishers, spill kits, drain lines, drain valves, signs, and safety cabinets is 10 years.
- Replacement life for prefabricated structures and drum spill containment systems is 15 years.
- Replacement life for permanent structures, block walls, concrete ramps, and concrete pavement is 25 years.

Maintenance costs were adjusted based on the perception of the effort to maintain a site relative to the standard three-bay structure. Labor costs associated with the daily movement and routine inspection of hazardous waste containers were not included because the cost differential between the minimum regulatory requirement alternative and the BMP alternative was assumed to be negligible. Replacement costs were calculated on 1993 dollars and escalated to the year of replacement.

The PC-ECONPACK, utilizing the above assumptions, determined the NPV for each of the selected sites for both minimum regulatory requirements and the BMP improvements. The NPV for each potential project plan is presented in the applicable project plan in Appendix C. Capital, O&M, and NPV cost estimates are summarized in Table 4.5-1. The life cycle

TABLE 4.5-1
Life Cycle Cost Analysis and Project Plan Recommendations Summary
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune/MCAS, New River

Responsible Unit (Site Designation)	Location (Drawing No.)	Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
2D FSSG 2D Landing Support Bn (<90-Day Storage Area)	FC-140 (S-6)	Minimum	2,000	530	11,700
		BMP	5,100	890	23,000
2D FSSG 2D Landing Support Bn (<90-Day Storage Area)	1871 (S-5)	Minimum	1,100	530	10,000
		BMP	3,300	890	22,700
2D FSSG 2D Maintenance Bn (ELMACO) (SAA)	FC-50 (S-9)	Minimum	—	—	—
		BMP	1,300	620	11,500
2D FSSG 2D Maintenance Bn (<90-Day Storage Area)	Outside FC-51 (S-4)	Minimum	24,600	530	36,300
		BMP	27,600	890	47,500
2D FSSG 2D Supply Bn (<90-Day Storage Area)	915 (S-4)	Minimum	14,400	530	16,800
		BMP	33,300	890	51,900
2D FSSG 2D Supply Bn (Medlog) (<90-Day Storage Area)	907 (S-7)	Minimum	21,500	530	40,400
		BMP	22,900	890	47,700
2D FSSG 2D Supply Bn (<90-Day Storage Area)	TP-466 (S-3)	Minimum	2,500	530	11,300
		BMP	32,200	890	49,700
2D FSSG 8th Engineering Support Bn (SAA)	Outside FC-200 (S-9)	Minimum	—	—	—
		BMP	2,600	620	14,100

Notes:
1) **Recommendations for project plans denoted by shaded area.**
2) **"—" indicates that no improvements are required for the site to meet minimum regulatory requirements.**

TABLE 4.5-1
Life Cycle Cost Analysis and Project Plan Recommendations Summary
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune/MCAS, New River

Responsible Unit (Site Designation)	Location (Drawing No.)	Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
2D Mar Div 2D Amphibious Assault Bn (<90-Day Storage Area)	Outside A-47 (S-5)	Minimum	1,800	530	11,200
		BMP	10,600	890	27,600
2D Mar Div 2D Amphibious Assault Bn (SAA)	Outside A-47 (S-5)	Minimum	—	—	—
		BMP	1,600	620	11,800
2D Mar Div 2D Combat Engineering Bn (SAA)	1883 (S-9)	Minimum	—	—	—
		BMP	4,000	620	16,900
2D Mar Div 2D Combat Engineering Bn (SAA)	1884 (S-9)	Minimum	—	—	—
		BMP	4,000	620	16,900
2D Mar Div 2D Combat Engineering Bn (<90-Day Storage Area)	S-1805 (S-6)	Minimum	1,600	530	10,900
		BMP	12,800	890	30,000
2D Mar Div, 2D Light Armored Infantry Bn (<90-Day Storage Area)	Outside 575 (S-1)	Minimum	31,700	530	43,500
		BMP	35,200	890	55,500
2D Mar Div, 2D Light Armored Infantry Bn (Two SAAs)	Outside 575 (S-1)	Minimum	—	—	—
		BMP	4,500	620	17,900
2D Mar Div 2D Light Armored Infantry Bn (NBC) (SAA)	445 (S-9)	Minimum	—	—	—
		BMP	1,800	620	12,500

Notes:
1) **Recommendations for project plans denoted by shaded area.**
2) **"—" indicates that no improvements are required for the site to meet minimum regulatory requirements.**

TABLE 4.5-1
Life Cycle Cost Analysis and Project Plan Recommendations Summary
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune/MCAS, New River

Responsible Unit (Site Designation)	Location (Drawing No.)	Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
2D Mar Div 2D Marine Regiment (NBC) (SAA)	HP-200 (S-9)	Minimum	—	—	—
		BMP	880	620	10,700
2D Mar Div 2D Reconaissance Bn (<90-Day Storage Area)	BA-130 (S-6)	Minimum	900	530	9,500
		BMP	6,300	890	24,000
2D Mar Div 8th Marine Regiment (Communications) (<90-Day Storage Area)	HP-104 (S-10)	Minimum	—	—	—
		BMP	31,200	890	55,900
2D Mar Div 2D 8th Marine Regiment (NBC) (SAA)	117 (S-10)	Minimum	—	—	—
		BMP	1,500	620	12,100
2D Mar Div 10th Marine Regiment (<90-Day Storage Area)	Outside 1450 (S-1)	Minimum	2,400	530	11,000
		BMP	10,000	620	25,000
2D MEF H & S Company (<90-Day Storage Area)	Outside 1205 (S-3)	Minimum	29,600	530	39,700
		BMP	34,900	890	52,800
2D SRIG, 8th Communications Bn (<90-Day Storage Area)	Outside 1604 (S-1)	Minimum	38,300	530	62,800
		BMP	41,000	890	68,400
2D SRIG HQ & S Company (<90-Day Storage Area)	Between 1309 and 1310 (S-7)	Minimum	3,100	530	13,900
		BMP	10,600	890	30,200

Notes:
1) **Recommendations for project plans denoted by shaded area.**
2) **"—" indicates that no improvements are required for the site to meet minimum regulatory requirements.**

TABLE 4.5-1
Life Cycle Cost Analysis and Project Plan Recommendations Summary
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune/MCAS, New River

Responsible Unit (Site Designation)	Location (Drawing No.)	Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
MCB Base Brig (<90-Day Storage Area; One SAA)	South of 1041 (S-8)	Minimum	9,100	260	18,100
		BMP	11,000	620	27,200
MCB Facilities Maintenance (<90-Day Storage Area)	Outside 1102 (S-2)	Minimum	2,100	530	11,800
		BMP	35,300	890	52,500
MCB Facility Maintenance (<90-Day Storage Area)	S-866 at 45 (S-7)	Minimum	1,300	530	10,400
		BMP	6,300	890	23,700
MCB Facilities Maintenance (Paint Shop) (SAA)	1202 (S-9)	Minimum	—	—	—
		BMP	560	620	10,100
MCB Logistics (<90-Day Storage Area	Outside 908 (S-8)	Minimum	5,500	260	11,000
		BMP	5,900	620	15,900
MCB Marine Corp Service Support School (<90-Day Storage Area)	SM-93 (S-4)	Minimum	4,000	530	14,400
		BMP	12,200	890	33,400
MCB MWR (Hobby Shop) (SAA)	Between 1106 and 1107 (S-10)	Minimum	—	—	—
		BMP	6,900	620	20,600
MCB MWR (Maintenance) (SAA)	1738 (S-5)	Minimum	—	—	—
		BMP	4,000	620	16,900

Notes:

1) **Recommendations for project plans denoted by shaded area.**
2) **"—" indicates that no improvements are required for the site to meet minimum regulatory requirements.**

TABLE 4.5-1
Life Cycle Cost Analysis and Project Plan Recommendations Summary
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune/MCAS, New River

Responsible Unit (Site Designation)	Location (Drawing No.)	Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
MCB MWR (Maintenance) (<90-Day Storage Area)	S-1762 (S-5)	Minimum	2,000	530	11,700
		BMP	8,100	890	28,900
MCB Reserve Support Unit (<90-Day Storage Area)	Outside 1111 (S-2)	Minimum	29,000	530	38,100
		BMP	31,800	890	48,800
MCB Rifle Range Detachment (<90-Day Storage Area)	RR-62 (S-8)	Minimum	2,900	530	12,600
		BMP	7,800	890	26,100
MCB School of Infantry (<90-Day Storage Area)	Outside TC-773/ Outside TC-611 (S-3)	Minimum	1,300	530	10,400
		BMP	32,300	890	49,900
MCB Training and Operations (<90-Day Storage Area)	Outside 1410 (S-2)	Minimum	34,500	530	48,900
		BMP	36,300	890	57,800
MCB Naval Hospital (Two SAAs)	NH-100 (S-11)	Minimum	—	—	—
		BMP	1,800	620	12,700
MCB Naval Hospital (SAA)	NH-100 (S-11)	Minimum	—	—	—
		BMP	290	620	9,600
MCB Naval Hospital (<90-Day Storage Area)	NH-118 (S-11)	Minimum	1,700	530	10,600
		BMP	29,300	890	56,500

Notes: 1) Recommendations for project plans denoted by shaded area.
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TABLE 4.5-1
Life Cycle Cost Analysis and Project Plan Recommendations Summary
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune/MCAS, New River

Responsible Unit (Site Designation)	Location (Drawing No.)	Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
2D MAW MACG 28, MATCSS 28 (<90-Day Storage Area)	AS-3506 (S-16)	Minimum	2,000	530	11,700
		BMP	3,700	890	20,200
2D MAW MAG 26, HMH-461 (<90-Day Storage Area)	AS-3905 (S-15)	Minimum	23,900	1,600	57,100
		BMP	27,100	1,900	66,300
2D MAW MAG 26, HMH 461 (Two SAAs)	AS-3905 (S-15)	Minimum	—	—	—
		BMP	1,900	620	12,800
2D MAW MAG 26, HMLA 167 (<90-Day Storage Area)	AS-4115 (S-16)	Minimum	23,400	530	34,000
		BMP	26,600	890	45,600
2D MAW MAG 26, HMM 261 (<90-Day Storage Area)	AS-574 (S-15)	Minimum	3,200	690	14,312
		BMP	6,600	1,000	25,800
2D MAW MAG 26, HMM 266 (Two <90-Day Storage Areas)	AS-530/AS-528 (S-11/S-12)	Minimum	3,000	530	10,600
		BMP	41,200	1,300	63,900
2D MAW MAG 26, HMT 204 (Two SAAs)	AS-504 (S-17)	Minimum	—	—	—
		BMP	1,800	550	11,700
2D MAW MAG 26, HMT 204 (<90-Day Storage Area)	AS-591 (S-13)	Minimum	35,700	530	59,900
		BMP	38,800	890	62,700

Notes:
1) **Recommendations for project plans denoted by shaded area.**
2) **"—" indicates that no improvements are required for the site to meet minimum regulatory requirements.**

TABLE 4.5-1

Life Cycle Cost Analysis and Project Plan Recommendations Summary

Hazardous Waste Accumulation Point Study

MCB, Camp Lejeune/MCAS, New River

Responsible Unit (Site Designation)	Location (Drawing No.)	Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
2D MAW MAG 26, MALS 26 (Avionics) (SAA)	AS-4141 (S-17)	Minimum	—	—	—
		BMP	500	620	10,000
2D MAW MAG 26, MALS 26 (GSE) (Three SAAs)	AS-4147 (S-17)	Minimum	—	—	—
		BMP	12,500	890	32,300
2D MAW MAG 26, MALS 26 (Maintenance) (Two SAAs)	AS-518 (S-17)	Minimum	—	—	—
		BMP	17,300	890	44,000
2D MAW MAG 26, MALS 26 (Maintenance) (<90-Day Storage Area)	AS-525 (S-13)	Minimum	11,600	1,100	32,400
		BMP	63,700	1,300	101,400
2D MAW MAG 26, MALS 26 (Flight Equip) (Two SAAs)	AS-552 (S-17)	Minimum	—	—	—
		BMP	9,500	620	24,300
2D MAW MAG 29, HMH 464 (SAA)	AS-3905 (S-15)	Minimum	—	—	—
		BMP	290	620	9,600
2D MAW MAG 29, HMM 162 (<90-Day Storage Area; One SAA)	AS-4117 (S-14)	Minimum	23,200	530	33,700
		BMP	31,900	1,500	53,000
2D MAW MAG 29, MHH 365 (<90-Day Storage Area)	AS-4100 (S-14)	Minimum	23,200	530	34,900
		BMP	27,200	890	46,800

Notes: **1) Recommendations for project plans denoted by shaded area.**
2) "—" indicates that no improvements are required for the site to meet minimum regulatory requirements.

TABLE 4.5-1

Life Cycle Cost Analysis and Project Plan Recommendations Summary

Hazardous Waste Accumulation Point Study

MCB, Camp Lejeune/MCAS, New River

Responsible Unit (Site Designation)	Location (Drawing No.)	Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
2D MAW MAG 29, MALS 29 (GSE) (<90-Day Storage Area)	Outside AS-4135 (S-12)	Minimum	12,000	530	26,100
		BMP	35,100	890	55,300
2D MAW MAG 29, MALS 29 (Maintenance) (SAA)	AS-4114 (S-17)	Minimum	—	—	—
		BMP	6,300	620	19,700
2D MAW MAG 29, MALS 29 (Maintenance) (<90-Day Storage Area)	AS-4134 (S-15)	Minimum	5,400	1,600	32,800
		BMP	8,700	1,900	44,300
2D MAW MAG 29, NBC (Multiple SAAs)	AS-811 (S-13)	Minimum	4,800	530	16,400
		BMP	11,400	620	24,900
2D MAW Future Tenant (<90-Day Storage Area)	AS-515 (S-14)	Minimum	23,200	530	33,600
		BMP	25,600	890	43,700
2D MAW MWSG 27, MWSS 272 (<90-Day Storage Area)	Outside AS-4158 (S-12)	Minimum	38,100	1,100	63,700
		BMP	41,200	1,300	72,800
MCAS Safety and Environmental Affairs (<90-Day Storage Area)	AS-605 (S-17)	Minimum	—	—	—
		BMP	147,500	3,600	176,200

Notes: 1) Recommendations for project plans denoted by shaded area.
2) "---" indicates that no improvements are required for the site to meet minimum regulatory requirements.

cost analysis information was used as a factor in determining which project plan alternative, minimum regulatory requirements or BMPs, to recommend to the Installation for each site.

4.5.3 Project Plans and Recommendations

RUST E&I's recommendations for each site are presented at the end of each project plan (see Appendix C) and are summarized in Table 4.5-1.

RUST E&I has also been tasked to recommend groupings of project plans for subsequent development of Scopes of Work and DD-1391 documentation. EMD personnel have indicated that it is acceptable and appropriate to group multiple sites together under a single funding request; however, MCB and MCAS projects would need to have separate funding requests. Therefore, the following groupings are recommended:

- The project plans for 40 sites at the MCB (total estimated capital cost of $482,830)
- The project plans for 21 sites at the MCAS (total estimated capital cost of $375,190)
- The project plans for 2 sites at the MCAS, AS-525 and AS-605 (total estimated capital cost of $211,200)

4.6 OTHER RECOMMENDATIONS

Below are additional recommendations pertaining to hazardous waste management procedures and facilities:

1. Lithium Batteries: The MCB and MCAS should develop procedures that can be used by HMSHs to segregate spent lithium batteries that can be deactivated and rendered non-hazardous from the "old style" batteries that cannot be readily deactivated. Segregation of spent lithium batteries should result in significant reduction in disposal costs for the non-hazardous batteries. With the shift to batteries that can be deactivated, this hazardous waste stream should be virtually eliminated in a few years.

2. Magnesium Batteries: Most spent magnesium batteries do not contain leachable chromium above the regulatory level. The MCB should develop procedures that can be used by the HMSHs to segregate spent magnesium batteries with and without chromium. Segregation of these spent batteries should result in significant reduction in disposal costs for the non-hazardous batteries. With the shift to magnesium

batteries that do not contain leachable chromium, this hazardous waste stream should be virtually eliminated in a few years.

3. Battery Electrolyte: The MCB and the MCAS should begin neutralizing waste battery acid on site in the battery rooms within the units. Personnel currently working with batteries should be capable of neutralizing the acid in accordance with standardized procedures. Neutralization would exempt waste battery acid from hazardous waste regulation. It is also recommended that pilot tests be conducted to explore the neutralization of waste electrolyte from the nickel-cadmium batteries.

4. Waste Oil Filters: Non-terne-plated waste oil filters do not contain leachable lead above the regulatory level and could be disposed as a solid waste. Even the terne-plated hazardous waste oil filters could be recycled and exempt from hazardous waste regulation. The Installation should begin recycling waste oil filters to minimize the volume of waste ultimately disposed. This can be accomplished by separating the metal, paper/filter media, and oil using a specially designed recycling unit. Recycling units are commercially available and could be placed in each shop where waste oil filters are generated. The Installation should conduct a pilot study to determine if recycling of waste oil filters using the specially designed recycling units is viable. If the costs associated with recycling waste oil filters are found to be prohibitive, then the Installation should develop procedures that can be used by the HMSHs to segregate waste oil filters with and without lead. Segregation of these waste oil filters should result in a reduction in disposal costs. With the manufacturing shift toward non-terne-plated oil filters that do not contain leachable lead, this hazardous waste stream should be virtually eliminated in a few years.

5. Waste Decontamination Kits: Discarded decontamination kits should be opened to segregate the hazardous and non-hazardous components of the kits. Segregation of the components of the kits should result in significant reduction in disposal costs because of the reduction in quantity of hazardous waste being disposed. The majority of components of the discarded kits are non-hazardous and could be disposed along with general trash.

6. Waste Paints: Many generators at the Installation place small cans (e.g., one-gallon cans) of waste paint, many of which are only partially full, directly into a 55-gallon hazardous waste accumulation drum. Cans of waste paint should be emptied into 55-gallon containers to reduce the quantity of hazardous waste paint being disposed. Waste paint should be consolidated in a single accumulation container, whenever possible, to reduce the number of different containers accumulating waste paint at

the Installation. Consolidation of waste paint and pouring paint from the original container should result in significant reduction in disposal costs.

7. NBC Sites: Procedures and protocols associated with accumulation of discarded materials from the NBC warehouses vary greatly throughout the Installation. Some sites are managed as SAAs and others managed as <90-day storage areas, even where the types and quantities of wastes generated are similar. The Installation should develop standardized procedures for handling discarded NBC gear in a manner that would minimize the quantity of hazardous waste generated. Consideration should be given to establishing one or two locations where discarded NBC gear could be placed for segregation and consolidation prior to disposal.

8. Consolidate <90-day storage areas: The MCB should consider consolidating <90-day storage areas wherever practical. The MCAS should consider consolidating the <90-day storage areas within MAG 26 and MAG 29. Other squadrons and organizations at the MCAS that are not associated with these two MAGs could use the main <90-day storage area (currently AS-605) if it were located closer to the hangars and the industrial activity.

   There is a need for generators to keep hazardous wastes segregated in order to ensure accountability for the hazardous waste. There are also Installation organizational constraints that tend to discourage sharing <90-day storage areas among units/squadrons/organizations. However, consolidation of sites would minimize the liabilities associated with storing hazardous waste because there would be fewer storage locations and reduce the labor requirements associated with temporary storage and transfer of hazardous waste.

   If the MCB shifts toward consolidated warehousing of hazardous materials on the battalion or regiment level, consolidated <90-day storage areas for hazardous waste could also be operated with a centralized turn-in point for unused hazardous materials and hazardous waste. MCB organizations (e.g., Logistics, MWR, Base Maintenance) could also share <90-day areas for activities within close proximity.

9. Improve the MCB's standard hazardous waste storage structures with additional improvements: The MCB should modify its standard hazardous wastes storage structure design and improve the current structures at the MCB (see Table 4.4-4) based on the standard design to include the BMP improvements listed for S-1762 in Appendix C. These improvements include installation of chemical resistant coating, an eyewash/safety shower, a telephone, an alarm pull-box, a fire extinguisher, new spill control equipment, and new signs.

4.7 DEVELOPMENT OF SCOPES OF WORK AND DD-1391 DOCUMENTATION (Reserved for Final Draft Report)

5.0 GENERATION OF DISCARDED COMMERCIAL CHEMICAL PRODUCTS

5.1 UNUSED PRODUCTS

Many unused products at the Installation become hazardous waste when discarded. The sources of these unused products are summarized below:

1. Excess products ordered from the supply system: Many organizations purchase reserve quantities of hazardous materials from the supply system near the end of each fiscal year if they have funds remaining in their operating budgets.

2. Unused products returned from on-site activities: Often an organization is not able to use all of the hazardous material ordered for performing a given task. The user may wait a long time before returning the hazardous material into the Sassy Management Unit's (SMU's) supply system, and the material becomes off-specification (off-spec) because of expired shelf life or other reasons, as described below.

3. Unused products returned from off-site activities: Organizations bring back hazardous materials from off-site activities, sometimes from outside of the United States. Often the materials are not needed or used at the Installation, are of unknown origin or are off-spec.

4. Excess products in the supply system: Occasionally the SMU orders a product normally supplied by Base Logistics (e.g., non-military consumable items) when Base Logistics does not have the material in stock. However, once Base Logistics replenishes its stock of the product, users of the product are disinclined to obtain the product from SMU and SMU's remaining stock goes unused.

5.2 OFF-SPECIFICATION PRODUCTS

Many off-spec products at the Installation become hazardous waste when discarded. Some of the reasons that these products are off-spec are noted below:

1. Expired shelf life: Organizations often do not use hazardous materials before the shelf life has expired. There are existing procedures for having the shelf life extended for certain classes of hazardous materials. However, organizations generally do not conduct routine inventories of these materials to check the shelf life.

Also, the SMU and Base Logistics occasionally issue materials whose shelf lives have already expired at the time of issuance.

2. Improper label/unidentified material: The SMU and the DRMO require certain specific information to be displayed on containers of hazardous materials before offering the material to others for use. Labels are often found to be illegible or missing information making future use of the material improbable. Sometimes materials have no label or an associated Material Safety Data Sheet, making identification almost impossible.

3. Unacceptable container: A container may become dented, rusted, or even leaking such that it cannot be re-issued at the Installation. This can occur because of excessive handling of the container, inadequate equipment for moving containers, and inadequate facilities for storing hazardous materials.

4. Changed physical/chemical composition: Sometimes hazardous materials cannot be reused because of a change in the physical or chemical state of the material (e.g., paint hardens, aerosol cans loose pressurization, material separates into multiple phases). This occurs because of the lack of adequate storage facilities and the use of improper storage techniques.

5.3 ESTIMATION OF WASTES DISCARDED AS HAZARDOUS WASTE

Information obtained from generators was not specific with respect to estimated generation of discarded products that are hazardous wastes. Therefore, data was used from the MCB's 1992 Hazardous Waste Annual Report to indicate quantities of discarded products generated at the Installation. Information on discarded products, as well as wastes generated at the MCB in FY 1992 is presented in Table D-1 in Appendix D. Information on discarded products, as well as wastes generated at the MCAS in FY 1992 is presented in Table D-2 in Appendix D. These quantities are anticipated to decrease in the future based on an increased awareness of the problem with discarded products and improvements in hazardous materials management procedures and facilities at the Installation.

5.4 RECOMMENDATIONS FOR REDUCING GENERATION OF DISCARDED COMMERCIAL CHEMICAL PRODUCTS

Unless otherwise stated, the following recommendations apply to both the MCB and the MCAS:

1. <u>Substitute non-hazardous materials:</u> The Installation should find non-hazardous materials that can be substituted for hazardous materials in operations whenever there is a commercially available substitute to minimize the potential for discarded products becoming hazardous waste.

2. <u>Revise hazardous materials procurement procedures:</u> The Installation should revise procedures for procuring hazardous materials by creating controls on the purchase of hazardous materials that are not normally used by a unit/squadron/organization. This can be done through an Authorized Use List for the Installation. Procedures for purchasing a needed hazardous material should not be so time-consuming that they create problems in obtaining new hazardous materials in a timely manner. These procedures should ensure that the material is required for operation and will not create unnecessary exposure risks for personnel using the material.

3. <u>Revise hazardous material management procedures:</u> The Installation should begin conducting routine (e.g., monthly, quarterly) inventories of hazardous materials and inspecting hazardous material storage areas at the unit level. These procedures would enable hazardous material users to identify unused, unneeded hazardous materials before the materials are considered off-spec and allow the user to return the material to the supply system, turn in the material to the DRMO for remarketing, or have the shelf life extended.

4. <u>Lower the order points for hazardous materials in the main supply systems:</u> SMU and Base Logistics should lower the order points (both the high and low) to minimize unnecessary inventories. SMU and Base Logistics should consider using just-in-time ordering practices stocking only what is necessary to keep the Installation functioning, whenever feasible, to minimize the quantity of hazardous materials in stock on site, unless the practice would interfere with operational readiness. Agreements should be made with suppliers to have expedited deliveries so that the organizations at the Installation do not have to wait for hazardous materials to arrive. The MALS 26 Supply and MALS 29 Supply should also consider operating in this manner if it would not interfere with the operational readiness of the MCAS.

5. <u>Revise procedures for returning unused/off-spec hazardous materials:</u> According to site personnel, the procedures for returning unused or off-spec materials are time-consuming and overly burdensome, and it is easier and quicker for users to dispose of the materials as hazardous waste. Because the MCB's and the MCAS's operating budgets currently pay for all hazardous waste disposal, there is no incentive to discourage this practice.

6. Create consolidated hazardous material issue points: One means of encouraging reuse of hazardous materials is to create consolidated hazardous material issue points (i.e., warehouses) within organizations (i.e., battalions, regiments, MAGs). These facilities could dispense the minimum required quantities of hazardous materials to users, similar to a pharmacy, and receive unused quantities on a regular basis (e.g., weekly), virtually eliminating the need for storing large quantities of hazardous materials in each work area. This would allow organizations to maintain tighter controls on hazardous materials issued and could reduce the stockpiling of materials within an organization. This system could also limit the burden of tracking shelf life to the consolidated issue points and the primary supply organizations.

7. Consolidate <90-day storage areas/hazardous material issue points: If consolidated hazardous material issue points are created, then the <90-day storage areas could be consolidated and co-located with the consolidated hazardous material warehouses. This would also ease the burden of maintaining multiple <90-day storage areas and minimize the labor associated with transporting hazardous wastes to the permitted hazardous waste facility at the MCB or to the main <90-day site at the MCAS.

8. Improve hazardous material tracking system: The Installation should consider using a bar code system to track all hazardous materials at the Installation. Labels could be coded with pertinent product information including the shelf life expiration date. At a minimum, bar code readers should be available at all primary supply organizations and at each consolidated hazardous material issue point (see Recommendation #5 above). Information should be available on a centralized computer system (probably separate systems for the MCB and the MCAS).

9. Improve hazardous material storage facilities: Most of the current hazardous material storage facilities are not designed to sufficiently protect the integrity of containers of hazardous materials. Many hazardous materials are stored outdoors and are exposed to the effects of heat, cold, and rain. Most structures are not climate-controlled and often are degrading because of their age. Improved facilities would help prevent labels from fading or eroding and containers from corroding or rupturing.

APPENDIX A

ACRONYMS & ABBREVIATIONS

LIST OF ACRONYMS & ABBREVIATIONS

BMP	Best Management Practice
CARC	Carcinogenic (refers to type of paint)
CFR	Code of Federal Regulations
Comm	Communications
DLA	Defense Logistics Agency
DOD	Department of Defense
DRMO	Defense Reutilization Marketing Office
EMD	Environmental Management Department (MCB, Camp Lejeune)
FY	Fiscal Year
HMDC	Hazardous Material Disposal Coordinator
HMDM	Hazardous Material Disposal Manager
HMDO	Hazardous Material Disposal Officer
HMSH	Hazardous Materials Site Handler
HM	Hazardous Material
HW	Hazardous Waste
IQC	Indefinite Quantities Contract
LQG	Large Quantity Generator
MALS	Marine Air Logistics Squadron
MCB	Marine Corps Base, Camp Lejeune, North Carolina

LIST OF ACRONYMS & ABBREVIATIONS - Continued

MCAS	Marine Corps Air Station, New River, Jacksonville, North Carolina
Motor-T	Motor Transportation Unit
MWR	Morale, Welfare, and Recreation
NAVFAC	Naval Facilities Engineering Command
NBC	Nuclear, Biological, and Chemical
NCAC	North Carolina Administrative Code
NCHWS	North Carolina Department of Environment, Health and Natural Resources, Solid Waste Division, Hazardous Waste Section
NOD	Notice of Deficiency
NOV	Notice of Violation
NPV	Net Present Value
O&M	Operation and Maintenance
Off-spec	Off-specification
RCRA	Resource Conservation and Recovery Act
RCRB	Resource Conservation Recovery Branch
RUST E&I	RUST Environment & Infrastructure
SAA	Satellite Accumulation Area (or Point)
SEA	Safety and Environmental Affairs Office (MCAS, New River)
SMU	Sassy Management Unit

LIST OF ACRONYMS & ABBREVIATIONS - Continued

TMO	Traffic Management Office
2D FSSG	2nd Force Service Support Group
2D Mar Div	2nd Marine Division
2D MAW	2nd Marine Air Wing
2D MEF	2nd Marine Expeditionary Force
2D SRIG	2nd Surveillance, Reconnaissance, & Intelligence Group

APPENDIX B

EXISTING HAZARDOUS WASTE ACCUMULATION FACILITIES INFORMATION

TABLE B-1.1 LIST OF SATELLITE ACCUMULATION AREAS: MCB, CAMP LEJEUNE

#	COMMAND	REG/BN/ORGANIZATION	UNIT/COMPANY	LOCATION (BUILDING #)	MAP NO.	SITE AGE (YRS)	AREA (SQ FT)	MAX Q (GAL)	AVE Q (GAL)	DAYS @ SITE	SATELLITE GENERATION POINT	SAA WASTE	SITE CONDITIONS
0	2ND FSSG	2ND DENTAL BN											ap
1	2ND FSSG	2ND LANDING SUPT BN		FC-120	L-7	9	1	5	5	unk	BATTERY ROOM	BATTERY ACID	f,h,i,l,q,t,ad
1	2ND FSSG	2ND LANDING SUPT BN	HEAVY EQ	FC-120	L-7	11	16	55	55	<3	MAINTENANCE BAY	OIL FILTERS	f,l,q
1	2ND FSSG	2ND LANDING SUPT BN	COMM SEC	FC-134	L-7	unk	16	55	55	<3	BATTERY TEST AREA	LI BATTERIES	h,l,p,ad
1	2ND FSSG	2ND LANDING SUPT BN	COMM SEC	FC-134	L-7	unk	16	55	55	<3	BATTERY TEST AREA	MG BATTERIES	h,l,p,ad
1	2ND FSSG	2ND MAINT BN	ENGR MAINT-FIRE CONTR	FC-285	L-7	unk	15	55	55	<3	BATTERY TEST AREA	NI/CD BATTERIES	l,ad
1	2ND FSSG	2ND MAINT BN	H&S CO MOTOR-T	FC-40	L-7	7	2	5	5	unk	BATTERY ROOM	BATTERY ACID	l,ad
1	2ND FSSG	2ND MAINT BN	H&S CO MOTOR-T	FC-40	L-7	7	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	h,ad
1	2ND FSSG	2ND MAINT BN	ORF	FC-45	L-7	unk	16	5	5	unk	BATTERY ROOM	BATTERY ACID	a,h,aa,ad,ai,an
1	2ND FSSG	2ND MAINT BN	ORF	FC-45	L-7	unk	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	(No deficiencies noted)
1	2ND FSSG	2ND MAINT BN	ELMACO	FC-50	L-7	8	4	5	5	unk	LAB	TCF-METHANE	l,ad
1	2ND FSSG	2ND MAINT BN	RADIO (ELMACO)	FC-51	L-7	unk	1	3	3	unk	REPAIR AREA	HG BATTERIES	d,i,p,ad
1	2ND FSSG	2ND MAINT BN	RADIO (ELMACO)	FC-51	L-7	unk	4	30	30	<3	REPARIR AREA	LI BATTERIES	d,i,p,ad
1	2ND FSSG	2ND MAINT BN	RADIO (ELMACO)	FC-51	L-7	unk	1	3	3	unk	REPAIR AREA	MG BATTERIES	d,i,p,ad
1	2ND FSSG	2ND MAINT BN	RADIO (ELMACO)	FC-51	L-7	unk	1	3	3	unk	REPAIR AREA	NI/CD BATTERIES	d,i,p,ad
1	2ND FSSG	2ND MEDICAL BN	COMM PLT	FC-263	L-7	7	30	55	55	<3	BATTERY TEST AREA	LI BATTERIES	e,f,g,ip,ad
1	2ND FSSG	2ND MEDICAL BN	COMM PLT	FC-263	L-7	7	30	55	55	<3	BATTERY TEST AREA	MG BATTERIES	e,f,l,l,p,ad
1	2ND FSSG	2ND MEDICAL BN	MOTOR-T	FC-263	L-7	7	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	h,l,af
1	2ND FSSG	2ND SUPPLY BN	MOTOR-T	FC-263	L-7	7	12	30	30	<3	MAINTENANCE BAY	OIL FILTERS	a,b,h,af
1	2ND FSSG	8TH ENGR SUPPT BN	COMM	FC-136	L-7	4	16	30	30	<3	BATTERY TEST AREA	HG BATTERIES	f,l
1	2ND FSSG	8TH ENGR SUPPT BN	COMM	FC-136	L-7	4	16	55	55	<3	BATTERY TEST AREA	LI BATTERIES	f,l,n,ac
1	2ND FSSG	8TH ENGR SUPPT BN	COMM	FC-136	L-7	4	16	55	55	<3	BATTERY TEST AREA	NI/CD BATTERIES	f,l
1	2ND FSSG	8TH ENGR SUPPT BN	MEPS	FC-190	L-7	11	4	5	5	unk	BATTERY ROOM	BATTERY ACID	f,h,i,l,ad,af
1	2ND FSSG	8TH ENGR SUPPT BN	MEPS	FC-190	L-7	11	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	f,l
1	2ND FSSG	8TH ENGR SUPPT BN	HEAVY EQ MAINT	FC-200	L-7	28	16	5	5	unk	BATTERY ROOM	BATTERY ACID	f
1	2ND FSSG	8TH ENGR SUPPT BN	COMM	FC-200	L-7	4	16	55	55	<3	COMM ROOM	MG BATTERIES	f,i,k,l,q,u,ad
1	2ND FSSG	8TH ENGR SUPPT BN	HEAVY EQ MAINT	FC-200	L-7	28	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	f,h,l,ac,ad
1	2ND FSSG	8TH ENGR SUPPT BN	BRIDGE CO	FC-816	L-7	46	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	f,h,i,l,ad
1	2ND FSSG	8TH MOTOR SUPPT BN		FC-270	L-7	5	6	5	5	unk	BATTERY ROOM	BATTERY ACID	l
1	2ND FSSG	8TH MOTOR SUPPT BN		FC-270	L-7	5	16	55	55	<3	MAINTENANCE BAY	OIL FILTERS	a,b,h,i,al
1	2ND FSSG	HQ & SERVICE BN	NBC WAREHOUSE	1211	L-6	40	25	55	55	<3	NBC STORAGE	CHARCOAL FILTERS	i,p
1	2ND FSSG	HQ & SERVICE BN	MOTOR T	FC-255	L-7	6	2	5	5	unk	BATTERY ROOM	BATTERY ACID	a,g,h,i
1	2ND FSSG	HQ & SERVICE BN	COMM	FC-255	L-7	6	16	55	55	<3	COMM ROOM	LI BATTERIES	h,l,p
1	2ND FSSG	HQ & SERVICE BN	COMM	FC-255	L-7	6	16	55	55	<3	COMM ROOM	MG BATTERIES	i
1	2ND FSSG	HQ & SERVICE BN	MOTOR T	FC-255	L-7	6	20	55	55	<3	MAINTENANCE BAY	OIL FILTERS	i
1	2ND FSSG	MSSG-22		FC-100	L-7	28	unk	unk	unk	unk	MAINTENANCE BAY	OIL FILTERS	ap
0	2ND FSSG	MSSG-24	(DEPLOYED)	SHARE SITES WITH MSSG-22									ap
0	2ND FSSG	MSSG-26	(DEPLOYED)	SHARE SITES WITH MSSG-22									ap
0	2ND FSSG	BSSG-4											ap
0	2ND FSSG	BSSG-6											ap
0	2ND FSSG	CSSD-21											ap
0	2ND FSSG	CSSD-23											ap
35													

TABLE B-1.1 LIST OF SATELLITE ACCUMULATION AREAS: MCB, CAMP LEJEUNE

#	COMMAND	REG/BN/ORGANIZATION	UNIT/COMPANY	LOCATION (BUILDING #)	MAP NO.	SITE AGE (YRS)	AREA (SQ FT)	MAX Q (GAL)	AVE Q (GAL)	DAYS @ SITE	SATELLITE GENERATION POINT	SAA WASTE	SITE CONDITIONS
1	2ND MAR DIV	10TH MAR REGT	HQ BATTERY-MOTOR-T	1323	L-6	2	1	5	5	unk	BATTERY ROOM	BATTERY ACID	i
1	2ND MAR DIV	10TH MAR REGT	HQ BATTERY-ENGR	1323	L-6	2	1	5	5	unk	BATTERY ROOM	BATTERY ACID	l
1	2ND MAR DIV	10TH MAR REGT	HQ BATTERY-MOTOR-T	1323	L-6	2	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	f,g,h,i,l
1	2ND MAR DIV	10TH MAR REGT	5TH BN-MT	1450	L-6	12	16	5	5	unk	BATTERY ROOM	BATTERY ACID	i
1	2ND MAR DIV	10TH MAR REGT	2ND BN-MAINT	1775	L-7	13	12	5	5	unk	BATTERY ROOM	BATTERY ACID	h,i
1	2ND MAR DIV	10TH MAR REGT	3RD BN-MAINT	1775	L-7	13	9	5	5	unk	BATTERY ROOM	BATTERY ACID	i
1	2ND MAR DIV	10TH MAR REGT	1ST BN-MAINT	1775	L-7	13	1	5	5	unk	BATTERY ROOM	BATTERY ACID	h,i,q
1	2ND MAR DIV	10TH MAR REGT	3RD BN-MAINT	1775	L-7	13	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	a,g,f,h,i,af
1	2ND MAR DIV	10TH MAR REGT	1ST BN-MAINT	1775	L-7	13	9	30	30	<3	MAINTENANCE BAY	OIL FILTERS	h,i,l,af
1	2ND MAR DIV	10TH MAR REGT	2ND BN-MAINT	1775	L-7	13	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	a,h,i,l,af
1	2ND MAR DIV	2ND ASLTPHIB BN		A-47	L-9	unk	15	5	5	unk	BATTERY ROOM	BATTERY ACID	h,i
1	2ND MAR DIV	2ND ASLTPHIB BN		A-47	L-9	unk	2	2	2	unk	BATTERY TEST AREA	HG BATTERIES	h,i
1	2ND MAR DIV	2ND ASLTPHIB BN		A-47	L-9	unk	12	55	55	<3	BATTERY TEST AREA	LI BATTERIES	h,i
1	2ND MAR DIV	2ND ASLTPHIB BN		A-47	L-9	unk	9	55	55	<3	BATTERY TEST AREA	MG BATTERIES	h,i,
1	2ND MAR DIV	2ND ASLTPHIB BN		A-47	L-9	unk	25	55	55	<3	MAINTENANCE BAY	OIL FILTERS	h,p
1	2ND MAR DIV	2ND ASLTPHIB BN		A-47	L-9	unk	25	55	55	<3	VARIOUS	PAINT	h,i,p,af
1	2ND MAR DIV	2ND COMBAT ENGR BTN	UTILITIES	1804	L-7	42	16	55	55	<3	MAINTENANCE BAY	OIL FILTERS	l,af
1	2ND MAR DIV	2ND COMBAT ENGR BTN		1880	L-7	19	16	5	5	unk	BATTERY ROOM	BATTERY ACID	i,ag
1	2ND MAR DIV	2ND COMBAT ENGR BTN		1880	L-7	19	6	55	55	<3	VARIOUS	ENAMEL PAINT	e,i,l,n,p,q,x,af
1	2ND MAR DIV	2ND COMBAT ENGR BTN	MOTOR-T	1880	L-7	19	6	55	55	<3	MAINTENANCE BAY	OIL FILTERS	h,af
1	2ND MAR DIV	2ND COMBAT ENGR BTN	HEAVY EQ	1880	L-7	19	6	55	55	<3	MAINTENANCE BAY	OIL FILTERS	h,l,af
1	2ND MAR DIV	2ND COMBAT ENGR BTN		1883	L-7	19	9	55	55	<3	VARIOUS	CARC PAINT	e,h,q,af
1	2ND MAR DIV	2ND COMBAT ENGR BTN	COMM SHOP	1895	L-7	5	16	30	30	<3	TEST AREA	HG BATTERIES	h,q
1	2ND MAR DIV	2ND COMBAT ENGR BTN	COMM SHOP	1895	L-7	5	9	55	55	<3	1895	LI BATTERIES	ag
1	2ND MAR DIV	2ND COMBAT ENGR BTN	COMM SHOP	1895	L-7	5	9	55	55	<3	1895	MG BATTERIES	h,i,q,r,ag
1	2ND MAR DIV	2ND COMBAT ENGR BTN	COMM SHOP	1895	L-7	5	15	30	30	<3	TEST AREA	NI/CD BATTERIES	h,i,q
1	2ND MAR DIV	2ND COMBAT ENGR BTN	NBC WAREHOUSE	434	L-5	51	12	55	55	<3	NBC STORAGE	CHARCOAL FILTERS	h,i,p,af
1	2ND MAR DIV	2ND LT ARM INF BTN	NBC WAREHOUSE	445	L-5	50	32	200 filt	200 filt	<3	NBC STORAGE	GAS MASK FILTERS	i,p,af
1	2ND MAR DIV	2ND LT ARM INF BTN	NBC WAREHOUSE	445	L-5	50	9	35	35	<3	NBC STORAGE	NBC KITS, M258, M291	h,i,p,af
1	2ND MAR DIV	2ND LT ARM INF BTN	NBC WAREHOUSE	445	L-5	50	15	35	35	<3	NBC STORAGE	NBC M256 KITS	h,i,p,af
1	2ND MAR DIV	2ND LT ARM INF BTN	NBC WAREHOUSE	445	L-5	50	9	35	35	<3	NBC STORAGE	SUPER TROPICAL BLEACH	i,p,af
1	2ND MAR DIV	2ND LT ARM INF BTN	COMM	575	L-7	unk	4	5	5	unk	BATTERY ROOM	BATTERY ACID	i
1	2ND MAR DIV	2ND LT ARM INF BTN	COMM	575	L-7	unk	2	2	2	unk	BATTERY STORAGE	HG BATTERIES	g,h,i,l,
1	2ND MAR DIV	2ND LT ARM INF BTN	COMM	575	L-7	unk	9	55	55	<3	BATTERY STORAGE	LITHIUM BATT	ap
1	2ND MAR DIV	2ND LT ARM INF BTN	COMM	575	L-7	unk	9	55	55	<3	BATTERY STORAGE	MG BATTERIES	h,i,l,
1	2ND MAR DIV	2ND LT ARM INF BTN	COMM	575	L-7	unk	2	2	2	unk	BATTERY STORAGE	NI/CD BATTERIES	g,h,i,l,
1	2ND MAR DIV	2ND LT ARM INF BTN	MOTOR-T	[575]	L-7	unk	16	55	55	<3	MAINT BAY	CARC PAINT	p,q,y,af,ag
1	2ND MAR DIV	2ND LT ARM INF BTN	MOTOR-T	[575]	L-7	unk	9	55	55	<3	MAINT BAY	ENAMEL PAINT	i,m,p,q,y,af,aj

TABLE B-1.1 LIST OF SATELLITE ACCUMULATION AREAS: MCB, CAMP LEJEUNE

#	COMMAND	REG/BN/ORGANIZATION	UNIT/COMPANY	LOCATION (BUILDING #)	MAP NO.	SITE AGE (YRS)	AREA (SQ FT)	MAX Q (GAL)	AVE Q (GAL)	DAYS @ SITE	SATELLITE GENERATION POINT	SAA WASTE	SITE CONDITIONS
1	2ND MAR DIV	2ND MAR REGT	NBC WAREHOUSE	HP-200	L-5	40	16	55	55	<3	NBC STORAGE	CHARCOAL FILTERS	af
1	2ND MAR DIV	2ND MAR REGT	NBC WAREHOUSE	HP-200	L-5	40	16	36	36	<3	NBC STORAGE	MISC DECON KITS	d,af
1	2ND MAR DIV	2ND MAR REGT	MOTOR T	HP-250	L-5	unk	1	5	5	unk	BATTERY ROOM	BATTERY ACID	h,l,ag
1	2ND MAR DIV	2ND MAR REGT	COMM SHOP	HP-250	L-5	unk	25	10	10	unk	TEST AREA	HG & NI/CD BATTERIES	c,d,aa
1	2ND MAR DIV	2ND MAR REGT	COMM SHOP	HP-250	L-5	unk	16	55	55	<3	TEST AREA	LI BATTERIES	h,l,ag
1	2ND MAR DIV	2ND MAR REGT	COMM SHOP	HP-250	L-5	unk	40	55	55	<3	TEST AREA	MG BATTERIES	l,ag
1	2ND MAR DIV	2ND MAR REGT	MOTOR T	HP-250	L-5	unk	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	h,l
1	2ND MAR DIV	2ND RECON BN		BA-123	L-10	unk	40	110	55	<3	BA-123	LI/MG BATTERIES	c,i,l,aa
1	2ND MAR DIV	2ND RECON BN	MOTOR-T	BA-130	L-10	unk	15	5	5	unk	BATTERY ROOM	BATTERY ACID	h,ag
1	2ND MAR DIV	2ND RECON BN	MOTOR-T	BA-130	L-10	unk	16	55	55	<3	MAINTENANCE BAY	OIL FILTERS	i,l,ag
1	2ND MAR DIV	2ND TANK BN	MAINT	1854	L-7	10	4	5	5	unk	BATTERY SHOP	BATTERY ACID	a,h,l,s
1	2ND MAR DIV	2ND TANK BN	MAINT	1854	L-7	10	9	55	55	<3	BATTERY TEST AREA	LI BATTERIES	l,ab
1	2ND MAR DIV	2ND TANK BN	MAINT	1854	L-7	10	9	55	55	<3	BATTERY TEST AREA	MG BATTERIES	l,ab
0	2ND MAR DIV	4TH MAR REGT	2ND BN (DEPLOYED)	USES 6TH MARINE REGIMENT SITES									ap
1	2ND MAR DIV	6TH MAR REGT	MOTOR-T	1829	L-7	2	2.25	5	5	unk	BATT ROOM	BATTERY ACID	l
1	2ND MAR DIV	6TH MAR REGT	COMM SHOP	1841	L-7	39	40	55	55	<3	BATTERY ROOM	LI BATTERIES	aa
1	2ND MAR DIV	6TH MAR REGT	COMM SHOP	1841	L-7	39	30	55	55	<3	COMM	MG BATTERIES	q
1	2ND MAR DIV	8TH MAR REGT	HQ CO-NBC WAREHOUSE	117	L-5	51	16	55	55	<3	NBC STORAGE	CHARCOAL FILTERS	h,af
1	2ND MAR DIV	8TH MAR REGT	HQ CO-NBC WAREHOUSE	117	L-5	51	16	55	55	<3	NBC STORAGE	M-256 KITS	h,i,ag
1	2ND MAR DIV	8TH MAR REGT	HQ CO-NBC WAREHOUSE	117	L-5	51	16	55	55	<3	NBC STORAGE	M-256 KITS	h,l,ag
1	2ND MAR DIV	8TH MAR REGT	MOTOR-T	HP-100	L-5	10	6	5	5	unk	BATTERY ROOM	BATTERY ACID	h,s,u
1	2ND MAR DIV	8TH MAR REGT	MOTOR-T	HP-100	L-5	10	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	h,l,
1	2ND MAR DIV	HQ BTN	TRUCK CO	1780	L-7	21	4	5	5	<3	BATTERY ROOM	BATTERY ACID	h,u,ai
1	2ND MAR DIV	HQ BTN	TRUCK CO	1780	L-7	21	6	55	55	<3	MAINTENANCE BAY	OIL FILTERS	h,i,ad
1	2ND MAR DIV	HQ BTN	COMM CO	1860	L-7	10	4	5	5	unk	BATTERY ROOM	BATTERY ACID	h,l,q
1	2ND MAR DIV	HQ BTN	COMM CO	1860	L-7	10	16	55	55	<3	BATTERY ROOM	LI BATTERIES	h,i,l
1	2ND MAR DIV	HQ BTN	COMM CO	1860	L-7	10	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	g,h,i,l,ad
64													

TABLE B-1.1 LIST OF SATELLITE ACCUMULATION AREAS: MCB, CAMP LEJEUNE

#	COMMAND	REG/BN/ORGANIZATION	UNIT/COMPANY	LOCATION (BUILDING #)	MAP NO.	SITE AGE (YRS)	AREA (SQ FT)	MAX Q (GAL)	AVE Q (GAL)	DAYS @ SITE	SATELLITE GENERATION POINT	SAA WASTE	SITE CONDITIONS
1	2ND MEF	H&S CO	MOTOR-T SECTION	1205	L-6	41	36	5	5	unk	BATTERY ROOM	BATTERY ACID	a,h,l,p,t,al
1	2ND MEF	H&S CO	MOTOR-T SECTION	1771 (NEW)	L-7	20	unk	unk	unk	unk	BATTERY ROOM	BATTERY ACID	(Site not set up.)
1	2ND MEF	SOTG		RR-206	L-8	50	unk	unk	unk	unk	RIFLE RANGE	LEAD SWEEPINGS	a,e,h,j,l,ab
-	2ND MEF	H&S CO	NBC SECTION @ 1827	INCLUDED W/2ND SRIG'S WASTE NBC GEAR									ap
3													
1	2ND SRIG	2ND ANGLICO CO	MOTOR-T	FC-251	L-7	15	4	5	5	3	BATTERY ROOM	BATTERY ACID	a,h,i,l,t,ag
1	2ND SRIG	2ND ANGLICO CO	MOTOR-T	FC-251	L-7	15	9	55	55	2	SERVICE BAY	OIL FILTERS	a,f,h,l
1	2ND SRIG	2ND ANGLICO CO	COMM SEC	FC-251	L-7	15	21	unk	unk	unk	RADIO BAY	LI BATTERIES	h,l
1	2ND SRIG	2ND ANGLICO CO	COMM SEC	FC-251	L-7	15	12	35	35	<1	RADIO BAY	NI/CD BATTERIES	h,l
1	2ND SRIG	2ND FORCE RECON CO	USE SAME AREAS AS 2ND	FC-251	L-7	15					BATTERY ROOM	BATTERY ACID	ah
1	2ND SRIG	2ND FORCE RECON CO	USE SAME AREAS AS 2ND	FC-251	L-7	15					SERVICE BAY	OIL FILTERS	a,f,h,i
1	2ND SRIG	2ND RADIO BN	MOTOR-T	FC-241	L-7	12	1	5	5	unk	BATTERY ROOM	BATTERY ACID	h,l
1	2ND SRIG	8TH COMM BN	ALPHA CO	1605	L-6	50	2	50 LBS	50 LBS	never full	KRYPTOLOGY	HG BATTERIES	l
1	2ND SRIG	8TH COMM BN	ALPHA CO	1605	L-6	>8	9	400 LB	55	<3		LI BATTERIES	l
1	2ND SRIG	HQ & SERVICE CO		1309/1310	L-8	51	9	5	5	unk	BATT DRAINED ON AD	BATTERY ACID	l,k,u,ac
1	2ND SRIG	HQ & SERVICE CO		1310	L-6	51	9	55	55	<3	SERVICE BAY	OIL FILTERS	h,i,l
1	2ND SRIG	HQ & SERVICE CO	NBC	1827	L-7	41	16	55	55	unk	WAREHOUSE	256 KITS	l,ad
1	2ND SRIG	HQ & SERVICE CO	NBC	1827	L-7	41	16	55	55	unk	WAREHOUSE	CHARCOAL FILTERS	i,l,ad
1	2ND SRIG	REMOTE PILOT VEH CO		1747	L-7	unk	16	45	<45	<1	COMM SHOP	LI/MG BATTERIES	c,l,ac
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TABLE B-1.1 LIST OF SATELLITE ACCUMULATION AREAS: MCB, CAMP LEJEUNE

#	COMMAND	REG/BN/ORGANIZATION	UNIT/COMPANY	LOCATION (BUILDING #)	MAP NO.	SITE AGE (YRS)	AREA (SQ FT)	MAX Q (GAL)	AVE Q (GAL)	DAYS @ SITE	SATELLITE GENERATION POINT	SAA WASTE	SITE CONDITIONS
1	MCB	BASE BRIG		1041	L-6	unk	64	55	55	<3	VARIOUS	WASTE PAINT	l,k,s,u,x,af
1	MCB	ENV MGMT DIV	RECYCLING CENTER	S-962(913)?	L-6	unk	16	5	5	unk	VARIOUS	NI/CD BATTERIES	a,e,i,p,ad
1	MCB	FAC-MAINTENANCE	PAINT SHOP	1202	L-6	51	25	55	55	<3	SPRAY BOOTH	WASTE PAINT	l,ad,af
1	MCB	FAC-MAINTENANCE		45	L-3	52	25	55	55	<3	MAINTENANCE BAY	OIL FILTERS	f,l,ai
1	MCB	FLD MED SERV SCHOOL		M-326	L-9	50	9	55	55	<3	VARIOUS	MG BATTERIES	h,i,q
1	MCB	LOGISTICS	(SITE NEVER USED)	1502	L-6	51	unk	N/A	N/A	N/A	BATTERY ROOM	BATTERY ACID	ak
1	MCB	LOGISTICS		908	L-6	44	3	30	30	<3	SPRAY BOOTH	WASTE PAINT	h,i,ad,af
1	MCB	MC ENGR SCHOOL	MAINT PLANT	BB-51	L-9	47	4	5	5	unk	BATTERY ROOM	BATTERY ACID	e,h,l,ad
1	MCB	MC ENGR SCHOOL	MAINT PLANT	BB-51	L-9	47	18	55	55	<3	MAINTENANCE BAY	OIL FILTERS	h,i,u,ad,af
1	MCB	MC SERV SPT SCHOOL	MOTOR-T	M-119	L-2	50	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	b,h,i,p
1	MCB	MC SERV SPT SCHOOL	MOTOR-T	M-90	L-2	15	16	5	5	unk	BATTERY ROOM	BATTERY ACID	a,b,h,l,
1	MCB	MORALE, WEL & REC	AUTO HOBBY SHOP(HP)	1106/1107	L-6	51	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	e,h,k,l,q,x,ad,af
1	MCB	MORALE, WEL & REC	CENTRAL SRV STA(HP)	1613	L-6	33	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	i,l,n
1	MCB	MORALE, WEL & REC	PAINT LOCKER	1738	L-7	18	16	55	55	<3	1738	WASTE PAINT	e,h,i,l,p,ad,af
1	MCB	MORALE, WEL & REC	MCAS SERV STATION	AS-410	L-4	44	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	i,l,n,p,af
1	MCB	MORALE, WEL & REC	AUTO HOBBY SHOP(CHB)	BB-71	L-9	39	9	55	55	<3	MAINTENANCE BAY	OIL FILTERS	h,l,ad,af
1	MCB	NAVAL HOSPITAL		NH-100	L-3	unk	1	5	5	unk	HOSPITAL LAB	FORMALDEHYDE	f,g,h,i,af,ag
1	MCB	NAVAL HOSPITAL		NH-100	L-3	unk	1	5	5	unk	HOSPITAL LAB	XYLENE	c,f,h,i,l,af,ag
1	MCB	NAVAL HOSPITAL		NH-118	L-3	unk	9	30	30	<3	MAINTENANCE BAY	OIL FILTERS	a,c,f,i,l,n,ad,af
1	MCB	NAVAL HOSPITAL		[NH-100]	L-3	unk	1	5	5	unk	HOSPITAL LAB	ETHYL ALCOHOL	c,f,h,i,l,af,ag
1	MCB	SCHOOL OF INFANTRY	COMM SEC	TC-611	L-1	47	4	2	2	unk	TC-611	HG BATTERIES	l,p,ac,ad
1	MCB	SCHOOL OF INFANTRY	COMM SEC	TC-611	L-1	47	12	55	55	<3	TC-611	LI BATTERIES	l,p,ad
1	MCB	SCHOOL OF INFANTRY	COMM SEC	TC-611	L-1	47	16	55	55	<3	TC-611	MG BATTERIES	f,g,i,l,p,q,ac,ad,ai
1	MCB	SCHOOL OF INFANTRY	COMM SEC	TC-611	L-1	47	4	30	30	<3	TC-611	NI/CD BATTERIES	l,p,q,ac,ad,af
0	MCB	COMM ELECTRONICS DIV											ap
0	MCB	DEPENDENT'S SCHOOLS											ap
0	MCB	FAC-BACHELOR HOUSE											ap
0	MCB	FAC-FIRE DIV											ap
0	MCB	FAC-PUBLIC WORKS											ap
0	MCB	HQ & SUPPORT BN											ap
0	MCB	MILITARY SUPPT DIV											ap
0	MCB	NAV DENTAL CLINIC											ap
0	MCB	PROVOST MARSHALL											ap
24													

TABLE B-1.2 LIST OF LESS THAN 90-DAY STORAGE AREAS: MCB, CAMP LEJEUNE

#	COMMAND	REG/BTN/ORGANIZATION	UNIT/COMPANY	LOCATION BUILDING NO.	MAP NO.	SITE AG (YRS)	AREA (SQ FT)	MAX (GAL)	AVE Q (GAL)	DAYS @ SITE	BATT ACID	HG BATT	LI BATT	MG BATT	NI/CD BATT	PAINT	OIL FILT	NBC GEAR	OTHER WASTES	SITE CONDITIONS
0	2ND FSSG	2ND DENTAL BN																		ap
1	2ND FSSG	2ND LANDING SUPT BN	H&S NBC	1871 (NEW)	L-7	10	160	100	55	<90								0	NBC ITEMS	e
1	2ND FSSG	2ND LANDING SUPT BN	COMM SEC	FC-140	L-7	4	100	110	55	45			0	0						e,h,p,q,ad
1	2ND FSSG	2ND LANDING SUPT BN		SFC-145*	L-7	unk	120	500	220	<90	0					0	0		(CARC PAINT)	e,r,x,ac
1	2ND FSSG	2ND MAINT BN	MTM CO (MOTOR-T)	1601 (OLD)	L-6	51	unk	unk	unk	unk	0					0	0			(needs improving if used in futur
1	2ND FSSG	2ND MAINT BN	OMC (ORD)	FC-265* O/S	L-7	unk	375	140	55	60				0					WASTE COMPRESSOR LUBRICANT	e,r,ad,af
1	2ND FSSG	2ND MAINT BN	RADIO (ELMACO)	FC-51 O/S(NEW	L-7	unk	72	50	10	unk		0	0	0	0					e,f,g,i,j,p,q,s,t,x,
1	2ND FSSG	2ND MAINT BN	GSM	SFC-262*	L-7	unk	240	660	110	<90						0	0		NAOH/DIATOM EARTH	a,b,e,m,p,r,x,ad,ag,al,an
1	2ND FSSG	2ND MAINT BN	H&S CO MOTOR-T	SFC-37*	L-7	unk	120	60	0	60	0						0			e,r,x,ad
1	2ND FSSG	2ND MAINT BN	ORF	SFC-46*	L-7	unk	120	60	0	60	0						0			e,j,r,x,ad
1	2ND FSSG	2ND MEDICAL BN		SFC-234*	L-7	unk	120	165	55	unk							0			e,j,r,x
1	2ND FSSG	2ND SUPPLY BN	MEDLOG	907	L-6	45	32	200	130	<90									VARIOUS ORGANICS/INORGANICS	e,f,i,r,v,al
1	2ND FSSG	2ND SUPPLY BN	H&S CO PP&P	915	L-7	40	120	440	330	30									PP&P/METAL PRESERVATIVE	e,l,r,x,ad,af
1	2ND FSSG	2ND SUPPLY BN	MOTOR-T	SFC-233*	L-7	unk	120	225	60	45						0	0	0	M256 KITS, P'S & U'S	b,e,f,n,r,x,ad,af,ag
1	2ND FSSG	2ND SUPPLY BN	SMU-FLAMMS	TP-466*	L-7	unk	150	250	55	< 90									OFF-SPEC MATERIALS	e,f,p,ad,af,ag
1	2ND FSSG	8TH ENGR SUPPT BN		SFC-221	L-7	4	625	275	165	60						0	0		CAOH, OFF-SPEC MATERIALS	e,f,j,ag,al
1	2ND FSSG	8TH MOTOR SUPPT BN		SFC-279*	L-7	unk	360	290	160	60	0						0		ASBESTOS; DS2 FROM NBC	e,r,am
1	2ND FSSG	HQ & SERVICE BN	MOTOR T	SFC-236*	L-7	unk	120	440	295	60			0	0			0		CHROMIUM BATTERIES	e,p,r,x,af,ag
1	2ND FSSG	HQ & SERVICE BN	COMM	SFC-236*	L-7	unk	unk	unk	unk	unk			0	0						e,p,r,x,af,ag
1	2ND FSSG	MSSG-22		SFC-97*	L-7	unk	120	110	110	60						0	0			a,b,f,m,p,q,x
–	2ND FSSG	MSSG-24	(DEPLOYED)	SHARE SITES WITH MSSG-22																ap
–	2ND FSSG	MSSG-26	(DEPLOYED)	SHARE SITES WITH MSSG-22																ap
0	2ND FSSG	BSSG-4																		ap
0	2ND FSSG	BSSG-6																		ap
0	2ND FSSG	CSSD-21																		ap
0	2ND FSSG	CSSD-23																		ap
19																				
1	2ND MAR DIV	2ND ASLTPHIB BN		A-47 (NEW)	L-9	unk	200	225	110	30	0	0		0		0	0			e,m,p
1	2ND MAR DIV	2ND ASLTPHIB BN	H&S CO-NBC WH	A-6	L-9	unk	30	55	55	<90								0	CHARCOAL FILTERS; M256 KITS	l,o,af
1	2ND MAR DIV	2ND COMBAT ENGR BTN	COMM SHOP	1695	L-7	5	9	55	55	60			0							ag
1	2ND MAR DIV	2ND COMBAT ENGR BTN	COMM SHOP	1695	L-7	5	9	55	55	60				0						h,l,q,r,ag
1	2ND MAR DIV	2ND COMBAT ENGR BTN	NBC WAREHOUSE	434 (NEW)	L-5	51	16	55	55	N/A								0	CHARCOAL FILTERS	e,l,p,ag
1	2ND MAR DIV	2ND COMBAT ENGR BTN		S-1605	L-7	3	200	260	115	60	0					0	0		CARC PAINT	m,p
1	2ND MAR DIV	2ND LT ARM INF BTN	MOTOR-T	575 O/S	L-7	unk	64	200	115	10	0								CARC PAINT	e,m,o,p,af,ag
1	2ND MAR DIV	2ND MAR REGT		SHP-249*	L-5	unk	240	440	220	14			0	0						e,q,r
1	2ND MAR DIV	2ND RECON BN	MOTOR-T	BA-130 O/S	L-10	unk	160	170	150	30	0		0	0			0			e,m,o,p,
1	2ND MAR DIV	2ND TANK BN	MAINT	S1653*	L-7	10	432	330	330	<90	0		0	0			0			m,r,w
–	2ND MAR DIV	4TH MAR REGT	2ND BN (DEPLOYED)	SHARES 6TH MARINE REGIMENT SITES																ap
1	2ND MAR DIV	6TH MAR REGT	MOTOR-T	S-1636*	L-7	1	215	220	300	<90	0		0	0			0	0	CHARC FILT, ETOH, S-K SOLVENT	e,p,r,s,w,ae
1	2ND MAR DIV	8TH MAR REGT	MOTOR-T	HP-100	L-5	10	300	255	55	30	0					0	0	0	CHARCOAL FILTERS	e,p
1	2ND MAR DIV	8TH MAR REGT	COMM	HP-104	L-5	5	60	330	165	60			0	0						h,l,z
1	2ND MAR DIV	10TH MAR REGT	HQ BATTERY-MOTOR-T	1323*	L-6	2	120	70	5	30						0	0		(CARC PAINT)	e,p,r
1	2ND MAR DIV	10TH MAR REGT	5TH BN-MAINT	1450	L-6	12	50	110	55	30						0			(CARC PAINT-ATYPICAL)	e,o,p,af
1	2ND MAR DIV	10TH MAR REGT	1ST/2ND/3RD BNS-MAINT	1775	L-7	13	300	400	295	60	0						0	0	NBC FILTERS	e,p
1	2ND MAR DIV	HQ BTN	NBC WAREHOUSE	1501	L-6	51	unk	unk	unk	unk								0	NBC ITEMS	ao
1	2ND MAR DIV	HQ BTN	TRUCK CO	1780*	L-7	21	120	500	120	30	0					0	0		CARC PAINT	m,p,w,aj
1	2ND MAR DIV	HQ BTN	COMM CO	1860*	L-7	10	240	170	115	60	0		0				0			p,r,ac
19																				
1	2ND MEF	H&S CO	MOTOR-T SECTION	1205	L-6	41	64	55	55	<90	0						0			b,e,f,j,k,n,p,q,u,af
1	2ND MEF	H&S CO	MOTOR-T SECTION	1771 (NEW)	L-7	20	unk	unk	unk	unk	0						0			(Site not set up.)
0	2ND MEF	H&S CO	NBC SECTION @ 1627	INCLUDED W/2ND SRIG'S WASTE NBC GEAR																ap
2																				

TABLE 8-1.2 LIST OF LESS THAN 90-DAY STORAGE AREAS: MCB, CAMP LEJEUNE

#	COMMAND	REG/BTN/ORGANIZATION	UNIT/COMPANY	LOCATION BUILDING NO.	MAP NO.	SITE AG (YRS)	AREA (SQ FT)	MAX (GAL)	AVE Q (GAL)	DAYS @ SITE	BATT ACID	HG BATT	LI BATT	MG BATT	NI/CD BATT	PAINT	OIL FILT	NBC GEAR	OTHER WASTES	SITE CONDITIONS
1	2ND SRIG	2ND ANGLICO CO	MOTOR-T	SFC-237*	L-7	<1	396	165	110	<90			0						NON-REGULATED WASTES	a,b,e,m,r,af
1	2ND SRIG	2ND FORCE RECON CO		USE SAME AREAS AS 2ND ANGLICO									0						NON-REGULATED WASTES	a,b,e,m,r,af
1	2ND SRIG	2ND RADIO BN	MOTOR-T	FC-241	L-7	12	1	5	5	unk	0									h,l,ag
1	2ND SRIG	2ND RADIO BN		FC-365 (VAN)	L-7	12	80	275	165	60			0	0						l
1	2ND SRIG	2ND RADIO BN	MOTOR-T	SFC-236	L-7	unk													NON-REGULATED WASTES	ak
1	2ND SRIG	8TH COMM BN	BRAVO CO	1604 O/S	L-6	50	10	120	120	45		0	0	0					KOH ELCTROLYTE	e,f,i,j,k,o,p,u,v
1	2ND SRIG	8TH COMM BN	HQ CO	FC-230	L-7	unk													PB/ACID BATT-RECYCLABLES	a,b,i,j,k,u,v,af
1	2ND SRIG	8TH COMM BN	HQ CO	SFC-235	L-7	unk													RECYLCEABLES ONLY	ak
1	2ND SRIG	HQ & SERVICE CO		1309	L-6	51	288	825	1*	<90							0			h,l,p
1	2ND SRIG	HQ & SERVICE CO		1309/1310	L-6	51	9	5	5	180	0									l,k,u,ac
1	2ND SRIG	INTELLIGENCE CO		1826	L-7	41	15	270	205	unk		0	0	0	0					e,i,j,l,p,z,ad,ag
1	2ND SRIG	REMOTE PILOT VEH CO		S1746*	L-7	1	525						0	0						e,m,p,r,x
12																				
1	MCB	BASE BRIG		1041 O/S	L-6	unk	32	55	55	60						0				e,f,i,m,r,s,,u,x,af
2	MCB	EMO/DRMO		TP-464	L-6	new	unk	unk	unk	unk						0			P'S & U'S	ao
1	MCB	FAC-MAINTENANCE		1102	L-6	50	250	330	165	60						0			COMPRESSOR OIL W/FREON	e,x,ad,af
1	MCB	FAC-MAINTENANCE		S-866	L-3	unk	300	110	55	30							0			e,l,p,x,ad,af
1	MCB	LOGISTICS		1502	L-6	51	24	110	110	30	0						0			h,l,af
1	MCB	LOGISTICS		906 O/S	L-6	unk	16	30	30	30						0				f,h,l,q,x,ad,af
1	MCB	MC ENGR SCHOOL	MAINT PLANT	BB-51*	L-6	47	96	390	60	60	0						0		CAUSTIC CLEANER	e,f,h,j,l,p,r,af,ag
1	MCB	MC SERV SPT SCHOOL		M-176 (NEW)*	L-2	unk	80	60	60	45			0	0		0			CONTAM. DIRT FROM PAINT	f,l,j,k,p,r,s,v,x
1	MCB	MC SERV SPT SCHOOL	MOTOR T	SM-93	L-2	10	unk	unk	unk	unk	0					0				p,r,ad,af,ag,aj,am
1	MCB	MORALE, WEL & REC	MAINT	1736	L-7	18	240	495	220	30						0	0			e,m,p,r,x,ad
1	MCB	NAVAL HOSPITAL		NH-118	L-3	unk	60	250	150	60	0								KOH ELECT, ETHYLENE OXIDE, MI	e,f,l,p,af
1	MCB	RESERVE SUPPORT UNIT	RESERVE AFF DEPT	1111	L-6	46	160	5	0	N/A							0		NO LONGER USE SITE	ak
1	MCB	RIFLE RANGE DETACH		RR-62	L-6	45	72	30	30	30						0	0			l,k,p,u,ad
1	MCB	SCHOOL OF INFANTRY		TC-773	L-1	47	150	235	155	30		7	0	0	0					e,p,q,x,ad,aj
1	MCB	TRAINING & OPS		1410	L-6	50	250	55	NA	unk	0					0			SAND BLAST GRIT, OTHER WASTE	e,h,j,k,n,p,r,u,v,x,ad,af
0	MCB	COMM ELECTRONICS DIV		?																ap
0	MCB	DEPENDENT'S SCHOOLS		?																ap
0	MCB	FAC-BACHELOR HOUSE		?																ap
0	MCB	FAC-FIRE DIV		?																ap
0	MCB	FAC-PUBLIC WORKS		1005	L-6	50														ap
0	MCB	HQ & SUPPORT BN		1117	L-2	40														ap
0	MCB	MILITARY SUPPT DIV		?																ap
0	MCB	NAV DENTAL CLINIC		?																ap
0	MCB	PROVOST MARSHALL		?																ap
16																				

TABLE B-2.1 LIST OF SATELLITE ACCUMULATION AREAS: MCAS, NEW RIVER

#	COMMAND	GROUP	SQUADRON	LOCATION (BUILDING #)	MAP NO.	AGE (YRS)	AREA (SQ FT)	MAX Q (GAL)	AVE Q (GAL)	DAYS @ SITE	SATELLITE GENERATION POINT	SAA WASTE	SITE CONDITIONS
?	2ND MAW	MAG-26	HMH 362 (DEPLOYED)									UNKNOWN	ap
1	2ND MAW	MAG-26	HMH 461	AS-3905	L-4	4	6.25	30	30	10-15	HANGAR DECK	OIL FILTERS	f,h,i,l,s,ab
1	2ND MAW	MAG-26	HMH 461	AS-3905	L-4	4	4	5	5	14	HYDRAULIC SHOP	P'TEST	a,g,h,i,l,q,s
1	2ND MAW	MAG-26	HMH 461	AS-3905, P/L	L-4	10	5.25	5	5	10-15	AIR FRAMES	PAINT	ab,af
1	2ND MAW	MAG-26	HMH 461	[AS-3905]P/L	L-4	10	5.25	5	5	10-15	AIR FRAMES	ALODINE	a,s,ab
1	2ND MAW	MAG-26	HMLA 167	AS-4106	L-4	24(R)	12	5	5	<1	HYDRAULIC SHOP	P'TEST	t,ab
1	2ND MAW	MAG-26	HMLA 167	AS-4115 (NEW)	L-4	7	9	35	35	10-15	FLIGHT EQUIP	HG BATTERIES	(Site not set up.)
1	2ND MAW	MAG-26	HMLA 167	AS-4115 (NEW)	L-4	7	9	35	35	10-15	FLIGHT EQUIP	LI BATTERIES	(Site not set up.)
1	2ND MAW	MAG-26	HMM 261	AS-515	L-4	30(R)	4	20	10	7	FLIGHT EQUIP	LI/HG BATTERIES	f,g,h,i,l,q,s
1	2ND MAW	MAG 26	HMM261	AS-515	L-4	30(R)	4	5	5	7	METAL SHOP	PAINT	f,h,i,q,s,ab
1	2ND MAW	MAG-26	HMM 261	AS-515	L-4	30(R)	4	5	5	<1	HYDRAULIC SHOP	P'TEST	h,i,l,q,
1	2ND MAW	MAG-26	HMM 261	AS-515	L-4	30(R)	4	10	8	<1	HANGAR DECK	PD 680	h,i,l,q,s
1	2ND MAW	MAG-26	HMM 261	AS-515	L-4	30(R)	4	30	30	<1	METAL SHOP	RAGS	f,h,i,q,s,ab
?	2ND MAW	MAG-26	HMM 264 (DEPLOYED)									UNKNOWN	ap
1	2ND MAW	MAG-26	HMM 266	AS-515	L-4	30(R)	16	0.9 cf	0.9 cf	<1	FLIGHT EQUIP	LI/MG BATTERIES	a,f,h,i,l,s
1	2ND MAW	MAG-26	HMM 266	AS-515	L-4	30(R)	4	55	55	14-21	HANGAR DECK	OIL FILTERS	h,i,l,q,
1	2ND MAW	MAG-26	HMM 266	AS-515	L-4	30(R)	16	5	5	<1	HYDRAULIC SHOP	P'TEST	f,h,i,s,ah
1	2ND MAW	MAG-26	HMM 266	AS-515	L-4	30(R)	4	5	5	unk	PAINT ROOM	RAGS (PAINT)	ak,aq
1	2ND MAW	MAG-26	HMT 204	AS-504	L-4	39	2.7	5	5	3	CORROSION CONTROL	PAINT	af
1	2ND MAW	MAG-26	HMT 204	AS-578	L-4	3	5.5	20	20	<3	HYDRAULIC SHOP	P'TEST/RAGS	h,i,l
1	2ND MAW	MAG-26	MALS 26 (AVIONICS)	AS-4141	L-4	17	180	5	5	7	AVIONIC SHOP	KOH ELECTROLYTE	f,h,i,l,ab
1	2ND MAW	MAG-26	MALS 26 (AVIONICS)	AS-4141	L-4	17	16	unk	unk	unk	AVIONIC SHOP	NI/CD BATTERIES	f,h,i,l,ab
1	2ND MAW	MAG-26	MALS 26 (AVIONICS)	AS-4141 (VAN)	L-4	unk	4	5	5	unk	AVIONIC SHOP	NI/CD BATTERIES	a,f,h,i,l,ab
1	2ND MAW	MAG-26	MALS 26 (GSE)	AS-4146	L-4	16	4	0	0	N/A	GSE/BATTERY ROOM	BATTERY ACID	f,g,l (Site never used.)
1	2ND MAW	MAG-26	MALS 26 (GSE)	AS-4146	L-4	16	6	55	55	unk	GSE	OIL FILTERS	a,b,d,m,s,ab,af,ag
1	2ND MAW	MAG-26	MALS 26 (GSE)	AS-4146	L-4	16	6	55	55	unk	GSE HYD SHOP	RAGS (FREON)	a,b,d,m,s,ab,af,ag
1	2ND MAW	MAG-26	MALS 26 (GSE)	[AS-4146]	L-4	16	6	25	10	unk	GSE HYD SHOP	P'TEST	a,b,d,m,s,ab,af,ag
1	2ND MAW	MAG-26	MALS 26 (MAINT)	AS-518	L-4	25 (R)	4	55	55	<3	METAL SHOP/STRIPPING	METHYLENE CHLORIDE	a,e,h,l,ab,af,ah
1	2ND MAW	MAG-26	MALS 26 (MAINT)	AS-518	L-4	25 (R)	4	55	55	<3	METAL SHOP/STRIPPING	METHYLENE CHLORIDE/WATER	a,e,h,l,ab,af,ah
1	2ND MAW	MAG-26	MALS 26 (MAINT)	AS-518	L-4	25 (R)	6	12	12	unk	HYDRAULIC SHOP	P'TEST	a,s,ac,ai
1	2ND MAW	MAG-26	MALS 26 (MAINT)	AS-552	L-4	15	12	8	8	unk	FLIGHT EQUIP	LI BATTERIES	b,e,h,i,l,n,q,s,u,x,z,ab,ac,a
1	2ND MAW	MAG-26	MALS 26 (MAINT)	[AS-552]	L-4	15	12	25	8	unk	FLIGHT EQUIP	HG BATTERIES	b,e,h,i,l,n,q,s,u,x,z,ab,ac,a
30													

NOTE: "R" IN THE "AGE" COLUMN INDICATES SITE RENOVATED WITHIN THE PAST 10 YEARS.

TABLE B-2.1 LIST OF SATELLITE ACCUMULATION AREAS: MCAS, NEW RIVER

#	COMMAND	GROUP	SQUADRON	LOCATION (BUILDING #)	MAP NO.	AGE (YRS)	AREA (SQ FT)	MAX Q (GAL)	AVE Q (GAL)	DAYS @ SITE	SATELLITE GENERATION POINT	SAA WASTE	SITE CONDITIONS
1	2ND MAW	MAG-29	HMH 464	AS-3905	L-4	4	4	0.9 cf	0.9 cf	14	FLIGHT EQUIP	HG BATTERIES	f,h,l,s,
1	2ND MAW	MAG-29	HMH 464	AS-3905	L-4	4	4	55	55	14	HANGAR DECK	OIL FILTERS	l,s,af
1	2ND MAW	MAG-29	HMH 464	AS-3905	L-4	4	2	20	20	2	HYDRAULIC SHOP	P'TEST	h,i,l,s,af
1	2ND MAW	MAG-29	HMH 464	AS-3905	L-4	4	4	55	55	14	CORROSION/METAL SHOP	PAINT	h,i,l,af
1	2ND MAW	MAG-29	HMLA 269	AS-4106	L-4	24(R)	5	10	<10	never full	FLIGHT EQUIP	HG BATTERIES	a,h,i,l,s,ab,ah
1	2ND MAW	MAG-29	HMLA 269	AS-4106	L-4	24(R)	1	10	<10	never full	FLIGHT EQUIP	LI BATTERIES	a,h,i,l,s,ab,ah
1	2ND MAW	MAG-29	HMLA 269	AS-4106	L-4	24(R)	6	10	10	<90	CORROSION CONTROL	P'TEST	a,s,t,ab
1	2ND MAW	MAG-29	HMM 162	AS-4106	L-4	24 (R)	18.33	106	57	4-5	HANGAR DECK	SOLVENT/PD680 RAGS	a,b,h,i,s,u,ab,af
1	2ND MAW	MAG-29	HMM 162	[AS-4117]	L-4	8	16	50	15	14	HYDRAULICS SHOP	P'TEST	a,e,i,l,p,s,t,ab,af,aj,an
?	2ND MAW	MAG-29	HMM 263 (DEPLOYED)									UNKNOWN	ap
1	2ND MAW	MAG-29	HMM 365	AS-515	L-4	30 (R)	2.25	30	30	7-14	FLIGHT EQUIP	LI BATTERIES	h,i,l,s,u,ab,af,an
1	2ND MAW	MAG-29	HMM 365	AS-515	L-4	30 (R)	4	35	35	14	HYDRAULIC SHOP	P'TEST	h,i,l,s,ab,af
1	2ND MAW	MAG-29	MALS 29 (MAINT)	AS-4114	L-4	7	96	30	20	unk	HYDRAULIC SHOP	P'TEST	e,g,s,af,ag,al
1	2ND MAW	MAG-29	NBC	AS-811	L-4	21	40	530 filt	2500 filt	30	NBC TRAINING	M13 CARTRIDGES/FILTERS	h,i,l,n,q,s,ab,ag
1	2ND MAW	MAG-29	NBC	AS-811	L-4	21	40	unk	varies	30	NBC TRAINING	M-10 CANISTERS	h,i,l,n,q,s,ab,ag
1	2ND MAW	MAG-29	NBC	AS-811	L-4	21	40	unk	varies	30	NBC TRAINING	DECON KITS	h,i,l,n,q,s,ab,ag
1	2ND MAW	MAG-29	VMO-1 (DISBANDED)	AS-4100	L-4	18	2.625	5	5	<5	METAL SHOP	P'TEST	s,ab,af
16													
?	2ND MAW	MACG-28	MACTS-28 (RELOCATING)	AS-3504	L-4	28	unk	unk	unk	unk	UNKNOWN	UNKNOWN	ap
1	2ND MAW	MWSG-27	MWSS272	AS-4157	L-4	12	180	55	55	14-21	COMM SHOP	LI BATTERIES	a,b,d,f,h,i,p,q,
1	2ND MAW	MWSG-27	MWSS272	AS-4157	L-4	12	180	55	55	14-21	COMM SHOP	MG BATTERIES	a,b,d,f,h,i,p,q,
1	2ND MAW	MWSG-27	MWSS272	AS-4157	L-4	12	180	10	10	14-21	COMM SHOP	NI/CD BATTERIES	a,b,d,f,h,i,p,q,
1	2ND MAW	MWSG-27	MWSS272	AS-4158	L-4	12	120	5	55	<3	MOTOR T	BATTERY ACID	a,b,f,h,i,q,al,al
1	2ND MAW	MWSG-27	MWSS272	AS-4158	L-4	12	4	55	55	<1	MOTOR T	OIL FILTERS	a,h,i,l,ab,ac
0	MCAS	MCAS HQ										NONE	ap
0	MCAS	NAMTD	HELICOPTER SQUAD	AS-222/AS-504	L-4							NONE	ap
5													

NOTE: "R" IN THE "AGE" COLUMN INDICATES SITE RENOVATED WITHIN THE PAST 10 YEARS.

TABLE B-2.2 LIST OF LESS THAN 90-DAY STORAGE AREAS: MCAS, NEW RIVER

#	COMMAND	GROUP	SQUADRON	LOCATION	MAP NO.	AGE (YRS)	AREA (SQ FT)	MAX Q (GAL)	AVE Q (GAL)	DAYS @ SITE	BATT ACID	HG BATT	LI BATT	MG BATT	NI/CD BATT	OIL FILTE	PAINT	PD680	PATCH TEST	MISC RAGS	OTHER WASTES	SITE CONDITIONS
?	2ND MAW	MAG-26	HMH 362 (DEPLOYED)																		UNKNOWN	ap
1	2ND MAW	MAG-26	HMH 461	AS-3905	L-4	4	5.25	30	15	<90									0			e,i,j,s
1	2ND MAW	MAG-26	HMLA 167	AS-4115	L-4	7	105	35	35	10-15							0	0		0	OFF-SPEC PRODUCTS	a,b,e,i,n,v,af
1	2ND MAW	MAG-26	HMM 261	AS-574	L-4	7	116	25	25	<90									0			e,f,h,i,j,t,af
1	2ND MAW	MAG-26	HMM 264 (DEPLOYED)																		UNKNOWN	ap
1	2ND MAW	MAG-26	HMM 266	AS-526	L-4	7	4	10	5	<90							0	0				e,h,i,ag
1	2ND MAW	MAG-26	HMM 268	AS-530	L-4	17	16	25	15	<90									0			e,i,s,af,ah
1	2ND MAW	MAG-26	HMT 204	AS-591	L-4	44	168	770	8	unk										0		f,h,i,j,n,p,s,v,x,ac,ai,ah
1	2ND MAW	MAG-26	MALS 26 (MAINT)	AS-525	L-4	6	1250	900	320	45-60	0	0	0	0	0	0	0	0	0	0	ALL MAG 26 WASTES	i,n,p,s,y,af
8																						
1	2ND MAW	MAG-29	HMLA 269	AS-4108	L-4	24(R)	24	145	75	90										0		h,i,j,n,r,af
1	2ND MAW	MAG-29	HMM 162	AS-4117	L-4	6	17	50	35	unk							0				OFF-SPEC PRODUCTS	a,b,e,f,h,i,j,p,s,q,af,ai
?	2ND MAW	MAG-29	HMM 263 (DEPLOYED)																		UNKNOWN	ap
1	2ND MAW	MAG-29	HMM 365	AS-515	L-4	30(R)	80	205	30	unk									0		METHYL ETHYL KETONE	f,h,i,j,r,s,u
1	2ND MAW	MAG-29	HMM 365	[AS-528]	L-4	7	12	10	10	<90									0			a,e,h,i,s,af,ag
1	2ND MAW	MAG-29	MALS 29 (MAINT)	AS-4134	L-4	6	2304	700	300	60		0	0	0	0	0	0	0	0	0	ALL MAG 29 WASTES	e,g,i,n,ad,ai
1	2ND MAW	MAG-29	MALS 29 (GSE)	AS-4135	L-4	4	365	1320	1320	unk	0						0			0		a,b,n,r,v,y,,ad,af,ag
1	2ND MAW	MAG-29	VMO-1 (DISBANDED)	AS-4100	L-4	18	3	5	5	<5									0			s,ab,af
7																						
1	2ND MAW	MACG-28	MATCS 28 (RELOCATING)	AS-3506(NEW)	L-4	28	143	220	220	unk		0	0	0	0		0				CART-FILTERS/CANISTERS	e,f,i,j,o,p,q,s,x,
1	2ND MAW	MWSG-27	MWSS272	AS-4156	L-4	3	700	415	70	45	0					0	0					b,k,p,r,s,u,af,ag
1	MCAS	MCAS HQ	HAZ WASTE WAREHOUSE	AS-605*	L-4	5	460	1160	440	varies	0	0	0	0	0	0	0	0	0	0	ALL HAZARDOUS WASTES	u,y,af
?	MCAS	MCAS HQ	SOLVENT RECYCLING	AS-226	L-4	unk	unk	unk	unk	unk								0	0			ap
0	MCAS	NAMTD	HELICOPTER SQUAD	AS-222/AS-504	L-4	39																ap
3																						

NOTE: "R" IN THE "AGE" COLUMN INDICATES SITE RENOVATED WITHIN THE LAST 10 YEARS.

APPENDIX C

PROJECT PLANS

PROJECT PLAN FOR SITE FC-140
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: FC-140

Responsible Unit: 2D FSSG, 2D Landing Support Bn

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-6

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install an eyewash/safety shower, a fire extinguisher, spill control equipment, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Apply chemical resistant coating and install a gate valve on drain line. Provide an eyewash/safety shower, a fire extinguisher, spill control equipment, new signs, alarm pull box, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	2,000	530	11,700
BMP	5,100	890	23,000

RUST E&I RECOMMENDATIONS:

Construct the improvements to meet minimum regulatory criteria. Because only batteries are stored at this site, the environmental exposure is minimal. Construction of minimum improvements will provide adequate storage facilities.

PROJECT PLAN FOR SITE 1871
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: 1871

Responsible Unit: 2D FSSG, 2D Landing Support Bn

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-5

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install a fire extinguisher, spill control equipment, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Apply chemical resistant coating and install a fire extinguisher, spill control equipment, new signs, an alarm pull box, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	1,100	530	10,000
BMP	3,300	890	22,700

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost differential is minimal, and BMP improvements will provide better operator safety.

PROJECT PLAN FOR SITE FC-50
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: FC-50

Responsible Unit: 2D FSSG, 2D Maintenance Bn (ELMACO)

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-9

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install one polyethylene spill containment pallet, spill control equipment, and new signs.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	1,300	620	11,500

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost is minimal, and the BMP improvements will provide better environmental protection.

PROJECT PLAN FOR SITE FC-51
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Outside FC-51

Responsible Unit: 2D FSSG, 2D Maintenance Bn

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-4

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Construct a standard 2-bay concrete block structure, including new signs, an eyewash/safety shower, a fire extinguisher, and spill control equipment.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Construct a standard 2-bay concrete block structure, including chemical resistant coating, new signs, an eyewash/safety shower, a fire extinguisher, spill control equipment, a telephone, and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	24,600	530	36,300
BMP	27,600	890	47,500

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. A permanent structure for storing hazardous waste is needed at this location. The cost differential is minimal, and BMP improvements will provide better environmental protection and operator safety.

PROJECT PLAN FOR SITE 915
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: 915

Responsible Unit: 2D FSSG, 2D Supply Bn

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-4

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install one 2-drum enclosure and one 6-drum enclosure, along with a fire extinguisher and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Construct a standard 3-bay concrete block structure, including chemical resistant coating, new signs, an eyewash/safety shower, a fire extinguisher, spill control equipment, a telephone, and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	14,400	530	16,800
BMP	33,300	890	51,900

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet minimum regulatory criteria. Improvements to provide security and secondary containment for hazardous waste are needed at this site. The drum enclosures will provide adequate facilities for temporary storage based on the nature and quantity of waste generated at this site.

PROJECT PLAN FOR SITE 907
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: 907

Responsible Unit: 2D FSSG, 2D Supply Bn (Medlog)

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-7

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install two prefabricated 6-drum enclosures.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install two prefabricated 6-drum enclosures, an eyewash/safety shower, new signs, and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	21,500	530	40,400
BMP	22,900	890	47,700

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Improvements to provide security and secondary containment for hazardous waste are needed at this site. The cost differential is minimal, and BMP improvements will provide greater operator safety.

PROJECT PLAN FOR SITE TP-466
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: TP-466

Responsible Unit: 2D FSSG, 2D Supply Bn

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-3

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install concrete block separation walls and curbing, an eyewash station, and new signs for the existing facility.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Construct a new standard 3-bay concrete block structure with chemical resistent coating, including new signs, an eyewash/safety shower, a fire extinguisher, spill control equipment, an alarm pull box, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	2,500	530	11,300
BMP	32,200	890	49,700

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet minimum regulatory criteria. Costs for a new structure (BMP improvements) are significantly higher than costs associated with modifying the existing facility. The existing structure is relatively new with adequate space and sufficient secondary containment.

PROJECT PLAN FOR SITE FC-200
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Outside FC-200

Responsible Unit: 2D FSSG, 8th Engineering Support Bn

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-9

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a polyethylene spill containment pallet, an alarm pull box, spill control equipment, and new signs.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	2,600	620	14,100

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost differential is minimal, and BMP improvements provide substantially better environmental protection and operator safety.

PROJECT PLAN FOR SITE A-47
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Outside A-47

Responsible Unit: 2D Mar Div, 2D Amphibious Assault Bn

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-5

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Provide eyewash/safety shower, fire extinguisher, and spill control equipment.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install concrete in front of existing storage area, access drive, and an additional 3 inches of curbing to provide additional containment capacity. Add chemical resistant coating to storage. Provide an eyewash/safety shower, a fire extinguisher, spill control equipment, new signs, an alarm pull box, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	1,800	530	11,200
BMP	10,600	890	27,600

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Although the cost differential is significant, BMP improvements will provide substantially better environmental protection and operator safety.

PROJECT PLAN FOR SITE A-47
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Outside A-47

Responsible Unit: 2D Mar Div, 2D Amphibious Assault Bn

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-5

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Construct a 3-sided concrete block bay with fiberglass cover, install a prefabricated 2-drum containment structure, and provide an eyewash/safety shower.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	1,600	620	11,800

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The costs of improvements are minimal when compared to benefits in spill containment, material separation, and operator safety.

PROJECT PLAN FOR SITE 1883
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: 1883

Responsible Unit: 2D Mar Div, 2D Combat Engineering Bn

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-9

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a polyethylene spill containment pallet, an eyewash/safety shower, an alarm pull box, spill control equipment, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	4,000	620	16,900

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The expense is justified to provide greater environmental protection and better fire protection. Consideration should be given to combining this site with the SAA at 1884 and placing waste paints in the same container if the paints are compatible.

PROJECT PLAN FOR SITE 1884
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: 1884

Responsible Unit: 2D Mar Div, 2D Combat Engineering Bn

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-9

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a polyethylene spill containment pallet, an eyewash/safety shower, an alarm pull box, a fire extinguisher, and spill control equipment.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	4,000	620	16,900

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The expense is justified to provide greater environmental protection and better fire protection. Consideration should be given to combining this site with the SAA at 1883 and placing waste paints in the same container if the paints are compatible.

PROJECT PLAN FOR SITE S-1805
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: S-1805

Responsible Unit: 2D Mar Div, 2D Combat Engineering Bn

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-6

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Provide an eyewash/safety shower and spill control equipment.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install 500 square feet of concrete in front of existing storage area, and raise existing concrete curbing an additional three inches to provide increased containment capacity. Apply chemical resistant coating to existing storage area and provide an eyewash/safety shower, spill control equipment, and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	1,600	530	10,900
BMP	12,800	890	30,000

RUST E&I RECOMMENDATIONS:

Construct the improvements to meet BMP criteria. The quantity and nature of the hazardous wastes stored at this site justify the additional cost to provide better environmental protection and operator safety.

PROJECT PLAN FOR SITE 575
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Outside 575

Responsible Unit: 2D Mar Div, 2D Light Armored Infantry Bn, (Motor-T)

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-1

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Construct a standard 3-bay concrete block structure, including new signs, an eyewash/safety shower, a fire extinguisher, and spill control equipment.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Construct a standard 3-bay concrete block structure, including chemical resistant coating, new signs, an eyewash/safety shower, a fire extinguisher, spill control equipment, a telephone, and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	31,700	530	43,500
BMP	35,200	890	55,500

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. A permanent structure for storing hazardous waste is needed at this location. The cost differential is minimal, and BMP improvements will provide better operator safety.

PROJECT PLAN FOR SITE 575
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Outside 575

Responsible Unit: 2D Mar Div, 2D Light Armored Infantry Bn, (Motor T)

Site Designation(s): Two SAAs

Conceptual Design Drawing: See Drawing S-1

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install an eyewash/safety shower, spill control equipment, and an alarm pull box to service the two SAAs.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	4,500	600	17,900

RUST E&I RECOMMENDATIONS:

Assuming that the MCB constructs a new <90-day storage area outside 575 as recommended in this study, only installation of an eyewash is recommended at these SAAs. However, BMP improvements are recommended if no new ancillary equipment is installed for the <90-day storage area outside 575.

PROJECT PLAN FOR SITE 445
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: 445

Responsible Unit: 2D Mar Div, 2D Light Armored Infantry Bn (NBC)

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-9

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a polyethylene spill containment pallet, an alarm pull box, and an eyewash/safety shower.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	1,800	620	12,500

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost is minimal, and the BMP improvements will provide better environmental protection and operator safety.

PROJECT PLAN FOR SITE HP-200
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: HP-200

Responsible Unit: 2D Mar Div, 2D Marine Regiment (NBC)

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-9

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a polyethylene spill containment pallet and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	880	620	10,700

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost is minimal, and the BMP improvements will provide better environmental protection and operator safety.

PROJECT PLAN FOR SITE BA-130
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: BA-130

Responsible Unit: 2D Mar Div, 2D Reconnaissance Bn

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-6

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Provide an eyewash/safety shower.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install 200 square feet of concrete in front of existing storage area and apply chemical resistant coating to the existing storage area. Provide an eyewash/safety shower, an alarm pull box, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	900	530	9,500
BMP	6,300	890	24,000

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Although the cost differential is significant, the BMP improvements will provide substantially better operator safety and better protection from potential spills during vehicle loading.

PROJECT PLAN FOR SITE HP-104

Hazardous Waste Accumulation Point Study

MCB, Camp Lejeune

Current Location: HP-104

Responsible Unit: 2D Mar Div, 8th Marine Regiment (Communications)

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-10

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Construct a standard 2-bay concrete block structure, including chemical resistant coating, new signs, an eyewash/safety shower, a fire extinguisher, spill control equipment, a telephone, and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	31,200	890	55,900

RUST E&I RECOMMENDATIONS:

Construct improvements to meet BMP criteria. Site personnel indicated that hazardous waste has been taken to other <90-day storage areas because of inadequate storage space at this location. Therefore, additional storage space is needed for storing hazardous waste at this location. Although the cost is significant, the BMP improvements will help minimize liabilities associated with movement of hazardous wastes from the SAAs to the <90-day storage area and will provide better environmental protection and operator safety.

PROJECT PLAN FOR SITE 117
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: 117

Responsible Unit: 2D Mar Div, 2D 8th Marine Regiment (NBC)

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-10

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install an eyewash/safety shower and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	1,500	620	12,100

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost is minimal, and BMP improvements will provide better operator safety.

PROJECT PLAN FOR SITE 1450
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Outside 1450

Responsible Unit: 2D Mar Div, 10th Marine Regiment, 5th Bn

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-1

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install an emergency eyewash.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install one prefabricated 2-drum enclosure and one prefabricated 4-drum enclosure, plus an eyewash/safety shower, new signs, an alarm pull box, and a telephone. Add additional fencing and gate to existing fence to encompass new enclosures.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	2,400	530	11,000
BMP	10,000	620	25,000

RUST E&I RECOMMENDATIONS:

Construct proposed improvements to meet BMP criteria. Improvements to meet minimum regulatory requirements do not address the problem of insufficient storage space at this site.

PROJECT PLAN FOR SITE 1205
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Outside 1205

Responsible Unit: 2D MEF, H & S Company

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-3

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Construct a standard 3-bay concrete block structure, including new signs, an eyewash/safety shower, a fire extinguisher, and spill control equipment.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Construct a standard 3-bay concrete block structure, including chemical resistant coating, new signs, an eyewash/safety shower, a fire extinguisher, spill control equipment, a telephone, and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	29,600	530	39,700
BMP	34,900	890	52,800

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. A permanent structure for storing hazardous waste is needed at this location. The cost differential is minimal, and BMP improvements will provide better operator safety.

PROJECT PLAN FOR SITE 1604
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Outside 1604

Responsible Unit: 2D SRIG, 8th Communications Bn

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-1

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Construct a standard 3-bay concrete block structure, including new signs, an eyewash/safety shower, a fire extinguisher, and spill control equipment.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Construct a standard 3-bay concrete block structure, including chemical resistant coating, new signs, an eyewash/safety shower, a fire extinguisher, spill control equipment, a telephone, and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	38,300	530	62,800
BMP	41,000	890	68,400

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. A permanent structure for storing hazardous waste is needed at this location. The cost differential is minimal, and BMP improvements will provide better operator safety.

PROJECT-PLAN FOR SITE 1309/1310
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Between 1309 and 1310

Responsible Unit: 2D SRIG, HQ & S Company

Site Designation(s): One <90-Day Storage Area; One SAA

Conceptual Design Drawing: See Drawing S-7

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install chain link fence, a gate, an eyewash/safety shower and new signs around existing <90-day and SAA.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- For <90-day site, install a prefabricated 2-drum enclosure, an eyewash/safety shower, a fire extinguisher, spill control equipment, an alarm pull box, a telephone, and new signs.

- For SAA, install a prefabricated 2-drum enclosure and new signs. The eyewash/safety shower, fire extinguisher, spill control equipment, alarm pull box, and telephone will be shared between the SAA and the <90-day area.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	3,100	530	13,900
BMP	10,600	890	30,200

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Although the cost differential is significant, the BMP improvements provide substantially better environmental protection and operator safety.

PROJECT PLAN FOR SITE 1041
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: South of 1041

Responsible Unit: MCB, Base Brig

Site Designation(s): One <90-Day Storage Area; One SAA

Conceptual Design Drawing: See Drawing S-8

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- For <90-day storage area install a prefabricated 2-drum enclosure and new signs.
- For SAA install a prefabricated 2-drum enclosure and new signs.
- Install an eyewash/safety shower, fire extinguisher, spill control equipment, a telephone, and an alarm pull box to service both areas.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- For <90-Day area install a prefabricated 2-drum enclosure and new signs.
- For SAA install a prefabricated 2-drum enclosure and new signs.
- Install an eyewash/safety shower, a fire extinguisher, spill control equipment, a telephone, and an alarm pull box to service both areas.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	9,100	260	18,100
BMP	11,000	620	27,200

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost differential is minimal, and BMP improvements will provide better operator safety.

PROJECT PLAN FOR SITE 1102
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Outside 1102

Responsible Unit: MCB, Facilities Maintenance

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-2

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install a fire extinguisher, an eyewash/safety shower, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Construct a standard 3-bay concrete block structure, including chemical resistant coating, new signs, an eyewash/safety shower, a fire extinguisher, spill control equipment, a telephone, and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	2,100	530	11,800
BMP	35,300	890	52,500

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Improvements to meet minimum regulatory criteria do not address the significant problem of insufficient storage space for hazardous waste.

PROJECT PLAN FOR SITE S-866
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: S-866 at 45

Responsible Unit: MCB, Facility Maintenance

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-7

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Provide an eyewash/safety shower, a fire extinguisher, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Provide a prefabricated 2-drum enclosure, an eyewash/safety shower, a fire extinguisher, new signs, an alarm pull box, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	1,300	530	10,400
BMP	6,300	890	23,700

RUST E&I RECOMMENDATIONS:

Construct improvements to meet minimum regulatory criteria. The existing structure with these minimum improvements would be adequate for storage of oil filters.

PROJECT PLAN FOR SITE 1202
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: 1202

Responsible Unit: MCB, Facilities Maintenance (Paint Shop)

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-9

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a polyethylene spill containment pallet and new signs.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	560	620	10,100

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost is minimal, and the BMP improvements provide better environmental protection.

PROJECT PLAN FOR SITE 908
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Outside 908

Responsible Unit: MCB, Logistics

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-8

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install a prefabricated 2-drum enclosure, an eyewash/safety shower, a fire extinguisher, spill control equipment, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a prefabricated 2-drum enclosure, an eyewash/safety shower, an alarm pull box, a fire extinguisher, spill control equipment, a telephone, and new signs.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	5,500	260	11,000
BMP	5,900	620	15,900

RUST E&I RECOMMENDATIONS:

Because this site is located outdoors, an enclosed structure with secondary containment is warranted. Construct the proposed improvements to meet BMP criteria. The cost differential is minimal, and BMP improvements will provide better operator safety.

PROJECT PLAN FOR SITE SM-93
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: SM-93

Responsible Unit: MCB, Marine Corp Service Support School

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-4

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install concrete block bays with locking gates to separate incompatible wastes; provide an eyewash/safety shower and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install two prefabricated 2-drum enclosures, an eyewash/safety shower, an alarm pull box, a telephone, and new signs.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	4,000	530	14,400
BMP	12,200	890	33,400

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Although the cost differential is significant, the BMP improvements will provide substantially better operator safety and environmental protection through improved secondary containment and control of potential stormwater run-on.

PROJECT PLAN FOR SITE 1106/1107
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Between 1106 and 1107

Responsible Unit: MCB, MWR (Hobby Shop)

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-10

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a prefabricated 4-drum enclosure, an eyewash/safety shower, an alarm pull box, a fire extinguisher, new signs, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	6,900	620	20,600

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Although the cost is significant, the BMP improvements provide significantly better environmental protection and operator safety.

PROJECT PLAN FOR SITE 1738
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: 1738

Responsible Unit: MCB, MWR (Maintenance)

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-5

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required for the SAA.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a polyethylene spill containment pallet, an eyewash/safety shower, an alarm pull box, spill control equipment, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	4,000	620	16,900

RUST E&I RECOMMENDATIONS:

Construct the improvements to meet BMP criteria. Containment and spill control equipment are needed at this site. BMP improvements will provide better environmental protection and operator safety.

PROJECT PLAN FOR SITE S-1762
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: S-1762

Responsible Unit: MCB, MWR (Maintenance)

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-5

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Provide an eyewash/safety shower, a fire extinguisher, spill control equipment, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a new concrete pad in front of structure, provide an eyewash/safety shower, a fire extinguisher, spill control equipment, new signs, an alarm pull box, and a telephone. Add chemical resistant coating to existing storage area.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	2,000	530	11,700
BMP	8,100	890	28,900

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. BMP improvements will greatly improve access to the site, thus minimizing the likelihood of a spill during transfer operations. (It is RUST E&I's understanding that this structure is being upgraded under another program to meet the MCB's current standard design for a hazardous waste storage structure, which includes locking gates, improved access ramps, and a coat of paint.)

PROJECT PLAN FOR SITE 1111

Hazardous Waste Accumulation Point Study

MCB, Camp Lejeune

Current Location: Outside 1111

Responsible Unit: MCB, Reserve Support Unit

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-2

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Construct a standard 3-bay concrete block structure, including new signs and a fire extinguisher.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Construct a standard 3-bay concrete block structure, including chemical resistant coating, new signs, an eyewash/safety shower, a fire extinguisher, spill control equipment, a telephone, and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	29,000	530	38,100
BMP	31,800	890	48,800

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet minimum regulatory criteria. Even though the cost differential is minimal, the quantity and nature of the waste do not justify the additional expenditure. Should waste generation increase in the future, BMP additions may be warranted.

PROJECT PLAN FOR SITE RR-62
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: RR-62

Responsible Unit: MCB, Rifle Range Detachment

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-8

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install 128 square feet of concrete paving; provide an eyewash/safety shower and spill control equipment.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a prefabricated 4-drum enclosure, an eyewash/safety shower, an alarm pull box, spill control equipment, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	2,900	530	12,600
BMP	7,800	890	26,100

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Although the cost differential is significant, the BMP improvements provide substantially better environmental protection and operator safety.

PROJECT PLAN FOR SITE TC-773 (TC-611)
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Outside TC-773

Responsible Unit: MCB, School of Infantry

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-3

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install new signs, an eyewash station, and a fire extinguisher.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Construct a standard 3-bay concrete block structure, including chemical resistant coating, new signs, an eyewash/safety shower, a fire extinguisher, spill control equipment, a telephone, and an alarm pull box.

- Construct the new structure outside TC-611, thus minimizing the distance for transporting hazardous wastes from SAAs.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	1,300	530	10,400
BMP	32,300	890	49,900

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The existing <90-day site is approximately 1,300 feet away from SAAs resulting in a high potential for accidental spills during transfer operations. Construction of BMP improvements will significantly reduce the potential liabilities associated with waste transfer.

PROJECT PLAN FOR SITE 1410
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: Outside 1410

Responsible Unit: MCB, Training and Operations

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-2

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Construct a standard 3-bay concrete block structure, including new signs, an eyewash/safety shower and a fire extinguisher.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Construct a standard 3-bay concrete block structure, including chemical resistant coating, new signs, an eyewash/safety shower, a fire extinguisher, spill control equipment, a telephone, and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	34,500	530	48,900
BMP	36,300	890	57,800

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. A permanent structure for storing hazardous waste is needed at this location. The cost differential is minimal, and BMP improvements will provide better operator safety.

PROJECT PLAN FOR SITE NH-100
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: NH-100

Responsible Unit: MCB, Naval Hospital

Site Designation(s): Two SAAs

Conceptual Design Drawing: See Drawing S-11

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install two undercounter safety cabinets.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	1,800	620	12,700

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost is minimal, and the BMP improvements will provide better environmental protection.

PROJECT PLAN FOR SITE NH-100
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: NH-100

Responsible Unit: MCB, Naval Hospital

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-11

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install one polyethylene spill containment pallet.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	290	620	9,600

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost is minimal, and the BMP improvements will provide better environmental protection.

PROJECT PLAN FOR SITE NH-118
Hazardous Waste Accumulation Point Study
MCB, Camp Lejeune

Current Location: NH-118

Responsible Unit: MCB, Naval Hospital

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-11

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install concrete block separation walls and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install three prefabricated medical waste storage buildings plus an eyewash/safety shower, an alarm pull box, a fire extinguisher, spill control equipment, and new signs.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	1,700	530	10,600
BMP	29,300	890	56,500

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet minimum regulatory criteria. After these improvements have been made, the existing structure should be adequate. It is also recommended that a chemical resistant coating be applied to the existing surfaces.

PROJECT PLAN FOR SITE AS-3506
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-3506

Responsible Unit: 2D MAW, MACG 28, MATCS 28

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-16

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install an eyewash/safety shower, a fire extinguisher, spill control equipment, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Apply a chemical resistant coating to the base and lower walls of building and install concrete curbing with access ramp, an eyewash/safety shower, a fire extinguisher, an alarm pull box, spill control equipment, new signs, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	2,000	530	11,700
BMP	3,700	890	20,200

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost differential is minimal, and the BMP improvements will provide better environmental protection and operator safety.

PROJECT PLAN FOR SITE AS-3905
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-3905

Responsible Unit: 2D MAW, MAG 26, HMH-461

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-15

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- In each of the three areas, install concrete block separation walls, security gates, an eyewash/safety shower, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- In each of the three areas, install concrete block separation walls, security gates, and concrete curbing with access ramp across entrance to each bay. Apply chemical resistant coating to each bay, and install an eyewash/safety shower, new signs, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	23,900	1,600	57,100
BMP	27,100	1,900	66,300

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost differential is minimal, and BMP improvements will allow segregation of hazardous materials and will provide better operator safety and environmental protection.

PROJECT PLAN FOR SITE AS-3905
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-3905

Responsible Unit: 2D MAW, MAG 26, HMH 461

Site Designation(s): Two SAAs

Conceptual Design Drawing: See Drawing S-15

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install two prefabricated safety storage cabinets.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	1,900	620	12,800

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. BMP improvements will provide better environmental protection, allow segregation of hazardous materials, and reduce potential fire hazards.

PROJECT PLAN FOR SITE AS-4115
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-4115

Responsible Unit: 2D MAW MAG 26, HMLA 167

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-16

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install a standard concrete block 2-bay structure, including an eyewash/safety shower, a fire extinguisher, spill control equipment, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a standard concrete block 2-bay structure, including chemical resistant coating, an eyewash/safety shower, a fire extinguisher, an alarm pull box, spill control equipment, new signs, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	23,400	530	34,000
BMP	26,600	890	45,600

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Additional space for storage of hazardous waste is needed at this location. The cost differential is minimal, and the BMP improvements will provide better operator safety.

PROJECT PLAN FOR SITE AS-574
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-574

Responsible Unit: 2D MAW, MAG 26, HMM 261

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-15

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install three concrete block separation walls, an eyewash/safety shower, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install three concrete block separation walls, concrete curbing with access ramp across entrance to each bay to provide secondary containment. Apply chemical resistant coating to each bay and install an eyewash/safety shower, an alarm pull box, new signs, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	3,200	690	14,312
BMP	6,600	1,000	25,800

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost differential is minimal, and BMP improvements provide better environmental protection and operator safety.

PROJECT PLAN FOR SITE AS-528/AS-530
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-528 and AS-530 (Proposed combination of sites)

Responsible Unit: 2D MAW, MAG 26, HMM 266 (and formerly MAG, 29 HMM 365)

Site Designation(s): Three <90-Day Storage Areas

Conceptual Design Drawing: See Drawings S-11 and S-12

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install concrete block separation walls.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a standard concrete block 4-bay structure adjacent to AS-528. New structure will replace <90-day storage areas in AS-528 and AS-530. Structure will include chemical resistant coating, an eyewash/safety shower, a fire extinguisher, an alarm pull box, spill control equipment, new signs, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	3,000	530	10,600
BMP	41,200	1,300	63,900

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet the BMP criteria. Improvements to meet minimum regulatory criteria will not address the significant problem of lack of storage space.

PROJECT PLAN FOR SITE AS-504
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-504

Responsible Unit: 2D MAW, MAG 26, HMT 204

Site Designation(s): Two SAAs

Conceptual Design Drawing: See Drawing S-17

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install two prefabricated safety storage cabinets.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	1,800	550	11,700

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost is minimal, and the BMP improvements will provide better environmental and fire protection.

PROJECT PLAN FOR SITE AS-591
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-591

Responsible Unit: 2D MAW, MAG 26, HMT 204

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-13

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install a standard concrete block 3-bay structure, including an eyewash/safety shower, a fire extinguisher, spill control equipment, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a standard concrete block 3-bay structure, including chemical resistant coating, an eyewash/safety shower, a fire extinguisher, an alarm pull box, spill control equipment, new signs, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	35,700	530	59,900
BMP	38,800	890	62,700

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Additional space for storing hazardous waste is needed at this location. The cost differential is minimal, and the BMP improvements will provide better operator safety.

PROJECT PLAN FOR SITE AS-4141
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-4141

Responsible Unit: 2D MAW, MAG 26, MALS 26 (Avionics)

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-16

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a polyethylene spill containment pallet and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	500	620	10,000

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost is minimal, and BMP improvements will provide better environmental protection and operator safety.

PROJECT PLAN FOR SITE AS-4147
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-4147

Responsible Unit: 2D MAW, MAG 26, MALS 26 (GSE)

Site Designation(s): Three SAAs

Conceptual Design Drawing: See Drawing S-17

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install three prefabricated 2-drum enclosures, an alarm pull box and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	12,500	890	32,300

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Although the cost is significant, the hazards and liabilities associated with accumulating hazardous wastes at this location warrant the expenditure.

PROJECT PLAN FOR SITE AS-518
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-518

Responsible Unit: 2D MAW, MAG 26, MALS 26 (Maintenance)

Site Designation(s): Two SAAs

Conceptual Design Drawing: See Drawing S-17

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install concrete containment curbing and access ramps, metal grating, chemical resistant coating, a ventilation system, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	17,300	890	44,000

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Construction of secondary containment for this site is recommended because of the volume of hazardous waste and hazardous materials at the generation points. Ventilation improvements are recommended due to the nature of the operations and the volatility of the material being processed at this site.

PROJECT PLAN FOR SITE AS-525
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-525

Responsible Unit: 2D MAW, MAG 26, MALS 26 (Maintenance)

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-13

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install concrete block separation walls with curbing, access ramps, and chain link gates. Install an eyewash/safety shower.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a standard concrete block 4-bay structure, including chemical resistant coating, an eyewash/safety shower, a fire extinguisher, an alarm pull box, spill control equipment, new signs, and a telephone. A hydraulic dock lift and an asphalt access drive are also included as recommended by site personnel.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	11,600	1,100	32,400
BMP	63,700	1,300	101,400

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The handling of flammable waste at this structure on the flight line justifies the need for improvements at this facility. A new structure (for flammables) separated from flight operations will provide better environmental protection and operator safety. The hydraulic lift and the asphalt access drive will help minimize the potential for spills during transfer operations.

PROJECT PLAN FOR SITE AS-552
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-552

Responsible Unit: 2D MAW, MAG 26, MALS 26 (Flight Equipment)

Site Designation(s): Two SAAs

Conceptual Design Drawing: See Drawing S-17

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install two prefabricated 2-drum enclosures, an alarm pull box, a fire extinguisher, new signs, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	9,500	620	24,300

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The expenditure is justified due to lack of storage space and hazards associated with the storage of flammables nearby.

PROJECT PLAN FOR SITE AS-3905
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-3905

Responsible Unit: 2D MAW, MAG 29, HMH 464

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-15

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a polyethylene spill containment pallet.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	290	620	9,600

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost is minimal, and the BMP improvements will provide better environmental protection.

PROJECT PLAN FOR SITE AS-4117
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-4117

Responsible Unit: 2D MAW, MAG 29, HMM 162

Site Designation(s): One <90-Day Storage Area; One SAA

Conceptual Design Drawing: See Drawing S-14

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- For SAA, no improvements required.
- For <90-day area, install a standard concrete block 2-bay structure, including an eyewash/safety shower, a fire extinguisher, spill control equipment, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- For SAA, install a prefabricated 2-drum enclosure and new signs.
- For <90-day area, install a standard concrete block 2-bay structure, including chemical resistant coating, an eyewash/safety shower, a fire extinguisher, an alarm pull box, spill control equipment, new signs, and a telephone. (The SAA and <90-day area will share emergency equipment.)

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	23,200	530	33,700
BMP	31,900	1,500	53,000

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The additional costs for BMP improvements are warranted for better operator safety and also will resolve the storage space problem. Consideration should be given to moving the SAA inside the hangar and managing it like similar SAAs for other squadrons.

PROJECT PLAN FOR SITE AS-4100
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-4100

Responsible Unit: 2D MAW, MAG 29, HMM 365 (Formerly used by MAG 29, VMO-1)

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-14

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install a standard concrete block 2-bay structure, including an eyewash/safety shower, a fire extinguisher, spill control equipment, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a standard concrete block 2-bay structure, including chemical resistant coating, an eyewash/safety shower, a fire extinguisher, an alarm pull box, spill control equipment, new signs, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	23,200	530	34,900
BMP	27,200	890	46,800

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Additional space for storing hazardous waste is needed at this location. The cost differential is minimal, and BMP improvements will provide better operator safety.

PROJECT PLAN FOR SITE AS-4135
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: Outside AS-4135

Responsible Unit: 2D MAW, MAG 29, MALS 29 (GSE)

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-12

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install concrete block separation walls and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a standard concrete block 3-bay structure, including chemical resistant coating, an eyewash/safety shower, a fire extinguisher, an alarm pull box, spill control equipment, new signs, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	12,000	530	26,100
BMP	35,100	890	55,300

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Although the cost differential is significant, the BMP improvements provide substantially better environmental protection and operator safety.

PROJECT PLAN FOR SITE AS-4114
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-4114

Responsible Unit: 2D MAW, MAG 29, MALS 29 (Maintenance)

Site Designation(s): One SAA

Conceptual Design Drawing: See Drawing S-17

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a prefabricated 2-drum enclosure, an emergency eyewash, an alarm pull box, spill control equipment, new signs, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	6,300	620	19,700

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost is warranted to correct problems of insufficient storage space and incompatible waste stored in the same area.

PROJECT PLAN FOR SITE AS-4134
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-4134

Responsible Unit: 2D MAW,MAG 29, MALS 29

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-15

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install three concrete block separation walls and two gates to secure the storage area, an eyewash/safety shower, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install three concrete block separation walls and two gates to secure the storage area, concrete curbing with access ramp across entrance to each bay to provide secondary containment, apply chemical resistant coating to each bay, and install roof vent. Install an eyewash/safety shower, new signs, and an alarm pull box.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	5,400	1,600	32,800
BMP	8,700	1,900	44,300

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. The cost differential is warranted considering the quantity of hazardous waste handled at this site. BMP improvements will provide better environmental protection and operator safety.

PROJECT PLAN FOR SITE AS-811
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-811

Responsible Unit: 2D MAW, MAG 29, (NBC)

Site Designation(s): Multiple SAAs

Conceptual Design Drawing: See Drawing S-13

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install one prefabricated 2-drum enclosure and one prefabricated 6-drum enclosure, an eyewash/safety shower, a fire extinguisher, an alarm pull box, spill control equipment, and new signs.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	11,400	620	24,900

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. Although the cost is significant, the BMP improvements will provide substantially better environmental protection and operator safety.

PROJECT PLAN FOR SITE AS-515
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-515

Responsible Unit: Future Tenant (Formerly used by MAG 29, HMM 365)

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-14

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install a standard concrete block 2-bay structure, including an eyewash/safety shower, a fire extinguisher, spill control equipment, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a standard concrete block 2-bay structure, including chemical resistant coating, an eyewash/safety shower, a fire extinguisher, an alarm pull box, spill control equipment, new signs, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	23,200	530	33,600
BMP	25,600	890	43,700

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. A permanent structure for storing hazardous waste is needed at this location. The cost differential is minimal, and BMP improvements will provide better operator safety.

PROJECT PLAN FOR SITE AS-4158
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: Outside AS-4158

Responsible Unit: 2D MAW, MWSG 27, MWSS 272

Site Designation(s): One <90-Day Storage Area

Conceptual Design Drawing: See Drawing S-12

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- Install a standard concrete block 3-bay structure, including an eyewash/safety shower, a fire extinguisher, spill control equipment, and new signs.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Install a standard concrete block 3-bay structure, including chemical resistant coating, an eyewash/safety shower, a fire extinguisher, an alarm pull box, spill control equipment, new signs, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	38,100	1,100	63,700
BMP	41,200	1,300	72,800

RUST E&I RECOMMENDATIONS:

Construct the proposed improvements to meet BMP criteria. A permanent structure for storing hazardous waste is needed at this location. The cost differential is minimal, and the BMP improvements will provide better operator safety.

PROJECT PLAN FOR SITE AS-605
Hazardous Waste Accumulation Point Study
MCAS, New River

Current Location: AS-605

Responsible Unit: MCAS, Safety and Environmental Affairs

Site Designation(s): One <90-Day Storage Area (Main <90-day Storage Area at the MCAS for consolidating off-site shipments of hazardous waste)

Conceptual Design Drawing: See Drawing S-16

PROPOSED IMPROVEMENTS TO MEET MINIMUM REGULATORY CRITERIA

- No improvements are required.

PROPOSED IMPROVEMENTS TO MEET BMP CRITERIA

- Construct a new hazardous waste storage building, capable of storing 5,500 gallons of Class IB liquids and 16,500 gallons of Class IC liquids. Building includes secondary containment, chemical resistant coating, a loading dock, a sprinkler system, an eyewash/safety shower, fire extinguishers, spill control equipment, new signs, alarm pull box, and a telephone.

COST COMPARISON BETWEEN OPTIONS

Alternative	Capital Cost ($)	O & M Cost ($)	Total Cost NPV ($)
Minimum	---	---	---
BMP	147,500	3,600	176,200

RUST E&I RECOMMENDATIONS:

Construct the proposed BMP improvements. Although the existing AS-605 structure meets minimum regulatory requirements, it is not located in the vicinity of the hangars at the MCAS. Vehicles transporting hazardous waste to and from this facility must travel by residential areas at the MCAS. Construction of a <90-day storage area at a location central to the hangars would greatly reduce the time spent transferring waste from the SAAs and the <90-day storage areas at the MCAS to the consolidated hazardous waste shipping point and minimize liabilities associated with transfers of hazardous waste. The proposed BMP improvements are based on a design provided by MCAS personnel.

APPENDIX D

DISCARDED COMMERCIAL CHEMICAL PRODUCT INFORMATION

TABLE D-1
FY 1992 HAZARDOUS WASTE GENERATION
MCB, CAMP LEJUENE

GENERATED WASTE	TOTAL (lbs)	HAZARDOUS WASTE CODES	COMMENTS
Dry Cleaning Solvent	0	D001	Spent
Coating Compound	1,332	D001	
Solvent, PD680	7,320	D001	Spent
Paint	568	D001	
Solvent, Naptha	304	D001	
Photo. Proc. Effluent Waste	22,000	D011	Recycle/Removal
Fingerprint Remover	424	D001, D005	
Paint, Thinner	707	D001, D005, D035	Used
Primer, Phosphoric Acid	190	D001, D007	
Paint	1,015	D001, D007, D008	Used
Waste Paint, Thinner	29,754	D001, D007, D008, D035	
Waste Paint, Thinner, Solvents	1,994	D001,D007,D008,D035,F003	
Paint Waste, Thinner	6,399	D001, D007, D035	
Waste Paint	3,022	D001, D008	
Paint, Solvent	836	D001, D035	
Paint, Waste Solvent	532	D001, F002, F003, F005	
Batteries w/Nickel/Cadmium	1,332	D006	Spent
Batteries w/Lithium	63,695	D003	Spent
Waste Electrolyte	2,845	D002, D008	
Waste Electrolyte	2,212	D002, D006	
Waste Batteries w/Mercury	705	D009	
Waste Oil w/Pb	3,182	D008	
Filters w/Pb	5,510	D008	
Waste Paint, Solvents	440	D007, D008, D035	
Paint Spill Clean Up	400	D007, D008, D035	
Waste Paint w/Pb/Chromium	1,054	D007, D008	
Batteries w/Magnesium	35,582	D007	Spent
Whetlerite Filters w/Chromium	12,065	D007	
Mustard Gas Stimulant w/Cresol	3,185	D026	
Mercury Spill Clean Up	61	D009	
Freon 113, Solvent, TCTFE	776	F002	
Oil, Trichlorotrifluoroethane	99,592	F002	
TOTAL GENERATED WASTE	**309,033**		

TABLE D-1
FY 1992 HAZARDOUS WASTE GENERATION
MCB, CAMP LEJEUNE

DISCARDED PRODUCT	TOTAL (lbs)	HAZARDOUS WASTE CODES	COMMENTS
Decontamination Kits	2,407	D001	Expired
Resin	377	D001	Expired shelf life
Adhesive	3,312	D001	Expired shelf life
Alcohol	1,796	D001	Expired shelf life
Varnish	4	D001	Shelf life
Xylene	80	D001	Shelf life
DS-2, Diethylenetriamine	3,401	D001, D002	Shelf life
Decontamination Kit	158	D001,D002,D003,D004,U154	Shelf life
Decontamination Kit	1,654	D001,D002,D003,D009,U154	Shelf life
Adhesive	146	D001, D035	Shelf life
Methyl Alcohol	1,179	D001, U154	Shelf life
Toluene	194	D001, U220	Shelf life
Lacquer	24	D004, D009, P030, P098	Shelf life
Coating Compound	737	D003	Shelf life
Bleaching Powder	6,046	D003	Shelf life
Hydrochloric Acid	136	D002	Shelf life
Ammonium Hydroxide	75	D002	Shelf life
Lindane	2,759	D013, U129	Shelf life
Trichloroethane	139	U226	Shelf life
Waste DDT, Residue	6,400	U061	
Unexploded Ordinance	24,880	D003,D005,D006,D008,D009	Expired
DS-2, Corrosive	11,975	D002	Unused
TOTAL DISCARDED PRODUCT	67,879		

MCB, CAMP LEJEUNE: FY 1992 HAZARDOUS WASTE TOTALS

	POUNDS	PERCENTAGE
GENERATED WASTE	309,033	82
DISCARDED PRODUCT	67,879	18
TOTALS	376,912	100

NOTE: Information obtained from the 1992 Hazardous Waste Report for MCB, Camp Lejeune.

TABLE D-2
FY 1992 HAZARDOUS WASTE GENERATION
MCAS, NEW RIVER

GENERATED WASTE	TOTAL (lbs)	HAZARDOUS WASTE CODES	COMMENTS
Solvent & Paint w/EK/Tol./Pb	461	D001, D005, D006, D007, D008, D035	Used
Solvent w/MEK/Barium/Pb	508	D001, D005, D007, D008, D018, F005	Used
Solvent w/MEK/Barium/Pb	330	D001, D005, D007, D018, D028, D040, F005	Used
Solvent w/MEK/Barium/Pb	167	D001, D005, D007, F005	Used
Used Paint w/Barium/Pb	304	D001, D005, D008	
Spent Solvent w/Ba/Pb/MEK	508	D001, D005, D008, D018, F005	
Spent Lubricants w/Ba/Benz.	345	D001, D005, D018	
Thinner & Paint w/MEK/MIK/Ca	106	D001, D006, D007, F003, F005	Spent
Used Paint w/Tol./Chromium	754	D001, D007	
Used Paint w/Cr/Pb/Methanol	140	D001, D007, D008	
Used Paint w/Cr/Pb/MEK	317	D001, D007, D008, D035	
Solvents w/Pet. Dist./Paint	300	D001, D007, D008, D035	Spent
Solvent & Paint w/MEK/Xylene	41	D001, D007, F003, F005	Spent
Solvent & Paint w/MEK/Xylene	144	D001, D007, F003, F005	Spent
Solvent & Paint w/Toluene	112	D001, D007, F005	Spent
Liquid w/Pb	508	D001, D008	
Used Paint w/MEK	219	D001, D035	
Solvent & Paint w/MEK	234	D001, D035	Spent
Adhesives w/MEK	81	D001, D035	
Solvent & Paint w/Tol./Xylene	47	D001, F003, F005	Spent
Solvent & Paint w/MEK/Xylene	98	D001, F003, F005	Spent
Solvent & Paint Strip. w/Met. Cl	555	D002, D005, D006, D007, D008, F002	Spent
Batteries w/Cadium/Nickle	7,805	D002, D006	Spent
Solvent & Paint Strip. w/Met. Cl	966	D002, D007, D008, F002	Spent
Spent Batteries w/Lithium	1,293	D003	
Corrosion Preventative w/Ba	124	D005	Used
Used Blasting Media w/Paint	12,160	D005, D006, D007, D008	
Slvnt & Pnt Strip. w/Met. Cl/Cr	1,343	D005, D006, D007, D008, F002	Spent
Slvnt & Pnt Strip. w/Met. Cl/Cr	1,074	D005, D006, D007, D008, F002	Spent
Slvnt & Pnt Strip. w/Met. Cl/Cr	804	D005, D006, D007, D008, F002	Spent
Slvnt & Pnt Strip. w/Met. Cl/Cr	270	D005, D006, D007, D008, F002	Spent
Batteries w/Barium/Chromium	1,906	D005, D007	Spent
Slvnt & Pnt Strip. w/Met. Cl/Cr	2,431	D006, D007, D008, F002	Spent
Rags w/Paint Stripper	301	D006, D007, D008, F002	
Rags w/Paint Stripper	148	D006, D007, D008, F002	
Spill Residue w/Chromium	132	D007	
Spill Residue w/Chromium .	119	D007	
Used Paint w/Chromium/Pb	18	D007, D008	
Slvnt & Pnt Strip. w/Met. Cl/Pnt	345	D007, D008, F002	Spent
Gas Mask Filters w/Ag/Pb	112	D007, D011	Used
Spill Residue w/Met. Cl/Cr	218	D007, D035, F001	
Slvnt & Pnt Strip. w/Met. Cl/Pnt	6,106	D007, F002	Spent
Used Oil Filters w/Pb	229	D008	
Spill Residue w/Mercury	51	D009	
Used Batteries w/Mercury	2,087	D009	
Rags w/Trichlorotrifluoroethane	343	F002	
Rags w/Trichlorotrifluoroethane	462	F002	
Solvent w/Hyd. Fluid/TCTFE	3,715	F002	Spent
Clean Up Debris w/TCTFE	95	F002	
Rags w/Trichlorotrifluoroethane	825	F002	
Rags w/MEK/TCTFE	1,514	F002, F005	
Rags w/Alcohol/MEK	522	F003, F005	
Rags w/MEK	996	F005	
Rags w/MEK	300	F005	
Rags w/MEK	128	F005	
Clean Up Debris w/MEK	132	F005	
TOTAL GENERATED WASTE	55,353		

TABLE D-2
FY 1992 HAZARDOUS WASTE GENERATION
MCAS, NEW RIVER

DISCARDED PRODUCT	TOTAL (lbs)	HAZARDOUS WASTE CODES	COMMENTS
Ethyl Acetate	57	D001	Out of date
Unused Polish	119	D001	Out of date
Paint w/Toluene/Xylene	962	D001	Out of date
Adhesive w/Toluene/THF	2,165	D001	Out of date
Dent Filler w/Styrene	78	D001	Out of date
Decon Agent w/Chlorine	625	D001	Out of date
Unused Paint w/Cr/Min. Spirits	182	D001, D007	Out of date
Unused Paint w/Cr/Pb/MEK	958	D001, D007, D008, D035	Out of date
Unused Paint w/Cr/MEK	671	D001, D007, D035	Out of date
Unused Paint w/Pb	354	D001, D008	Out of date
Unused Lubricants w/Pb/Tol.	30	D001, D008	Out of date
Unused Paint w/MEK	786	D001, D035	Out of date
Unused Formaldehyde	337	D001, U122	Out of date
Unused Xylene	685	D001, U239	Out of date
Decon Agent w/NaOH/DETA	977	D002	Unused
Clean Cmpnd w/Met.Cl/Formic	1,010	D002	Out of date
Diethylenetriamine (DETA)	65	D002	Unused
Trichloroethane	383	U226	Out of date
TOTAL DISCARDED PRODUCT	10,444		

MCAS, NEW RIVER: FY 1992 HAZARDOUS WASTE TOTALS

	POUNDS	PERCENTAGE
GENERATED WASTE	55,353	84
DISCARDED PRODUCT	10,444	16
TOTALS	65,797	100

NOTE: 1) Information obtained from the 1992 Hazardous Waste Report for the MCB, Camp Lejeune.
2) Does not include generation information for hazardous wastes recycled on site at the MCAS.

FINAL

FISCAL YEAR 1994
SITE MANAGEMENT PLAN FOR
MARINE CORPS BASE, CAMP LEJEUNE,
NORTH CAROLINA

CONTRACT TASK ORDER 0099

Prepared For:

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

Under:

LANTDIV CLEAN Program
Contract N62470-89-D-4814

Prepared by:

BAKER ENVIRONMENTAL, INC.
Coraopolis, Pennsylvania

SEPTEMBER 29, 1993

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- LIST OF ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DEHNR	Department of Environment, Health, and Natural Resources
EPA	Environmental Protection Agency
FFA	Federal Facility Agreement
FS	Feasibility Study
FY	Fiscal Year
HPIA	Hadnot Point Industrial Area
IAS	Initial Assessment Study
IRA	Interim Remedial Action
IRP	Installation Restoration Program
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
NACIP	Navy Assessment and Control of Installation Pollutants
NPL	National Priorities List
OU	Operable Unit
PCB	Polychlorinated Biphenyl
POL	Petroleum, Oil, and Lubricants
PRAP	Proposed Remedial Action Plan
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
SI	Site Inspection
SMP	Site Management Plan
TS	Treatability Study
VOC	Volatile Organic Compound
WTP	Water Treatment Plant or Wastewater Treatment Plant

1.0 INTRODUCTION

This report presents the Fiscal Year 1994 update of the Site Management Plan (SMP) for Marine Corps Base (MCB) Camp Lejeune, North Carolina (Installation). The purpose of the SMP is to present the planned activities to be conducted at the Installation during Fiscal Year 1994 and to provide projection for long-term progress at the facility in accordance with the Department of the Navy's Installation Restoration Program (IRP). This report has been prepared by Baker Environmental, Inc. (Baker) for the Atlantic Division, Naval Facilities Engineering Command (LANTDIV).

1.1 Description of the Facility

MCB Camp Lejeune is located in Onslow County, North Carolina (see Figure 1-1). There are six major Marine Corps and two Navy Commands aboard MCB Camp Lejeune: Marine Corps Base owns all the real estate, operates entry-level formal training schools, and provides support and training for tenant commands; Headquarters Nucleus, II Marine Expeditionary Force (II MEF) coordinates operational planning for Fleet Marine Commands; 2d Marine Division (2d MAR DIV) is the ground combat element of the Force; 2d Force Service Support Group (2d FSSG) is the service and support element of the Force; 2d Surveillance, Reconnaissance and Intelligence Group (2d SRIG) obtains, produces, and releases information and intelligence during planning and execution of exercises and combat operations; 6th Marine Expeditionary Brigade (6th MEB) provides the planning staff for the Fleet Marine Force associated with Maritime Prepositioning Ships Squadron-I; the Naval Hospital and the Naval Dental Clinic provide primary medical and dental care to Marines and sailors stationed at Camp Lejeune and medical care to their families.

The Marine Corps Air Station, New River, and Camp Geiger are considered as a single urban area possessing two separate missions and supported by two unrelated groups of personnel. The MCAS, New River encompasses 2,772 acres and is located in the northwestern section of the Complex and lies approximately five miles south of Jacksonville. The Air Station includes air support activities, troop housing, and personnel support facilities, all of which immediately surround the aircraft operations and maintenance areas.

Camp Geiger, located directly north of MCAS, New River contains a mixture of troop housing, personnel support, and training uses.

Attachment C
Expedited Site Management
Schedule for Operable Units 1-13
MCB Camp Lejeune, North Carolina

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

MAY 25 1993
4WD-FFB

<u>CERTIFIED MAIL</u>
<u>RETURN RECEIPT REQUESTED</u>

Mr. Byron Brant
Department of the Navy - Atlantic Division
Naval Facilities Engineering Command
Code 1822
Norfolk, Virginia 23511-6287

RE: Marine Corps Base Camp Lejeune NPL Site
Jacksonville, North Carolina

Dear Mr. Brant:

EPA has received and reviewed the Draft Fiscal Year 1994 Site Management Plan for the subject facility. Overall, the plan is well-prepared and meets all the objectives of a Site Management Plan. I anticipate approval upon submittal of the next document. To facilitate file maintenance and eliminate unnecessary paperwork, I suggest the next submittal be titled "Final". Comments on the draft submittal dated May 14, 1993 are enclosed.

If you have any questions or comments, please call me at (404) 347-3016.

Sincerely,

Michelle M. Glenn

Michelle M. Glenn
Senior Project Manager

cc: Peter Burger, NCDEHNR
Neal Paul, MCB Camp Lejeune

Printed on Recycled Paper

COMMENTS
DRAFT FY94
SITE MANAGEMENT PLAN
MCB Camp Lejeune, NC

1. Page 4-1, Section 4.0, top of page - Why does this only refer to ten operable units?

2. Page 4-6, Table 4-3 - It may be helpful to include some part of the work plan schedule as a reference frame for the reader. For example, RI/FS Project Plan approval or finalization.

3. Page 4-17, Table 4-12 - It may be helpful to include a work plan approval date for Operable Unit 4 as a reference for the reader.

4. Page 5-5, Section 5.3, 2nd paragraph - "Will be were"?

5. Page 5-7, Table 5-3 - This schedule includes "Agency review" of the Draft SI project plans. Does the Navy/Marine Corps intend to submit these plans to EPA? These would be considered secondary documents under the Federal Facilities Agreement.

Attachment B
Response to EPA Comments to the Draft FY94 SMP EPA Letter Dated May 25, 1993
MCB Camp Lejeune, North Carolina

Attachment B

Response to EPA Comments to the Draft FY 94 SMP
EPA Letter Dated May 25, 1993

1. The reference has been changed to "13" operable units.

2. The submittal of the Final RI/FS Project Plans, which indicates "approval," has been included on Table 4-3.

3. The submittal of the Final RI/FS Project Plans has been included on Table 4-12.

4. This sentence has been deleted since no additional field investigations will be conducted at Sites 43, 63, and 65. All three sites will be included in the RI/FS program.

5. As a courtesy, the Navy/Marine Corps will submit these plans to EPA and the DEHNR.

Table 1

Expedited Site Management Schedule - FY 94

Sites 21, 24, and 78 (Operable Unit No. 1) MCB Camp Lejeune, NC

Activity	Days	Start	Finish
Project Management	317d	4/15/93	7/1/94
Subcontractor Procurement	30ed	4/16/93	5/16/93
Field Investigation	64d	4/16/93	7/15/93
Mobilization	30ed	4/16/93	5/16/93
Surveying (Pre-Inv.)	5ed	5/10/93	5/15/93
Soil Gas Investigation	7ed	5/10/93	5/17/93
Soil Investigation	30ed	5/17/93	6/16/93
Groundwater Investigation	24ed	6/21/93	7/15/93
SW/SD Investigation	3ed	6/9/93	6/12/93
Surveying (Post-Inv.)	10ed	6/21/93	7/1/93
Sample Analysis/Validation	92d	5/17/93	9/21/93
Data Evaluation	21ed	9/21/93	10/12/93
Risk Assessment	42ed	10/12/93	11/23/93
Treatability Studies	63ed	9/21/93	11/23/93
RI Report	134d	10/12/93	4/16/94
Preliminary Draft RI Report	42ed	10/12/93	11/23/93
Comment Period	21ed	11/23/93	12/14/93
Draft RI	21ed	12/14/93	1/4/94
Comment Period	30ed	1/4/94	2/3/94
Draft Final RI Report	30ed	2/3/94	3/5/94
Comment Period	21ed	3/5/94	3/26/94
Final RI	21ed	3/26/94	4/16/94

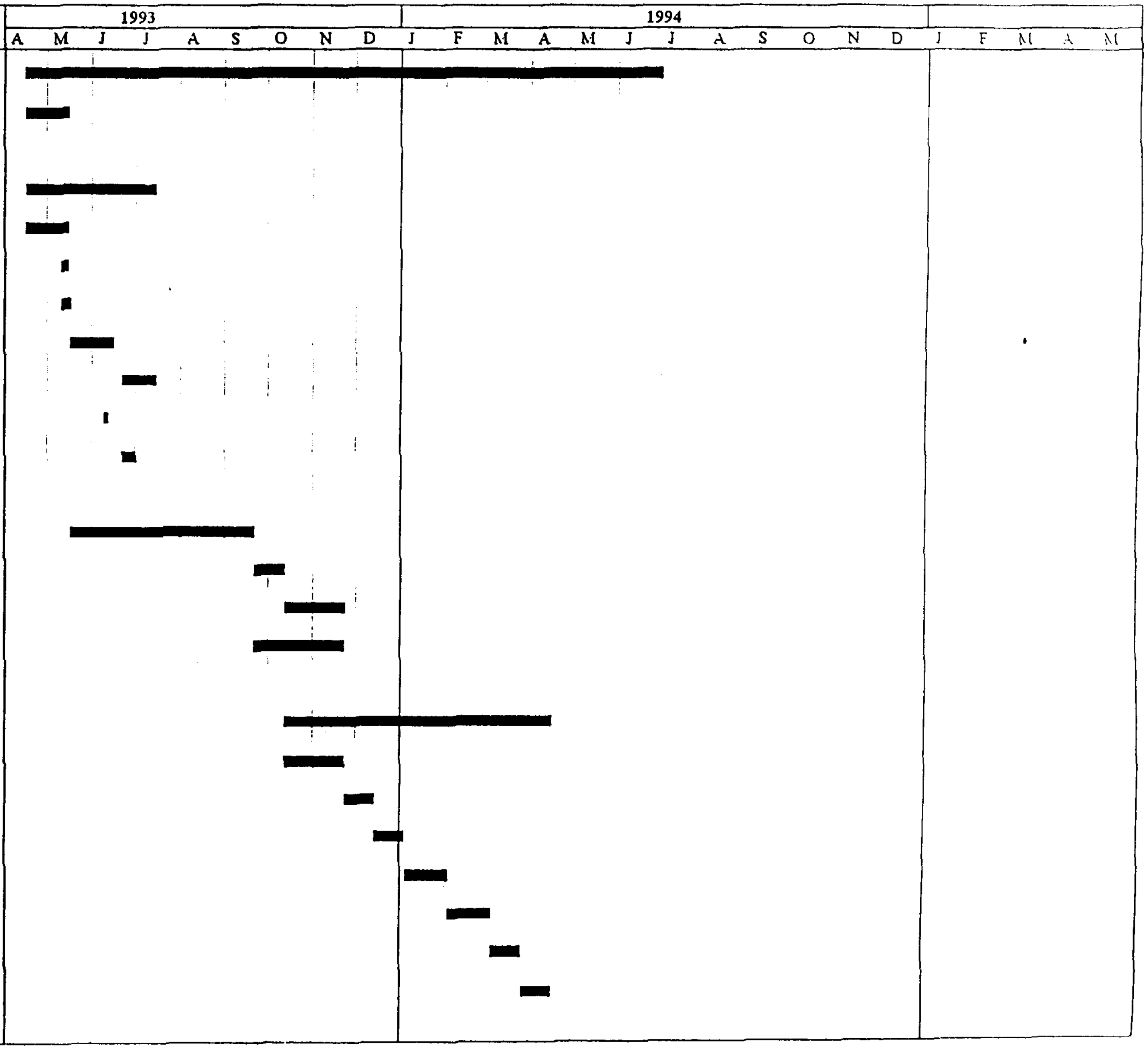
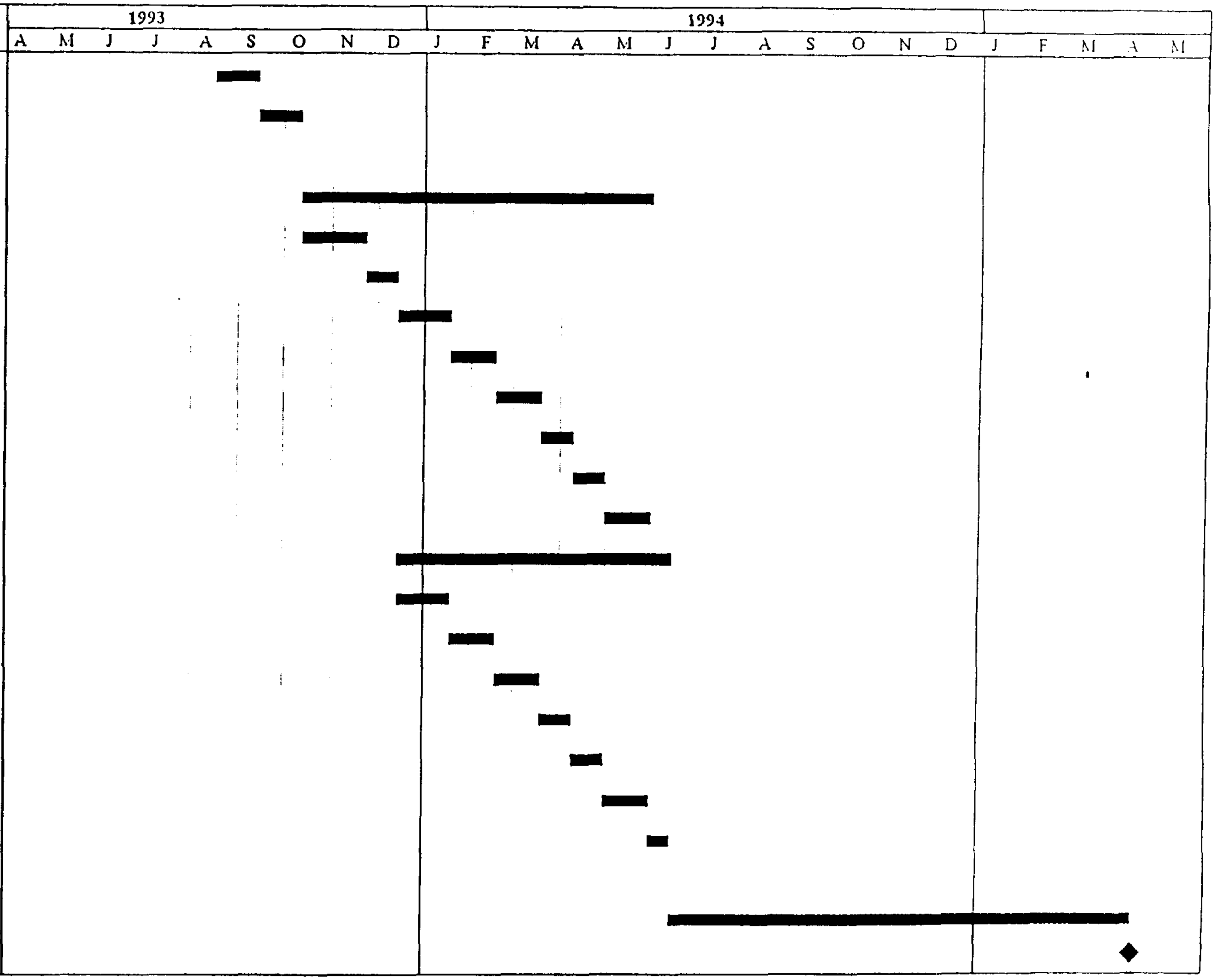


Table 1

Expedited Site Management Schedule - FY 94

Sites 21, 24, and 78 (Operable Unit No. 1) MCB Camp Lejeune, NC

Activity	Days	Start	Finish
Alternative Screening	28ed	8/17/93	9/14/93
Alternative Evaluation	28ed	9/14/93	10/12/93
FS Report	164d	10/12/93	5/30/94
Preliminary Draft FS/PRAP	42ed	10/12/93	11/23/93
Comment Period	21ed	11/23/93	12/14/93
Draft FS/PRAP	35ed	12/14/93	1/18/94
Comment Period	30ed	1/18/94	2/17/94
Draft Final FS/PRAP	30ed	2/17/94	3/19/94
Comment Period	21ed	3/19/94	4/9/94
Final FS/PRAP	21ed	4/9/94	4/30/94
Public Comment Period	30ed	4/30/94	5/30/94
ROD	129d	12/14/93	6/13/94
Preliminary Draft ROD	35ed	12/14/93	1/18/94
Comment Period	30ed	1/18/94	2/17/94
Draft ROD	30ed	2/17/94	3/19/94
Comment Period	21ed	3/19/94	4/9/94
Draft Final ROD	21ed	4/9/94	4/30/94
Comment Period	30ed	4/30/94	5/30/94
Final ROD	14ed	5/30/94	6/13/94
Remedial Design (1)	305ed	6/13/94	4/14/95
Begin RA (1)	1d	4/14/95	4/14/95

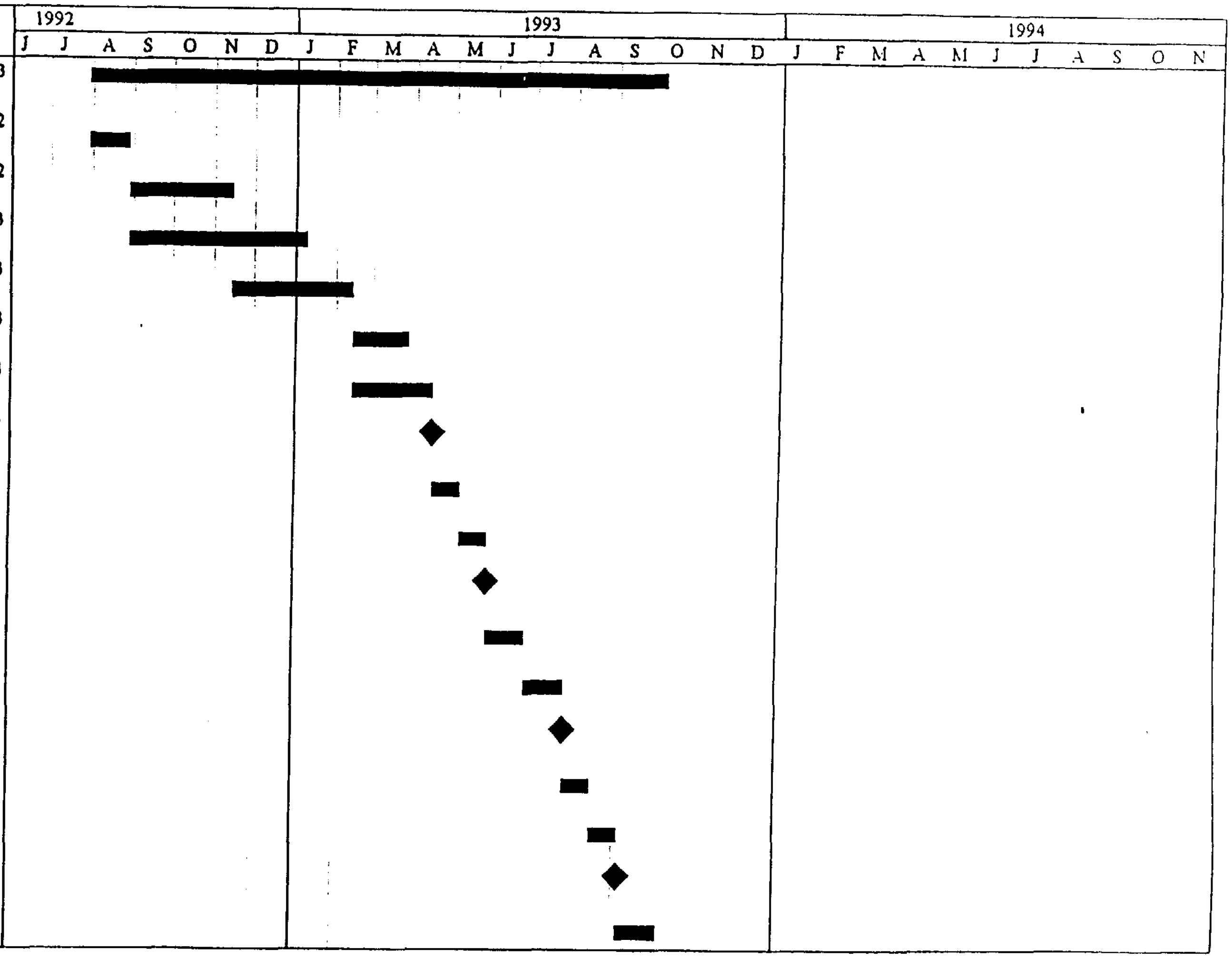


(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

Table 2

Expedited Site Management Schedule - FY 94
Sites 6 , 9 and 82 (Operable Unit No. 2) - MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS	309d	7/29/92	10/5/93
Notice to Proceed/Mobilization	30ed	7/29/92	8/28/92
Field Investigation	78ed	8/28/92	11/14/92
Data Analysis/Validation	134ed	8/28/92	1/9/93
Data Evaluation	91ed	11/14/92	2/13/93
Risk Assessment	42ed	2/13/93	3/27/93
Prepare Preliminary Draft RI/FS and PRAP	60ed	2/13/93	4/14/93
Submit Preliminary Draft RI/FS and PRAP	0d	4/14/93	4/14/93
LANTDIV Review	21ed	4/14/93	5/5/93
Prepare Draft RI/FS and PRAP	21ed	5/5/93	5/26/93
Submit Draft RI/FS and PRAP	0d	5/26/93	5/26/93
Agency Review	30ed	5/26/93	6/25/93
Prepare Draft Final RI/FS and PRAP	30ed	6/25/93	7/25/93
Submit Draft Final RI/FS and PRAP	0d	7/25/93	7/25/93
Agency Review	21ed	7/25/93	8/15/93
Prepare Final RI/FS and PRAP	21ed	8/15/93	9/5/93
Prepare Final RI/FS and PRAP	0d	9/5/93	9/5/93
Public Comment Period	30ed	9/5/93	10/5/93



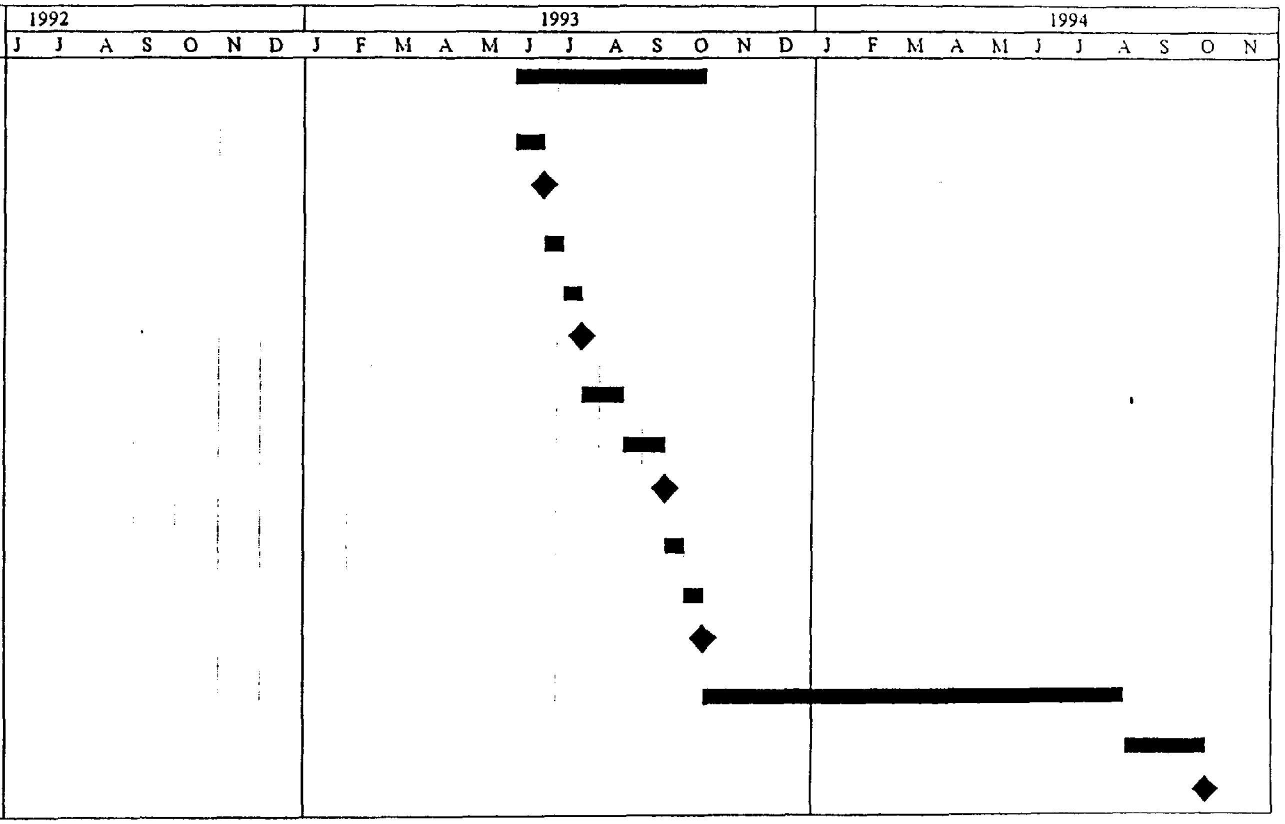
Attachment A
EPA Comments to the Draft
FY94 Site Management Plan
MCB Camp Lejeune, North Carolina

Table 2

Expedited Site Management Schedule - FY 94

Sites 6 , 9 and 82 (Operable Unit No. 2) - MCB Camp Lejeune, NC

Task	Days	Start	Finish
ROD	99d	5/31/93	10/15/93
Prepare Preliminay Draft ROD	21ed	5/31/93	6/21/93
Submit Preliminary Draft ROD	0d	6/21/93	6/21/93
LANTDIV Review	14ed	6/21/93	7/5/93
Prepare Draft ROD	14ed	7/5/93	7/19/93
Submit Draft ROD	0d	7/19/93	7/19/93
Agency Review	30ed	7/19/93	8/18/93
Prepare Draft Final ROD	30ed	8/18/93	9/17/93
Submit Draft Final ROD	0d	9/17/93	9/17/93
Agency Review	14ed	9/17/93	10/1/93
Prepare Final ROD	14ed	10/1/93	10/15/93
Submit Final ROD	0d	10/15/93	10/15/93
Remedial Design (1)	305ed	10/15/93	8/16/94
Procedure RA Contractor (1)	60ed	8/16/94	10/15/94
Remedial Action (1)	0d	10/15/94	10/15/94



(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

Table 3

Site Management Schedule - FY 94

Sites 41, 69 and 74 (Operable Unit No. 4) - MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS	288d	10/1/93	11/9/94
Notice to Proceed/Mobilization	30ed	10/1/93	10/31/93
Field Investigation	60ed	10/31/93	12/30/93
Data Analysis/Validation	116ed	10/31/93	2/24/94
Data Evaluation	42ed	2/24/94	4/7/94
Risk Assessment	28ed	4/7/94	5/5/94
Prepare Preliminary Draft RI/FS and PRAP	42ed	4/7/94	5/19/94
Submit Preliminary Draft RI/FS and PRAP	0ed	5/19/94	5/19/94
LANTDIV Review	21ed	5/19/94	6/9/94
Prepare Draft RI/FS and PRAP	21ed	6/9/94	6/30/94
Submit Draft RI/FS and PRAP	0ed	6/30/94	6/30/94
Agency Review	30ed	6/30/94	7/30/94
Prepare Draft Final RI/FS and PRAP	30ed	7/30/94	8/29/94
Submit Draft Final RI/FS and PRAP	0ed	8/29/94	8/29/94
Agency Review	21ed	8/29/94	9/19/94
Prepare Final RI/FS and PRAP	21ed	9/19/94	10/10/94
Prepare Final RI/FS and PRAP	0ed	10/10/94	10/10/94
Public Comment Period	30ed	10/10/94	11/9/94

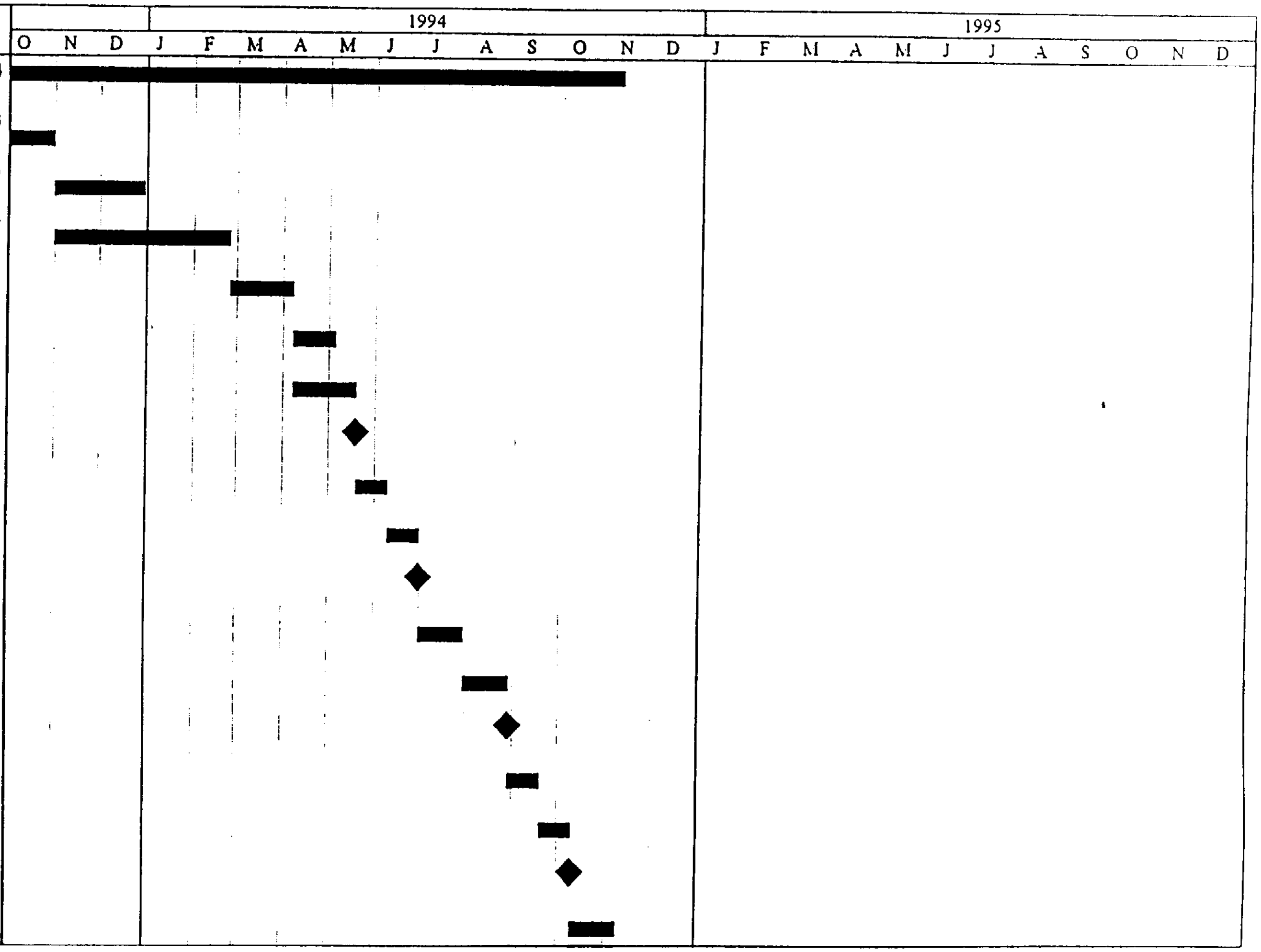


Table 3

Site Management Schedule - FY 94

Sites 41, 69 and 74 (Operable Unit No. 4) - MCB Camp Lejeune, NC

Task	Days	Start	Finish
ROD	112d	6/18/94	11/23/94
Prepare Preliminay Draft ROD	21ed	6/18/94	7/9/94
Submit Preliminary Draft ROD	0ed	7/9/94	7/9/94
LANTDIV Review	21ed	7/9/94	7/30/94
Prepare Draft ROD	14ed	7/30/94	8/13/94
Submit Draft ROD	0ed	8/13/94	8/13/94
Agency Review	30ed	8/13/94	9/12/94
Prepare Draft Final ROD	30ed	9/12/94	10/12/94
Submit Draft Final ROD	0ed	10/12/94	10/12/94
Agency Review	21ed	10/12/94	11/2/94
Prepare Final ROD	21ed	11/2/94	11/23/94
Submit Final ROD	0ed	11/23/94	11/23/94

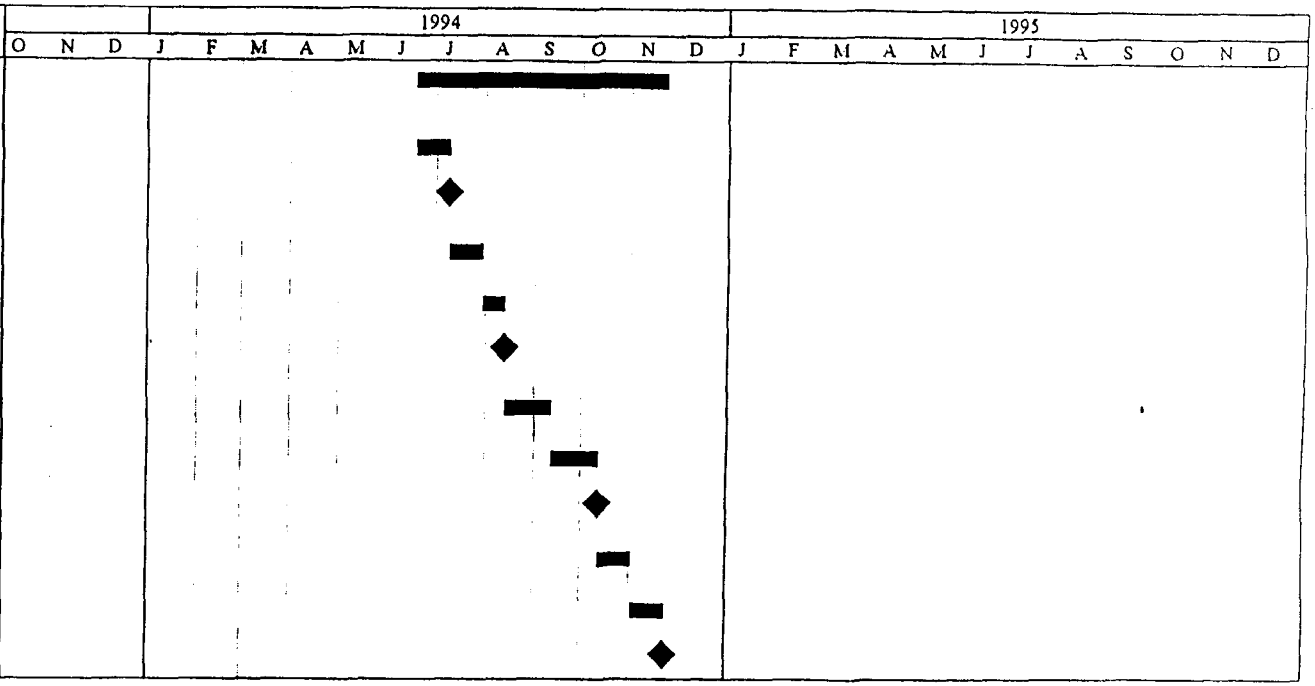


Table 4

Expedited Site Management Schedule - FY 94

Site 2 (Operable Unit No. 5) MCB Camp Lejeune, NC

Activity	Days	Start	Finish
Project Management	283d	4/15/93	5/16/94
Subcontractor Procurement	30ed	4/16/93	5/16/93
Field Investigation	41d	4/16/93	6/12/93
Mobilization	30ed	4/16/93	5/16/93
Surveying (Pre-Inv.)	5ed	5/10/93	5/15/93
Soil Investigation	24ed	5/17/93	6/10/93
Groundwater Investigation	5ed	5/28/93	6/2/93
SW/SD Investigation	2ed	5/24/93	5/26/93
Surveying (Post-Inv.)	2ed	6/1/93	6/3/93
Aquifer Tests	5ed	6/7/93	6/12/93
Sample Analysis/Validation	68d	5/17/93	8/18/93
Data Evaluation	21ed	8/18/93	9/8/93
Risk Assessment	42ed	9/8/93	10/20/93
Treatability Studies	63ed	8/18/93	10/20/93
RI Report	118d	9/8/93	2/20/94
PreliminaryDraft RI Report	42ed	9/8/93	10/20/93
Comment Period	30ed	10/20/93	11/19/93
Draft RI	30ed	11/19/93	12/19/93
Comment Period	21ed	12/19/93	1/9/94
Draft Final RI Report	21ed	1/9/94	1/30/94
Final RI Report	21ed	1/30/94	2/20/94

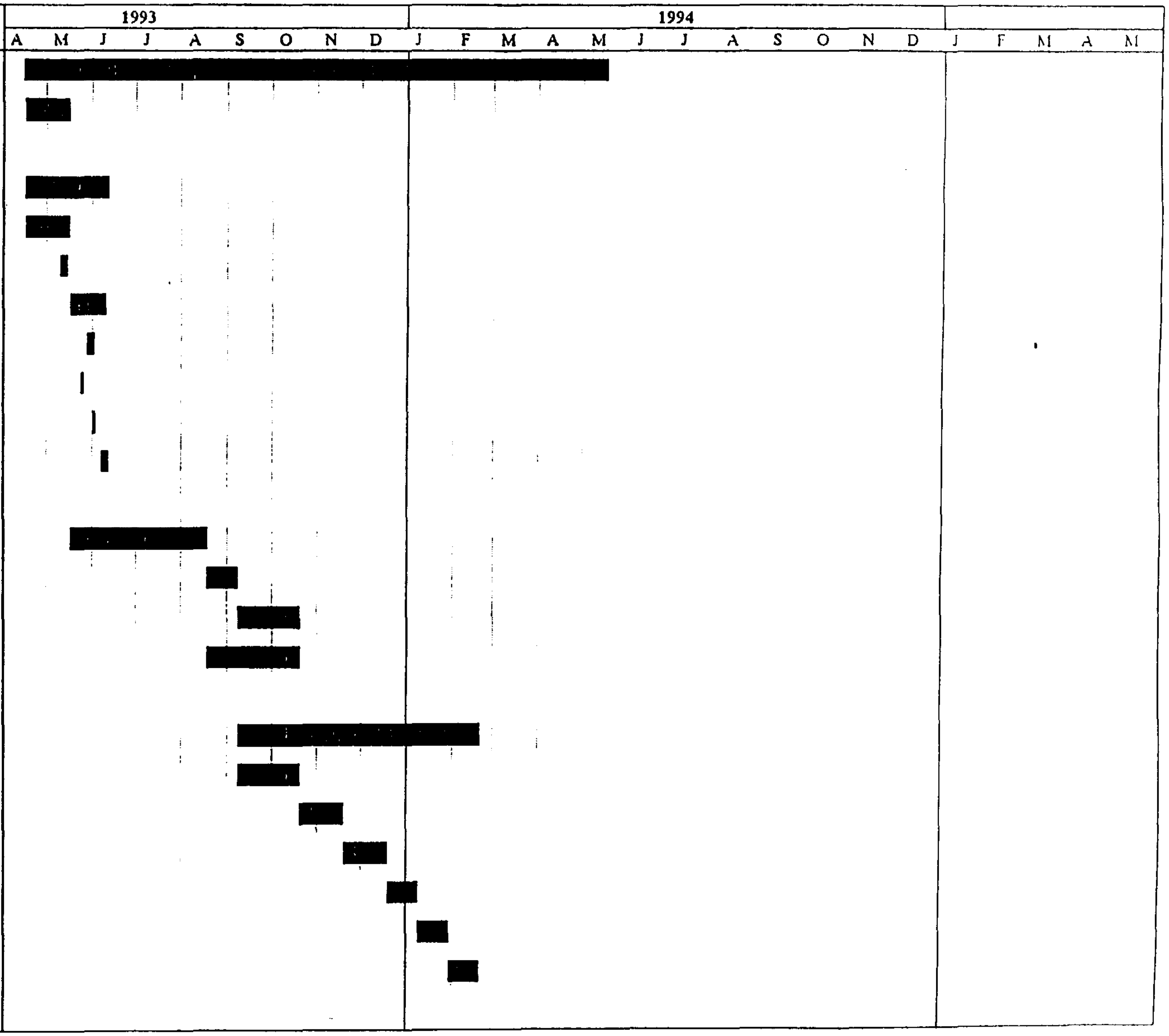
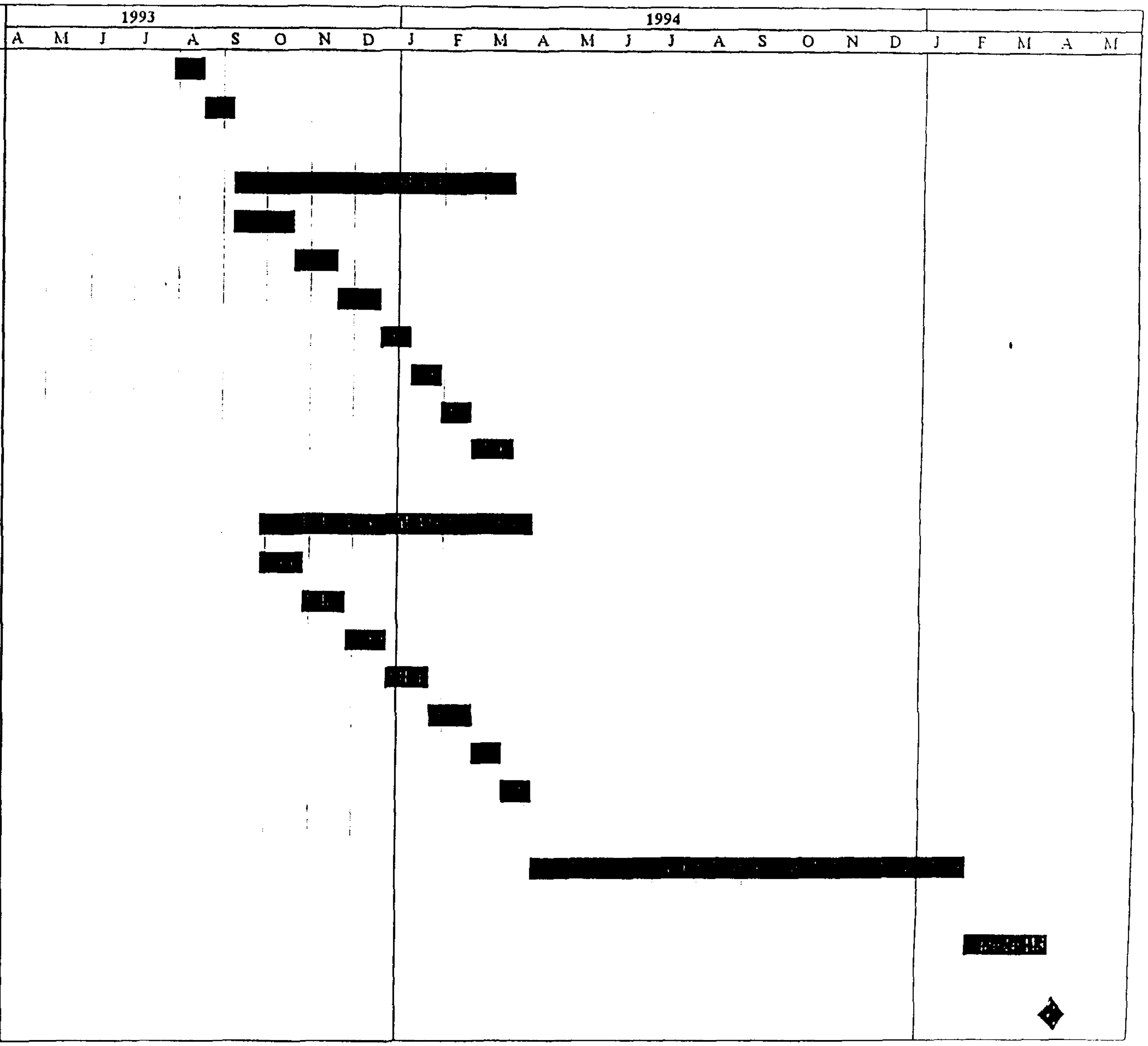


Table 4

Expedited Site Management Schedule - FY 94

Site 2 (Operable Unit No. 5) MCB Camp Lejeune, NC

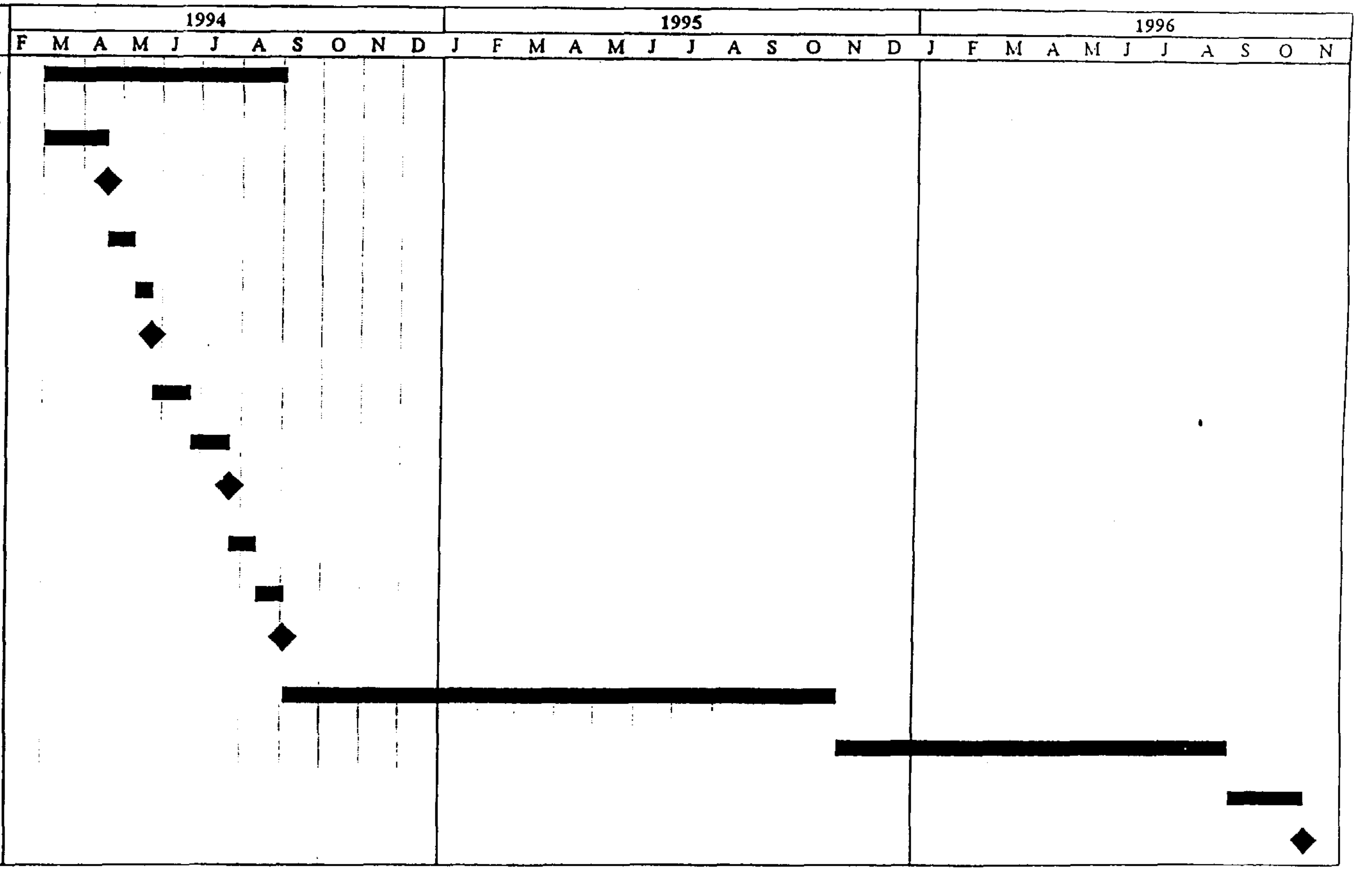
Activity	Days	Start	Finish
Alternative Screening	21ed	7/28/93	8/18/93
Alternative Evaluation	21ed	8/18/93	9/8/93
FS Report	139d	9/8/93	3/22/94
Preliminary Draft FS/PRAP	42ed	9/8/93	10/20/93
Comment Period	30ed	10/20/93	11/19/93
Draft FS/PRAP	30ed	11/19/93	12/19/93
Comment Period	21ed	12/19/93	1/9/94
Draft Final FS/PRAP	21ed	1/9/94	1/30/94
Final FS/PRAP	21ed	1/30/94	2/20/94
Public Comment	30ed	2/20/94	3/22/94
ROD	136d	9/27/93	4/5/94
Preliminary Draft ROD	30ed	9/27/93	10/27/93
Comment Period	30ed	10/27/93	11/26/93
Draft ROD	28ed	11/26/93	12/24/93
Comment Period	30ed	12/24/93	1/23/94
Draft Final ROD	30ed	1/23/94	2/22/94
Comment Period	21ed	2/22/94	3/15/94
Final ROD	21ed	3/15/94	4/5/94
Remedial Design (1)	305ed	4/5/94	2/4/95
Procure RA Contractor (1)	60ed	2/4/95	4/5/95
Begin Remedial Action (1)	0ed	4/5/95	4/5/95



(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

Table 5
Expedited Site Management Schedule - FY 94
Sites 36, 43, 44, 54 and 86 (Operable Unit No. 6) - MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	134d	3/1/94	9/3/94
Prepare Prelim. Draft RI/FS Proj. Plans	49ed	3/1/94	4/19/94
Submit Prelim. Draft RI/FS Proj. Plans	0ed	4/19/94	4/19/94
LANTDIV Review	21ed	4/19/94	5/10/94
Prepare Draft RI/FS Project Plans	14ed	5/10/94	5/24/94
Submit Draft RI/FS Project Plans	0ed	5/24/94	5/24/94
Agency Review	30ed	5/24/94	6/23/94
Prepare Draft Final RI/FS Project Plans	30ed	6/23/94	7/23/94
Submit Draft Final RI/FS Project Plans	0ed	7/23/94	7/23/94
Agency Review	21ed	7/23/94	8/13/94
Prepare Final RI/FS Project Plans	21ed	8/13/94	9/3/94
Submit Final RI/FS Project Plans	0ed	9/3/94	9/3/94
RI/FS, PRAP, and ROD (1)	427ed	9/3/94	11/4/95
Remedial Design (1)	305ed	11/4/95	9/4/96
Procure RA Contractor (1)	60ed	9/4/96	11/3/96
Begin Remedial Action (1)	0ed	11/3/96	11/3/96

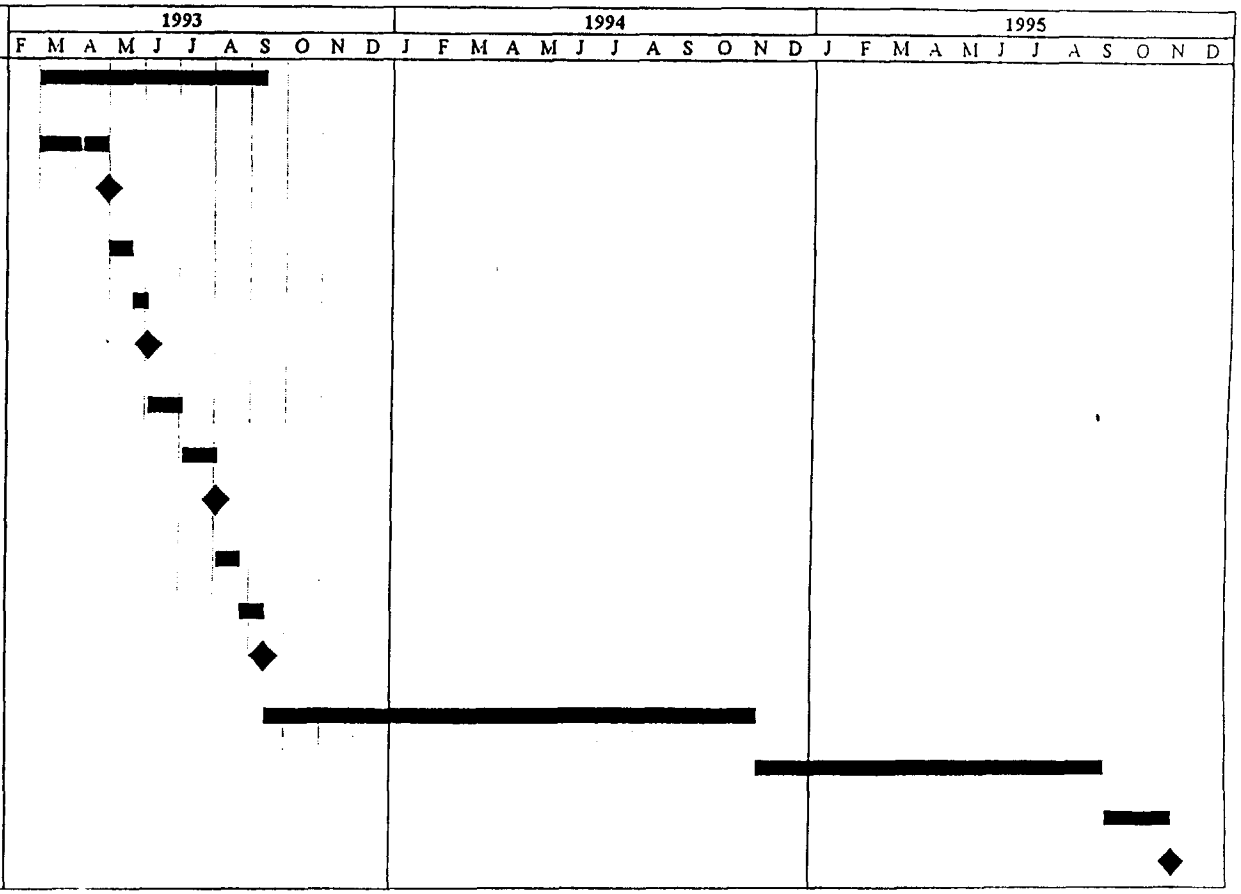


(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

Table 6

Expedited Site Management Schedule - FY 94
Sites 1, 28, and 30 (Operable Unit No. 7) - MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	141d	3/1/93	9/14/93
Prepare Prelim Draft RI/FS Proj Plans	60ed	3/1/93	4/30/93
Submit Prelim Draft RI/FS Proj Plans	0ed	4/30/93	4/30/93
LANTDIV Review	21ed	4/30/93	5/21/93
Prepare Draft RI/FS Proj Plans	14ed	5/21/93	6/4/93
Submit Draft RI/FS Proj Plans	0ed	6/4/93	6/4/93
Agency Review	30ed	6/4/93	7/4/93
Prepare Draft Final RI/FS Proj Plans	30ed	7/4/93	8/3/93
Submit Draft Final RI/FS Proj Plans	0ed	8/3/93	8/3/93
Agency Review	21ed	8/3/93	8/24/93
Prepare Final RI/FS Project Plans	21ed	8/24/93	9/14/93
Submit Final RI/FS Project Plans	0ed	9/14/93	9/14/93
RI/FS, PRAP, and ROD (1)	427ed	9/14/93	11/15/94
Remedial Design (1)	305ed	11/15/94	9/16/95
Procure RA Contractor (1)	60ed	9/16/95	11/15/95
Begin Remedial Action (1)	0ed	11/15/95	11/15/95

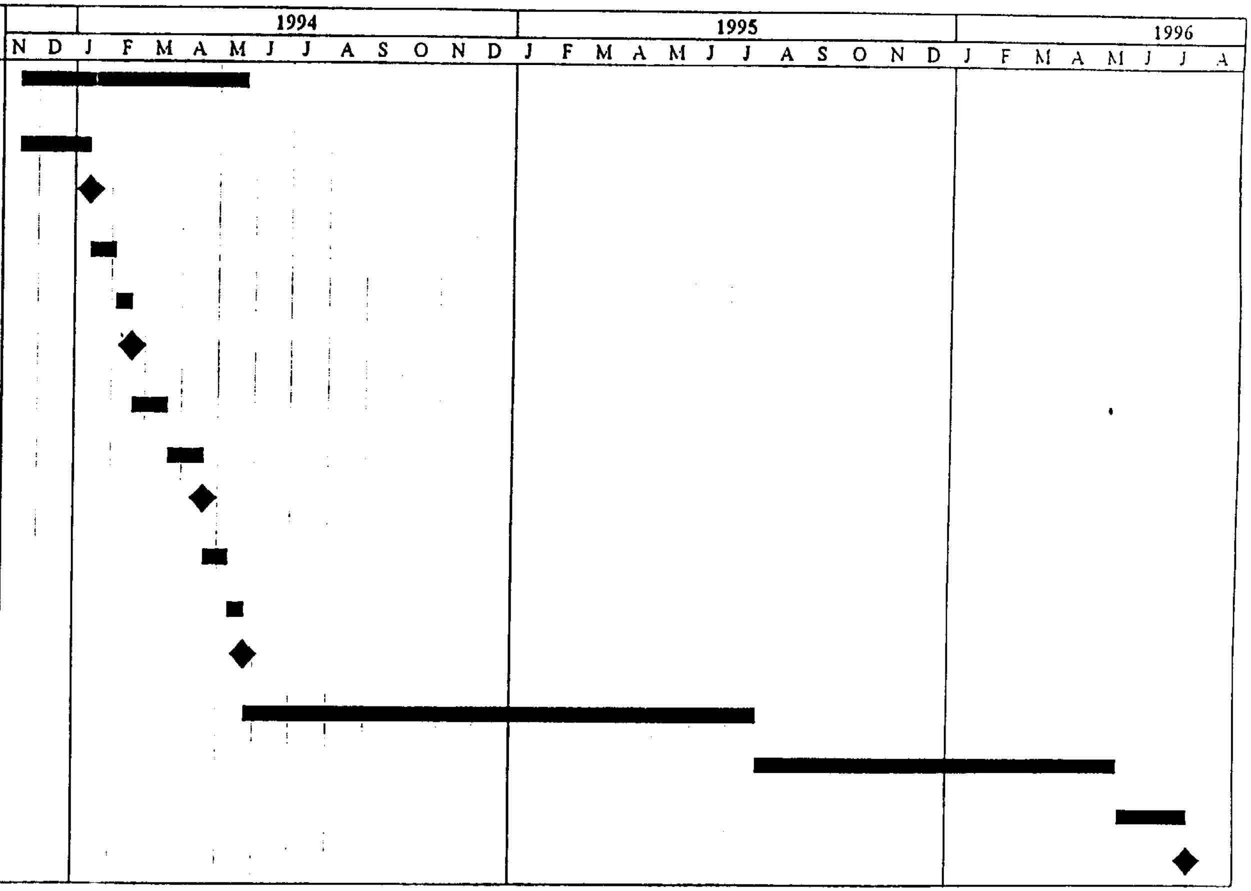


(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

Table 7

Expedited Site Management Schedule - FY 94
Site 16 (Operable Unit No. 8) - MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	136d	11/15/93	5/24/94
Prepare Prelim Draft RI/FS Proj Plans	60ed	11/15/93	1/14/94
Submit Prelim Draft RI/FS Proj Plans	0ed	1/14/94	1/14/94
LANTDIV Review	21ed	1/14/94	2/4/94
Prepare Draft RI/FS Project Plans	14ed	2/4/94	2/18/94
Submit Draft RI/FS Project Plans	0ed	2/18/94	2/18/94
Agency Review	30ed	2/18/94	3/20/94
Prepare Draft Final RI/FS Proj Plans	30ed	3/20/94	4/19/94
Submit Draft Final RI/FS Project Plans	0ed	4/19/94	4/19/94
Agency Review	21ed	4/19/94	5/10/94
Prepare Final RI/FS Project Plans	14ed	5/10/94	5/24/94
Submit Final RI/FS Project Plans	0ed	5/24/94	5/24/94
RI/FS, PRAP, and ROD (1)	427ed	5/24/94	7/25/95
Remedial Design (1)	305ed	7/25/95	5/25/96
Procure RA Contractor (1)	60ed	5/25/96	7/24/96
Begin Remedial Action (1)	0ed	7/24/96	7/24/96



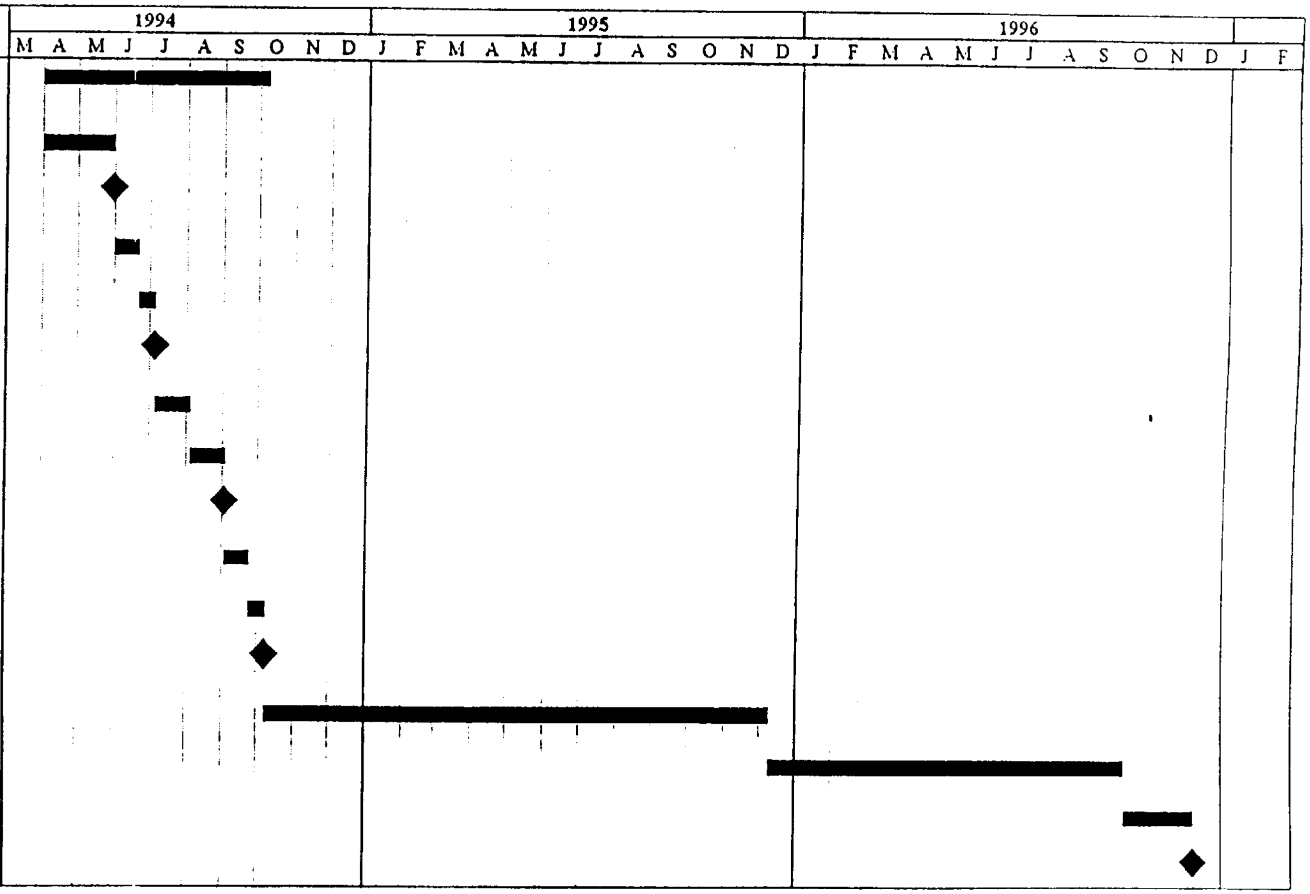
(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

Table 8

Expedited Site Management Schedule - FY 94

Sites 65 and 73 (Operable Unit No. 9) - MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	136d	4/1/94	10/8/94
Prepare Prelim Draft RI/FS Proj Plans	60ed	4/1/94	5/31/94
Submit Prelim Draft RI/FS Proj Plans	0ed	5/31/94	5/31/94
LANTDIV Review	21ed	5/31/94	6/21/94
Prepare Draft RI/FS Proj Plans	14ed	6/21/94	7/5/94
Submit Draft RI/FS Proj Plans	0ed	7/5/94	7/5/94
Agency Review	30ed	7/5/94	8/4/94
Prepare Draft Final RI/FS Proj Plans	30ed	8/4/94	9/3/94
Submit Draft Final RI/FS Proj Plans	0ed	9/3/94	9/3/94
Agency Review	21ed	9/3/94	9/24/94
Prepare Final RI/FS Project Plans	14ed	9/24/94	10/8/94
Submit Final RI/FS Project Plans	0ed	10/8/94	10/8/94
RI/FS PRAP, and ROD (1)	427ed	10/8/94	12/9/95
Remedial Design (1)	305ed	12/9/95	10/9/96
Procure RA Contractor (1)	60ed	10/9/96	12/8/96
Begin Remedial Action (1)	0ed	12/8/96	12/8/96



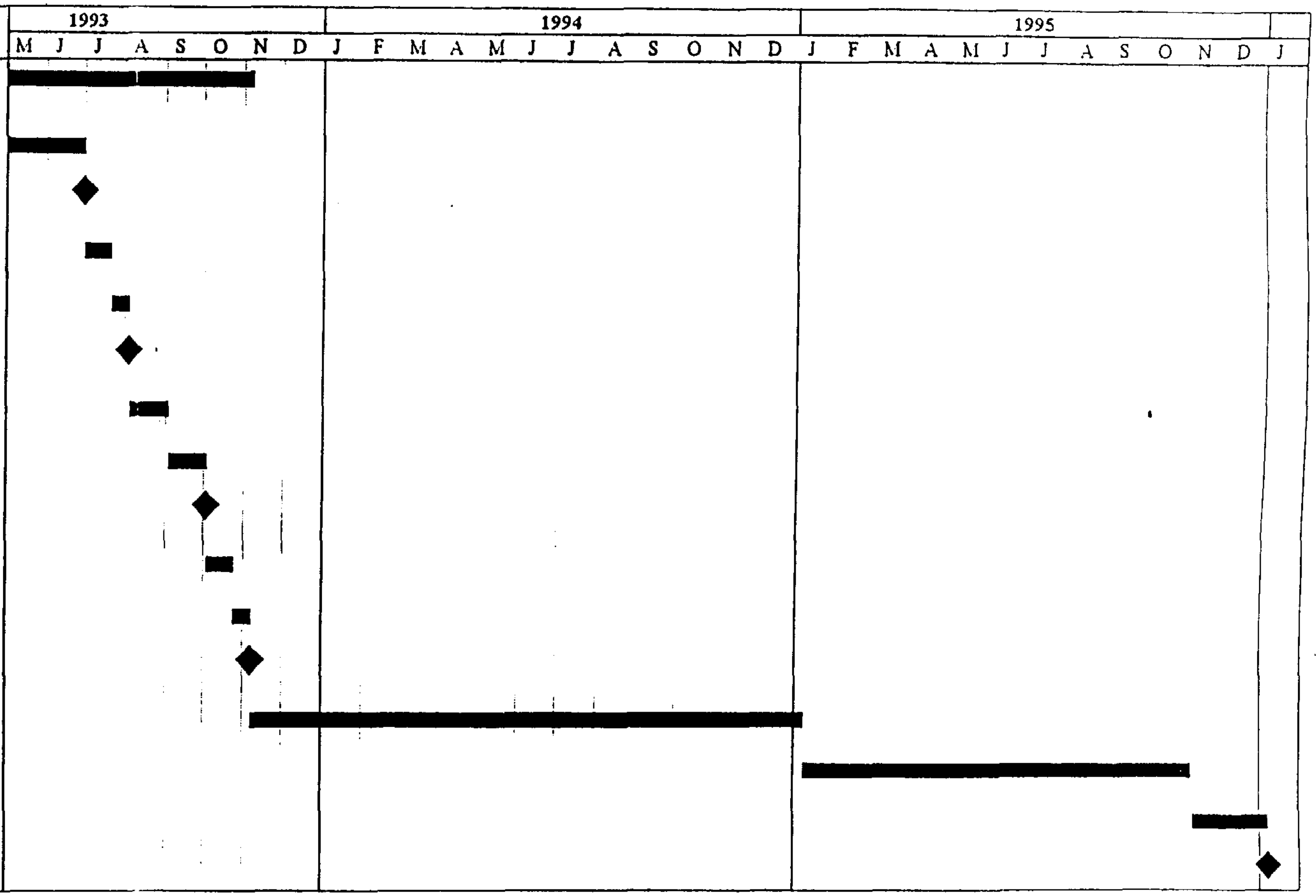
(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

Table 9

Expedited Site Management Schedule - FY 94

Site 35 (Operable Unit No. 10) - MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	135d	5/1/93	11/7/93
Prepare Prelim Draft RI/FS Proj Plans	60ed	5/1/93	6/30/93
Submit Prelim Draft RI/FS Proj Plans	0ed	6/30/93	6/30/93
LANTDIV Review	21ed	6/30/93	7/21/93
Prepare Draft RI/FS Proj Plans	14ed	7/21/93	8/4/93
Submit Draft RI/FS Proj Plans	0ed	8/4/93	8/4/93
Agency Review	30ed	8/4/93	9/3/93
Prepare Draft Final RI/FS Proj Plans	30ed	9/3/93	10/3/93
Submit Draft Final RI/FS Proj Plans	0ed	10/3/93	10/3/93
Agency Review	21ed	10/3/93	10/24/93
Prepare Final RI/FS Project Plans	14ed	10/24/93	11/7/93
Submit Final RI/FS Project Plans	0ed	11/7/93	11/7/93
RI/FS PRAP, and ROD (1)	427ed	11/7/93	1/8/95
Remedial Design (1)	305ed	1/8/95	11/9/95
Procure RA Contractor (1)	60ed	11/9/95	1/8/96
Begin Remedial Action (1)	0ed	1/8/96	1/8/96



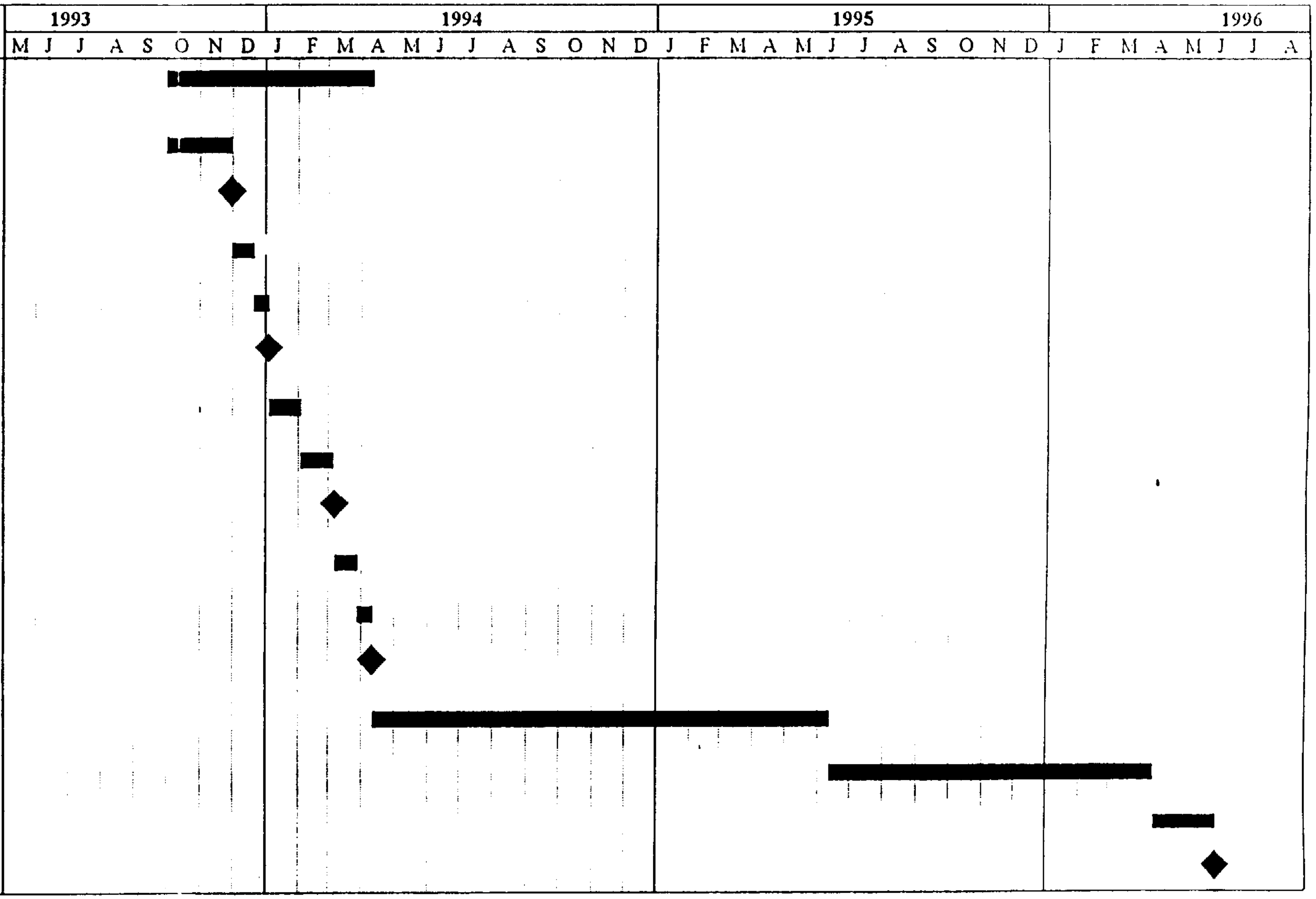
(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

Table 10

Expedited Site Management Schedule - FY 94

Sites 7 and 80 (Operable Unit No. 11) - MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	136d	10/1/93	4/11/94
Prepare Prelim Draft RI/FS Proj Plans	60ed	10/1/93	11/30/93
Submit Prelim Draft RI/FS Proj Plans	0ed	11/30/93	11/30/93
LANTDIV Review	21ed	11/30/93	12/21/93
Prepare Draft RI/FS Proj Plans	14ed	12/21/93	1/4/94
Submit Draft RI/FS Proj Plans	0ed	1/4/94	1/4/94
Agency Review	30ed	1/4/94	2/3/94
Prepare Draft Final RI/FS Proj Plans	30ed	2/3/94	3/5/94
Submit Draft Final RI/FS Proj Plans	0ed	3/7/94	3/7/94
Agency Review	21ed	3/7/94	3/28/94
Prepare Final RI/FS Project Plans	14ed	3/28/94	4/11/94
Submit Final RI/FS Project Plans	0ed	4/11/94	4/11/94
RI/FS PRAP, and ROD (1)	427ed	4/11/94	6/12/95
Remedial Design (1)	305ed	6/12/95	4/12/96
Procure RA Contractor (1)	60ed	4/12/96	6/11/96
Begin Remedial Action (1)	0ed	6/11/96	6/11/96

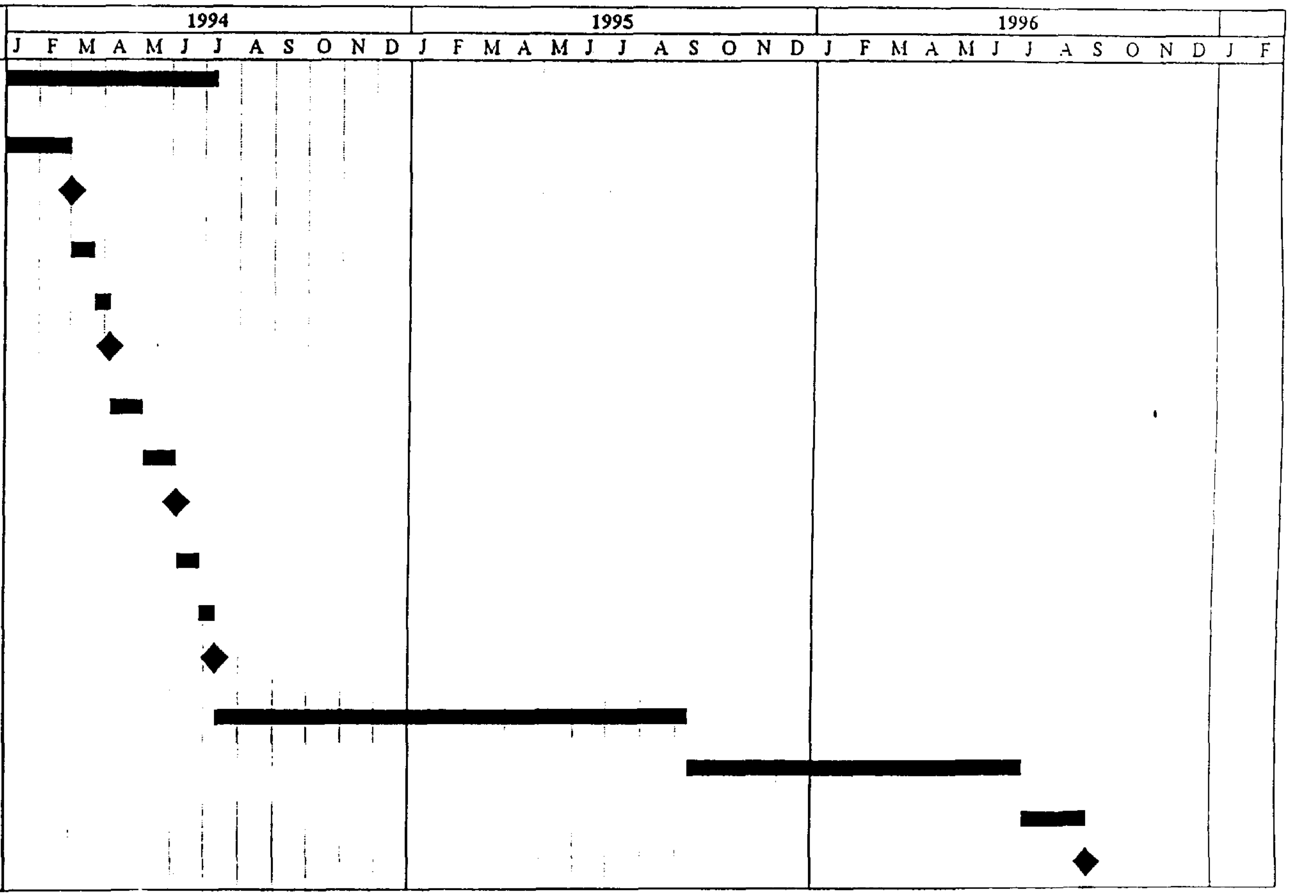


(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

Table 11

Expedited Site Management Schedule - FY 94
Site 3 (Operable Unit No. 12) - MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	135d	1/1/94	7/11/94
Prepare Prelim Draft RI/FS Proj Plans	60ed	1/1/94	3/2/94
Submit Prelim Draft RI/FS Proj Plans	0ed	3/2/94	3/2/94
LANTDIV Review	21ed	3/2/94	3/23/94
Prepare Draft RI/FS Proj Plans	14ed	3/23/94	4/6/94
Submit Draft RI/FS Proj Plans	0ed	4/6/94	4/6/94
Agency Review	30ed	4/6/94	5/6/94
Prepare Draft Final RI/FS Proj Plans	30ed	5/6/94	6/5/94
Submit Draft Final RI/FS Proj Plans	0ed	6/6/94	6/6/94
Agency Review	21ed	6/6/94	6/27/94
Prepare Final RI/FS Project Plans	14ed	6/27/94	7/11/94
Submit Final RI/FS Project Plans	0ed	7/11/94	7/11/94
RI/FS PRAP, and ROD (1)	427ed	7/11/94	9/11/95
Remedial Design (1)	305ed	9/11/95	7/12/96
Procure RA Contractor (1)	60ed	7/12/96	9/10/96
Begin Remedial Action (1)	0ed	9/10/96	9/10/96



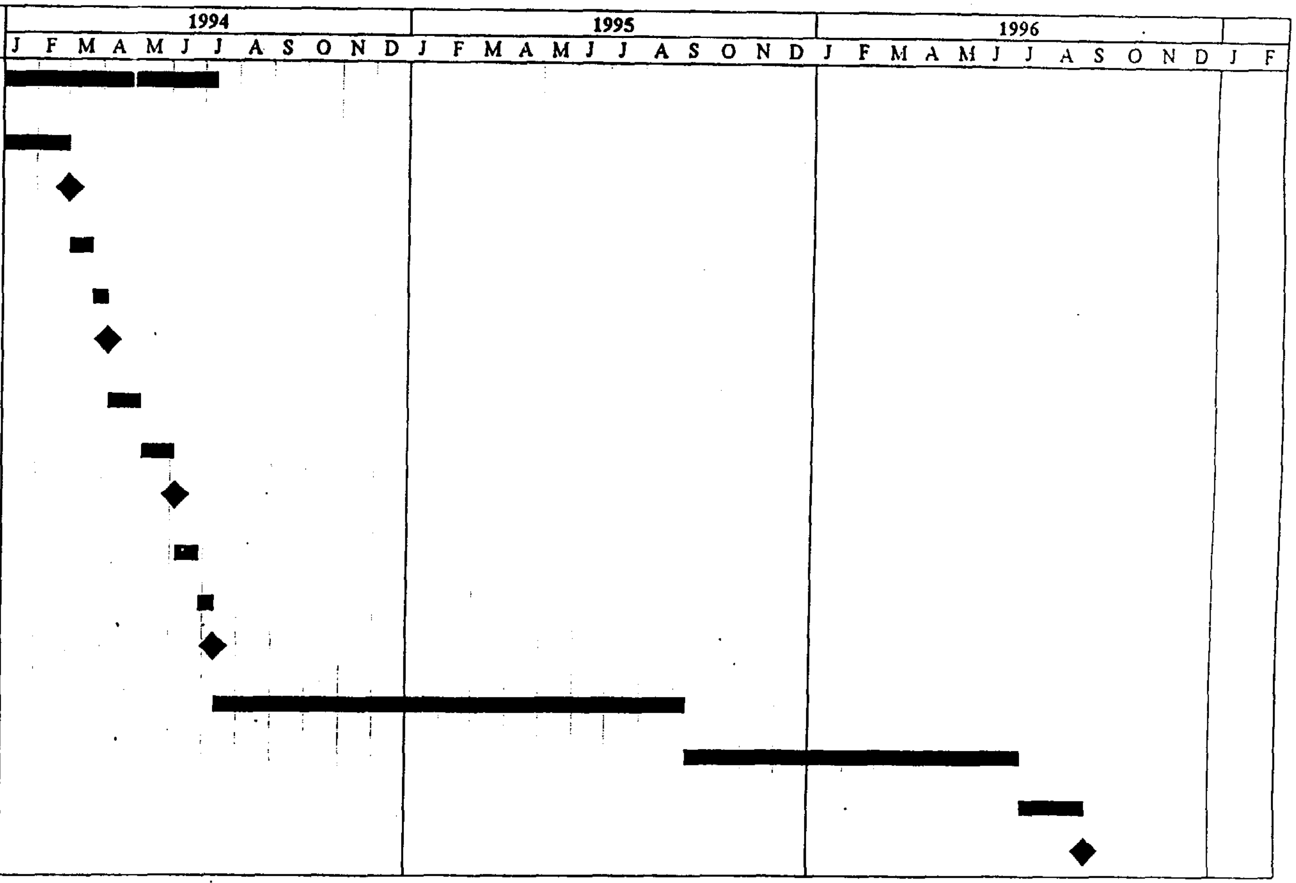
(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

Table 12

Expedited Site Management Schedule - FY 94

Site 63 (Operable Unit No. 13) - MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	135d	1/1/94	7/11/94
Prepare Prelim Draft RI/FS Proj Plans	60ed	1/1/94	3/2/94
Submit Prelim Draft RI/FS Proj Plans	0ed	3/2/94	3/2/94
LANTDIV Review	21ed	3/2/94	3/23/94
Prepare Draft RI/FS Proj Plans	14ed	3/23/94	4/6/94
Submit Draft RI/FS Proj Plans	0ed	4/6/94	4/6/94
Agency Review	30ed	4/6/94	5/6/94
Prepare Draft Final RI/FS Proj Plans	30ed	5/6/94	6/5/94
Submit Draft Final RI/FS Proj Plans	0ed	6/6/94	6/6/94
Agency Review	21ed	6/6/94	6/27/94
Prepare Final RI/FS Project Plans	14ed	6/27/94	7/11/94
Submit Final RI/FS Project Plans	0ed	7/11/94	7/11/94
RI/FS PRAP, and ROD (1)	427ed	7/11/94	9/11/95
Remedial Design (1)	305ed	9/11/95	7/12/96
Procure RA Contractor (1)	60ed	7/12/96	9/10/96
Begin Remedial Action (1)	0ed	9/10/96	9/10/96



(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

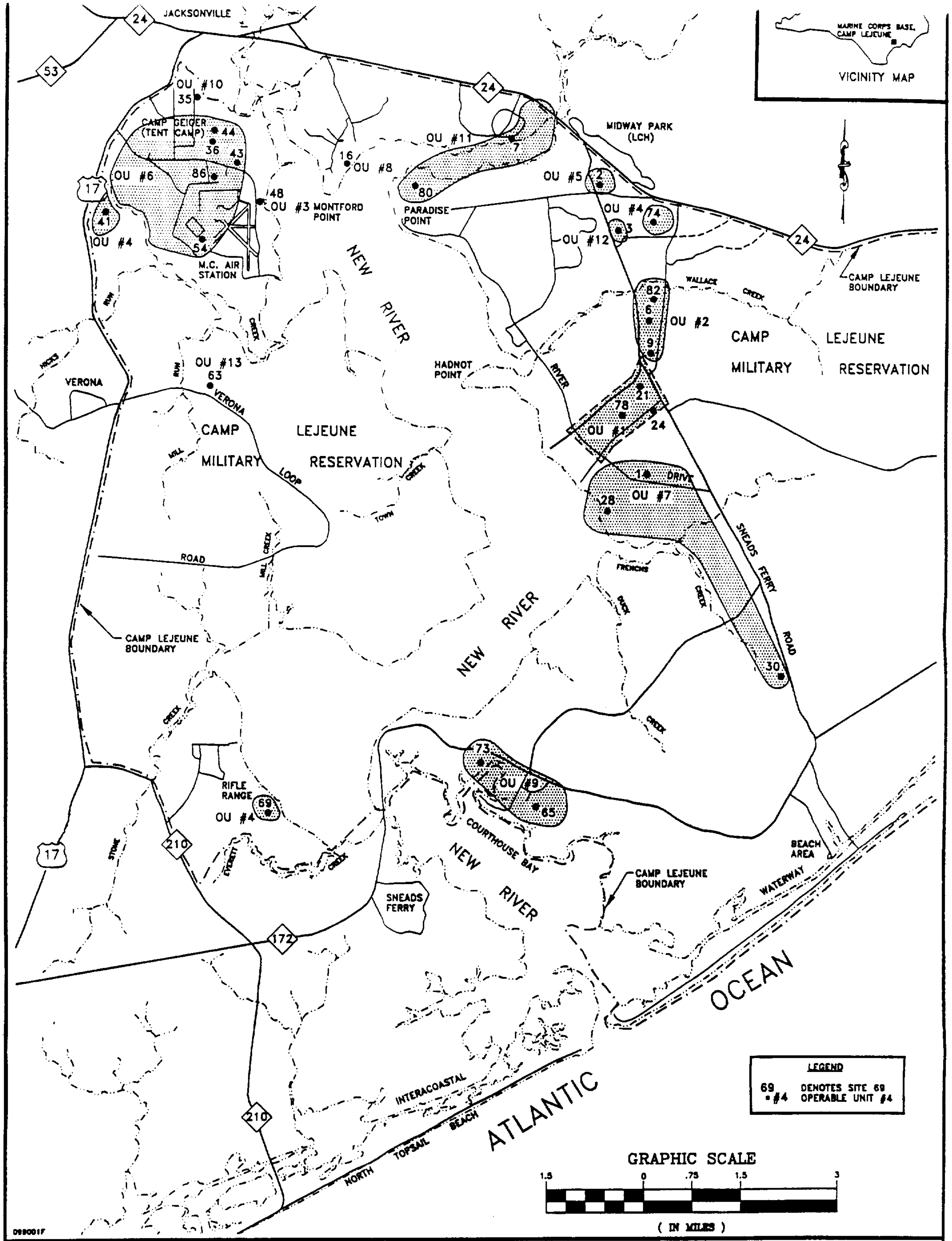


FIGURE 1-1
OPERABLE UNITS AND SITE LOCATIONS AT
MARINE CORPS BASE CAMP LEJEUNE

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

The facility currently covers approximately 234 square miles and is bisected by the New River. The Atlantic Ocean forms the southeastern boundary of the facility. The City of Jacksonville is located immediately northwest of the facility. Within 15 miles are three large, publicly-owned tracts of land: Croatian National Forest, Hoffman Forest, and Camp Davis Forest. The remaining land use surrounding the facility is agricultural. Estuaries along the coast support commercial fishing. Tourism and residential resort areas have stimulated the regional economy. The facility is located in the Atlantic Coastal Plain on generally flat topography.

1.2 Environmental History of the Facility

The facility has been actively involved in various environmental investigation and remediation programs since 1983, beginning with the Navy Assessment and Control of Installation Pollutants (NACIP) Program. The first study conducted under the NACIP to investigate potentially hazardous sites at MCB Camp Lejeune was an Initial Assessment Study (IAS). This study, which was conducted in 1983, identified areas of concern that may potentially cause threats to human health and the environment as a result of past storage, handling, and/or disposal of hazardous materials. Based on a review of historical records, field inspections, and personal interviews, 76 areas of concern (AOCs) were identified. The IAS concluded that, while none of the sites pose an immediate threat to human health or the environment, 22 sites warrant further investigation to assess long-term impacts. During preliminary investigation of the AOCs, an additional AOC (Site 78, Hadnot Point Industrial Area) was identified. Subsequent sampling and monitoring activities of these sites have been initiated since 1984.

The Department of Navy's Installation Restoration Program (IRP) was initiated in 1986 following the legislation of the Superfund Amendments and Reauthorization Act (SARA). The IRP, which was implemented to follow the requirements of SARA, replaced the NACIP.

MCB Camp Lejeune was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL) effective October 4, 1989 (54 Federal Register 41015, October 4, 1989). Following the listing of MCB Camp Lejeune on the NPL, a Federal Facilities Agreement (FFA) between the United States Environmental Protection Agency Region IV (EPA), the North Carolina Department of Environment, Health, and Natural Resources (DEHNR), and the Department of the Navy was signed in February 1991. The objectives of the FFA are:

- To ensure that the environmental impacts associated with past and present activities at MCB Camp Lejeune are thoroughly investigated and appropriate CERCLA response actions are developed and implemented as necessary to protect the public health, welfare and the environment;

- To establish a procedural framework and schedule for developing, implementing and monitoring appropriate response actions at MCB Camp Lejeune in accordance with CERCLA, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and EPA policy relevant to remediation at MCB Camp Lejeune; and

- To facilitate cooperation, exchange of information and participation of the Parties in such action.

The FFA covers 23 sites at MCB Camp Lejeune. These sites are required to be investigated in accordance with the NCP, CERCLA, and SARA, under the terms and conditions of the FFA. Since then, additional sites have been added, based on the conclusions and recommendations identified by Site Inspections of other existing or newly-identified sites throughout MCB Camp Lejeune.

1.3 Purpose of the Site Management Plan

This Fiscal Year 1994 Site Management Plan (SMP) is one of the primary documents identified in the FFA. The SMP documents the decisions and evaluations made during the project planning and scoping process for MCB Camp Lejeune. The SMP includes proposed deadlines for completion of primary documents, as specified in the FFA, to be submitted during Fiscal Year 1994. In addition, the SMP identifies Installation Restoration activities projected for the next five-year period (1994-1998).

1.4 Site Changes Since the Signing of the 1991 Federal Facilities Agreement

The FFA identified 23 sites where RI/FS activities are to be conducted (see Table 1-1). Since that time, two sites (Sites 22 and Site 45) will be investigated as UST sites and will not require an RI/FS at this time. In addition, Site "A" and Site 68 will require a Site Inspection prior to undertaking, if necessary, RI/FS activities.

TABLE 1-1

IRP AREAS OF CONCERN/SITES IDENTIFIED IN THE 1991 FEDERAL FACILITIES AGREEMENT

Site No.	Site Description
1	French Creek Liquids Disposal Area
2	Former Nursery/Day-Care Center
3	Old Creosote Site
6	Storage Lots 201 and 203
7	Tarawa Terrace Dump
9	Fire Fighting Training Pit at Piney Green Road
12	Exposure Ordnance Disposal
16	Montford Point Burn Dump (1958-1972)
21	Transformer Storage Lot 140
22 (1)	Industrial Area Tank Farm
24	Industrial Area Fly Ash Dump
28	Hadnot Point Burn Dump
30	Sneads Ferry Road - Fuel Tank Sludge Area
35	Camp Geiger Area Fuel Farm
36	Camp Geiger Area Dump near Sewage Treatment Plant
41	Camp Geiger Dump near former Trailer Park
43	Agan Street Dump(2)
44	Jones Street Dump
45 (1)	Campbell Street Underground AVGAS Storage and Adjacent JP Fuel Farm at Air Station
48	MCAS New River Mercury Dump Site
54 (2)	Crash Crew Fire Training Burn Pit
63	Verona Loop Dump(2)
65	Engineer Area Dump(2)
68 (2)	Rifle Range Dump
69	Rifle Range Chemical Dump
73	Courthouse Bay Liquids Disposal Area
74	Mess Hall Grease Pit Area
75 (2)	MCAS Basketball Court Site
76 (2)	MCAS Curtin Road Site
A (2)	MCAS (H) Officer's Housing Area
78	Hadnot Point Industrial Area
80	Paradise Point (Gold Course Pesticide Area)
82	VOC Disposal Area at Piney Creek Road
84	Building 45 Area(2)
85	Camp Johnson Battery Dump(2)
86	Tank Area AS419-AS421 at MCAS

Note: Other specific locations may be added to the above list upon identification of the need to perform an RI/FS at those locations resulting in the corresponding modification to the Scope of Work Primary Document (described in the Federal Facilities Agreement).

(1) UST Petroleum Site (UST Petroleum Investigation/Corrective Action Regulations).

(2) Site Inspections will initially be conducted. The SI will determine the need to conduct an RI/FS.

Based on the results of Site Inspections conducted at MCB Camp Lejeune during the period 1991-1993, the following sites will be included under the RI/FS phase:

- Site 3 (Old Creosote Plant)
- Site 7 (Tarawa Terrace Dump)
- Site 43 (Agan Street Dump)
- Site 44 (Jones Street Dump)
- Site 54 (Crash Crew Fire Training Burn Pit)
- Site 63 (Verona Loop Dump)
- Site 65 (Engineer Area Dump)
- Site 80 (Paradise Point)
- Site 82 (VOC Disposal Area at Piney Green Road)

With these changes, a total of 27 sites will require RI/FS activities.

1.5 Recommended Amendments to the 1991 Federal Facilities Agreement

Appendix D of the FFA lists and describes various primary and secondary documents that will be submitted by the Navy/Marine Corps. Primary document No. 10 (Location-Specific Remedial Design Reports) should be amended to include Remedial Design Work Plans, Treatability Study Reports, and Requirements Packages.

1.6 Format of the Site Management Plan

This SMP consists of seven sections. Section 1.0 (Introduction) explains the history of environmental activities at MCB Camp Lejeune, the purpose of the FFA, and the purpose of the SMP. Section 2.0 (Operable Units) describes the Operable Units at MCB Camp Lejeune that will be addressed in the SMP. A summary of ongoing and planned activities associated with these Operable Units is outlined in Section 3.0 (Operable Unit Scope of Work). Section 4.0 (IRP Management Schedules) provides estimated (and amended) schedules for conducting CERCLA activities for each Operable Unit. Detailed schedules are provided for those Operable Units that are active or will be initiated in Fiscal Year 1994. Section 4.0 also includes schedules for those Operable Units that will be studied in Fiscal Years 1995-1998 and specific target submittal dates for draft primary and secondary documents for Fiscal Year 1994 through 1998. Ongoing and/or planned Site Inspection (SI) activities are presented in

Section 5.0 (Site Inspection Activities). Ongoing and/or planned removal actions are discussed in Section 6.0 (Removal/Interim Remedial Actions). References are provided in Section 7.0.

2.0 OPERABLE UNITS

As defined in the NCP, an "Operable Unit means a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site. Operable units may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site."

This section identifies the Operable Units at MCB Camp Lejeune where IRP activities are or will be implemented. Anticipated project startup dates for these activities are also identified. The project startup dates coincide with the priority of the Operable Units with respect to their potential for groundwater contamination, proximity to receptors, contaminants verified, and potential ecological impacts.

2.1 Operable Unit Determination

In accordance with guidance provided in the NCP, the Navy/Marine Corps has recommended that the 27 current IRP sites be grouped into 13 Operable Units (OU) for the purposes of proceeding with RI/FS activities (see Table 2-1).

The 27 RI/FS sites represent an increase of nine sites (Sites 3, 7, 43, 44, 54, 63, 65, 80, and 82) from the previous SMP (i.e., Fiscal Year 1993).

Site 3 (Old Creosote Plant) will be included as Operable Unit No. 12. Site 7 (Tarawa Terrace Dump) and Site 80 (Paradise Point) will be investigated as Operable Unit No. 11 since these two sites share a common local drainage basin (Northeast Creek). Site 43 (Agan Street Dump), Site 44 (Jones Street Dump), and Site 54 (Crash Crew Training Burn Pit) have been combined with two other sites to form Operable Unit No. 6. These five sites are all located in the same geographic area and exhibit similar waste types. Site 63 (Verona Loop Dump) will be studied alone as Operable Unit No. 13. Site 65 (Engineer Area Dump) has been included as part of Operable Unit No. 9 due to its close proximity to Site 73. Site 82 (Piney Green Road VOC Area) has been included under Operable Unit No. 2 since this site is adjacent to Sites 6 and 9.

TABLE 2-1

RECOMMENDED OPERABLE UNITS FOR MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA

Operable Unit No.	Site No(s).	Site Name(s)	Primary Reasons for OU Selection
1	21	Transformer Storage Lot 140	Sites are geographically located in the same area.
	24	Industrial Area Fly Ash Dump	
	78	Hadnot Point Industrial Area	
2	6	Storage Lots 201 and 203	Sites are located near each other.
	9	Firefighting Training Pit at Piney Green Road	Sites are currently undergoing RI/FS activities (development of RI/FS Project Plans).
	82	Piney Green Road VOC Area	
3	48	MCAS New River Mercury Dump Site	Unique characteristics of the site involving the disposal of mercury, which is highly toxic and bioaccumulates.
4	41	Camp Geiger Dump Near Former Trailer Park	Unique characteristics of the site involving the disposal of chemical wastes generated on the base.
	69	Rifle Range Chemical Dump	
	74	Mess Hall Grease Disposal Area	
5	2	Former Nursery/Day Care Center	Similar characteristics of materials disposed (pesticides).
6	36	Camp Geiger Area Dump near Sewage Treatment Plant	Similar characteristics of materials disposed (POL, waste oils, solvents) and contaminants detected (metals, VOCs, O&G). Sites are located in the Brinson Creek and Tank Creek watershed.
	43	Agan Street Dump	
	44	Jones Street Dump	
	54	Crash Crew Fire Training Burn Pit	
	86	Tank Area AS419-AS421 at Marine Corps Air Station	

TABLE 2-1 (Continued)

RECOMMENDED OPERABLE UNITS FOR MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA

Operable Unit No.	Site No(s).	Site Name(s)	Primary Reasons for OU Selection
7	1	French Creek Liquids Disposal Area	Sites are located near each other and are located in the French Creek watershed. Similar contaminants detected (metals, O&G).
	28	Hadnot Point Burn Dump	
	30	Sneads Ferry Road Fuel Tank Sludge Area	
8	16	Montford Point Burn Dump	Isolated site which requires additional site investigation.
9	65	Engineer Area Dump	Geographic proximity.
	73	Courthouse Bay Liquids Disposal Area	
10	35	Camp Geiger Area Fuel Farm	Accelerated cleanup necessary to abate impacts to Brinson Creek.
11	7	Tarawa Terrace Dump	Geographic proximity. Both sites are located in the Northeast Creek Watershed.
	80	Paradise Point	
12	3	Old Creosote Plant	Isolated site with unique waste source.
13	63	Verona Loop Dump	Isolated site.

Site 35 has been taken out of Operable Unit No. 6. Site 35 is now considered Operable Unit No. 10. Due to a highway project in the area, Site 35 is on an expedited RI/FS schedule.

Site 41 (Camp Geiger Dump Near Former Trailer Park) will no longer be included as part of Operable Unit No. 6 since chemical agents may have been disposed of at this location. Therefore, Site 41 will be included as part of Operable Unit No. 4 with Sites 69 and 74, which reportedly may have buried chemical agents.

These Operable Units are depicted in Figure 1-1 and described below.

2.2 Operable Unit Descriptions

This section describes the operable units at MCB Camp Lejeune where RI/FS and remediation activities are or will be conducted.

2.2.1 Operable Unit No. 1 (Sites 21, 24, and 78)

Operable Unit No. 1 consists of Site 21 (Transformer Storage Lot 140), Site 24 (Industrial Area Fly Ash Dump), and Site 78 (Hadnot Point Industrial Area). These sites are described below.

Site 21 - Transformer Storage Lot 140

Site 21 is located between Ash Street and Sneads Ferry Road on Center Road. A transformer oil pit was located in the northeastern end of Lot 140 across the railroad tracks from Building 702. The entire lot is approximately 220 feet by 890 feet with the dimensions of the pit measuring 25 to 30 feet long by 6 feet wide by 8 feet deep.

Lot 140 was used from 1958 to 1977, for pesticide mixing and as a cleaning area for pesticide application equipment. The mixing area for the pesticides is believed to have been the southeast corner of the lot. Pesticide contamination possibly occurred as a result of small spills, washout, and excess disposal. In 1977, before activities were moved to a different location, washout was estimated to be about 350 gallons per week of overland discharge.

In 1950 and 1951, an on-site pit was used as a drainage receptor for oil from transformers.

Sand was occasionally placed in the pit when oil was found standing in the pit bottom. The total quantity of oil drained in this manner is unknown.

Site 24 - Industrial Area Fly Ash Dump

Site 24 is located south and east of the intersection of Birch and Duncan Streets. Four separate disposal locations were investigated as potential areas of contamination. Site 24 was used for the disposal of fly ash, cinders, solvents, used paint stripping compounds, sewage sludge, and water treatment sludge from the late 1940s to 1980. Approximately 20 to 25 acres in size, the site lies adjacent to upstream portions of Cogdels Creek.

Site 78 - Hadnot Point Industrial Area

The Hadnot Point Industrial Area (HPIA) is located on the east side of the New River. The HPIA is defined as that area bounded by Holcomb Boulevard to the west, Sneads Ferry Road to the north, Louis Street to the east, and the Main Service Road to the south.

The establishment of MCB Camp Lejeune began in the early 1940s with the construction of the HPIA. Water supply for the base was furnished by wells that tapped a potable aquifer 50 to 300 feet below the base. In 1941, a water treatment system, including 21 water supply wells, was placed on-line at HPIA. The system serviced most of the base until the 1950s, when additional wells and treatment facilities were installed because of the expanding needs of the base. Today, eight water treatment facilities and over 160 water supply wells serve the MCB at Camp Lejeune.

The HPIA is comprised of approximately 75 buildings/facilities. These include maintenance shops, gas stations, administrative offices, commissaries, snack bars, warehouses, and storage yards. A steam plant and training facility occupy the southwest portion of HPIA. In addition, numerous underground storage tanks, stormwater drains, and oil/water separators are present.

A transformer storage yard (Site 21) and a petroleum UST fuel tank farm (Site 22) are located within the northern portion of HPIA.

2.2.2 Operable Unit No. 2 (Sites 6, 9, and 82)

Operable Unit No. 2 consists of Site 6 (Storage Lots 201 and 203), Site 9 (Fire Fighting Training Pit at Piney Green Road), and Site 82 (Piney Green Road VOC Area). These sites are described below.

Site 6 - Storage Lots 201 and 203

Storage Lots 201 and 203 are located on Holcomb Boulevard between Wallace and Bear head Creeks. Lot 201 is estimated to be approximately 25 acres in size, and Lot 203 is approximately 46 total acres. The area between the storage lots and surrounding these lots is primarily wooded. However, random disposal areas in the woods have been documented.

These lots have a long history of various uses, including disposal and storage. The land surface is flat and unpaved, and surface soils have been moved about as a result of regrading and equipment movement. The site was and still is used to store hazardous materials. DDT is reported to have been disposed of at Lot 203 when it served as a waste disposal area in the 1940s. Transformers containing PCBs have also been stored at this site. No spills or leaks have been reported.

Site 9 - Firefighting Training Pit at Piney Green Road

This 2-acre site is located between Piney Green Road and Holcomb Boulevard, south of Bearhead Creek. This AOC has been used for firefighting training exercises from the 1960s to the present. Until 1981, the fire training activities were carried out in an unlined pit. Flammable liquids, including used oil, solvents, and contaminated fuels (nonleaded), were burned in the pit. An oil-water separator has been installed at the site as a means of pollution control.

Site 82 - Piney Green Road VOC Area

The Piney Green Road VOC Area is a forested area between Lot 203 and Wallace Creek and appears to have been used as a disposal area at some point in the past. It is estimated to be 30 acres. There is visual evidence of debris piles and small depressions as identified by ES&E in the Site Summary Report, June 1990. A ravine, which is filled with debris in various sections, bisects the site. This site is bounded on the north by Wallace Creek and to the south by

Storage Lot 203. The site is therefore a reasonable source of the observed VOCs in groundwater and Wallace Creek.

2.2.3 Operable Unit No. 3 (Site 48)

Operable Unit No. 3 is the Marine Corps Air Station (MCAS) Mercury Dump (Site 48). The MCAS New River Mercury Dump Site is located on Longstaff Road next to Building AS-804. The disposal area was utilized from 1956 to 1966 and covers a 100- to 200-foot wide corridor extending from the rear of Building AS-804 (former photo lab) to the edge of the New River. These dimensions correlate with an area of approximately 20,000 square feet. Metallic mercury was periodically drained from the delay lines of the radar units and disposed of at this AOC. Approximately 1 gallon per year of mercury was deposited over a 10-year period, amounting to more than 1,000 pounds total. The best information available indicates that the material was carried by hand and dumped or buried in small quantities at randomly selected spots. Building AS-804 is currently being used as an administrative office and classroom for nuclear, biological, and chemical warfare training.

2.2.4 Operable Unit No. 4 (Sites 41, 69, and 74)

Operable Unit No. 4 is comprised of Site 41 (Camp Geiger Dump Near Former Trailer Park), Site 69 (Rifle Range Chemical Dump) and Site 74 (Mess Hall Grease Pit Disposal Area). These sites are described below.

Site 41 - Camp Geiger Dump near Former Trailer Park

The Camp Geiger Dump is located south of the terminus of Robert L. Wilson Boulevard and south of the abandoned trailer park. The area lies between an unnamed creek and Tank Creek. This 30-acre disposal area was operated from 1946 to 1970, and was used as an open burn dump that received mixed industrial waste, commercial waste, construction debris, waste oils, solvents from the air station, garbage, trash, asphalt, concrete, old batteries, Mirex, and ordnance. The size estimate for Site 41 is based on map and photographic information. Field estimates have been made, but no field measurements were performed.

Based on interviews with MCAS New River and Camp Lejeune personnel, it is estimated that 10,000 to 15,000 gallons of waste oils and solvents were disposed of at this site. Most of these wastes were probably burned. The number of old lead-containing batteries disposed of is assumed to be relatively small. Tons of Mirex in bags were disposed of in 1964. The disposed quantity of ordnance is estimated to include thousands of mortar shells. At least one case of grenades and one 105mm howitzer shell were also reported to have been disposed of within the filled area. In the mid-1960s over a 1- to 2-year period, at least two waste disposal incidents occurred during which two truckloads of drummed wastes were unloaded at the site. These wastes were described as being similar to those disposed of at the Rifle Range Chemical Dump (Site 69). (Pesticides, PCBs, solvents, and chemical agent training kits were reportedly disposed of at Site 69.) No other information concerning drum content is available. Based on an estimated fill depth of 5 feet, the total estimated volume of waste of the site is approximately 110,000 cubic yards.

Site 69 - Rifle Range Chemical Dump

The Rifle Range Chemical Dump is located approximately 9,000 feet east of the intersection of Range Road and Sneads Ferry Road, north of Everett Creek. The site is an estimated 6 acres in size. Available records indicate the site was active from the early 1950s until 1976. It is reported that the site was utilized as a disposal area for all chemical wastes generated on the base. The list of materials disposed of at the site include the following materials: pentachlorophenol, DDT, trichloroethylene, malathion, diazinon, lindane, gas cylinders, HTH, PCBs, drums that appeared to contain training agent consisting of chloroacetophenone (CN) gas, all other hazardous materials generated or used on the base, and chemical agent test kits for chemical warfare. The materials were disposed of in trenches or pits that were between 6 to 20 feet deep. At least 12 different disposal events have been documented.

Site 74 - Mess Hall Grease Disposal Area

The Mess Hall Grease Disposal Area is located in a wooded area approximately 1/2 mile east of Holcomb Boulevard in the northeast portion of Camp Lejeune. The Pest Control Area is located approximately 20 to 50 yards south of the grease pit and 75 yards east of Supply Well 654. The disposal area north of the dirt access road is approximately 3 acres in size. The grease pit measured 135 feet long, 30 feet wide, and 12 feet deep. The total size of the Pest Control Area has been estimated at 100 feet by 100 feet. Available information indicates the site was active from the early 1950s until 1960. Disposal activities at the site included the placement of mess hall grease and some waste food into a pit. Records indicate that there was at least one unsuccessful attempt to burn the grease using a more volatile substance. The material was washed out of the pit in 1954, when Hurricane Hazel passed through the area.

Use of the pit was discontinued at this time. No estimates regarding the quantity of grease disposed of at the site have been made.

Drums and pesticide-soaked bags were dumped near the grease pit. Detailed information regarding the contents of the drums is not available. Personnel involved with disposal of the drums were not informed of the drum's contents or origin. It is speculated that the drums may have contained pesticides and/or transformer oil containing PCBs. Best estimates indicate that approximately 500 gallons of pesticides were released from the deposition of the bags. Approximately 2,200 gallons of pesticides, contained in drums, were deposited at the site. It is estimated that 1,100 gallons of PCB-containing oil were buried at the site. One internal memorandum indicated that drums which were supposed to be taken to Site 69 were instead taken to Site 74. (Pesticides, PCBs, solvents, and chemical agent training kits were reportedly disposed of at Site 69.)

2.2.5 Operable Unit No. 5 (Site 2)

Operable Unit No. 5 consists of Site 2 (Former Nursery/Day Care Center). From 1945 to 1958 this building was used for the storing, handling, and dispensing of pesticides. The building at this location was later used as a children's day-care center. Chemicals known to have been used include chlordane, DDT, diazinon, and 2,4-D. Chemicals known to have been stored on site include dieldrin, lindane, malathion, silvex, and 2,4,5-TP. Areas of suspected contamination are the fenced playground, mixing pad, wash pad, and railroad drainage ditch. Contamination is believed to have occurred as a result of small spills, washout, and excess disposal. A preliminary soil sampling investigation conducted at this site in 1982 indicated the presence of DDE, DDD, DDT, and chlordane. Based on these results, the day-care activities were moved to another location. Building 712 is currently being used as a personnel office for non-appropriated funding personnel.

2.2.6 Operable Unit No. 6 (Sites 36, 43, 44, 54, and 86)

Site 36 (Camp Geiger Area Dump Near the Sewage Treatment Plant), Site 41 (Camp Geiger Dump Near Former Trailer Park), Site 43 (Agan Street Dump), Site 44 (Jones Street Dump), Site 54 (Crash Crew Fire Training Area), and Site 86 (Tank Area AS419-AS421) will be investigated as an Operable Unit. These sites are described below.

Site 36 - Camp Geiger Area Dump near Sewage Treatment Plant (STP)

The Camp Geiger Area Dump is located east of the Camp Geiger STP approximately 200 feet on the south side of Brinson Creek, downstream of Site 35. An unnamed ditch is located less than 100 feet southeast of the filled area. Site 36 was used for the disposal of municipal wastes and mixed industrial wastes including garbage, trash, waste oils, solvents, and hydraulic fluids from the air station from the late 1940s to the late 1950s. Most of the material was first burned and then buried. However, some unburned material was buried. According to interviews conducted during the IAS process, less than 5 percent of all hydrocarbons used at the air station were disposed of at the site. Using a 5 percent estimate for dumping over the 9 years of operation, approximately 25, 000 gallons of material could have been disposed of in the landfill areas. If it is assumed that this amount was split between this site and the trailer park dump (Site 41), 10,000 to 15,000 gallons of solvents and oils may have been placed into Site 36. The records state that all waste solvents and oils were burned after disposal at this site.

The site covers about 25,000 square feet and rises about 10 to 12 feet above grade. Based on an average depth of fill of 15 feet, the estimated volume of the disposal area is 14,000 cubic yards. These estimates are based on map and photographic information only. No field measurements have been performed for this purpose.

Site 43 - Agan Street Dump

Site 43 is located at the Marine Corps Air Station, New River portion of MCB Camp Lejeune. The site is located about one mile east of the main entrance to MCAS and one mile north of the runway. Site 43 is located off of Agan Street and adjacent to the site of a former sewage treatment plant. To the immediate north of the site is Edwards Creek. Strawhorn Creek, which discharges into Edwards Creek, borders the site to the east and south. Edwards Creek discharges into the New River approximately one-half mile north of the site.

The Agan Street Dump is approximately 20 acres in size. Boards, trash, fiberglass, and wastewater treatment plant sludge were disposed on the ground surface. The years of operation are unknown. However, the STP ceased operations in 1975. There is little evidence of the construction debris at the site. In addition, the area(s) where sludges were disposed of are not evident. Much of the area is heavily overgrown and wooded. Various dirt roads are present throughout the site area. The dirt roads are very narrow. It is unlikely that these roads are utilized by military vehicles. It is more probably that the roads are used for biking or just walking.

During the site inspection (July-August 1991), much of the site experienced flooding due to several rainy periods. Marshes are present around most of the site.

Site 44 - Jones Street Dump

The Jones Street Dump (Site 44) is located at Marine Corps Air Station, New River. The site is situated adjacent to a base housing complex. The site is approximately five acres in size and is bordered to the north by Edwards Creek and to the south by Jones Street. Woods are present to the east and west.

The dump operated in the 1950s and received mainly debris, cloth, boards, and paint cans. It is reported that small quantities of hazardous materials may also have been disposed of on site (Water & Research, 1983). However, no other details are available with respect to the types or quantities of hazardous materials.

Site 54 - Crash Crew Fire Training Burn Pit

This 1.5-acre site within MCAS New River is located adjacent to the southwest end of Runway 5-23 near Building AS-3614. This AOC is believed to have been used in the mid-1950s for crash crew training and continues into the present. Contaminated fuels (principally JP-type and possibly leaded fuels) and waste fuels were used in the training exercises. Originally, the training was conducted on the ground surface with the area surrounded by a berm. Later, a burn pit was used which was lined in approximately 1975.

Site 86 - Tank Area AS419 - AS421 at Marine Corps Air Station

Site 86 is located at Marine Corps Air Station, New River, North Carolina, on the southwest corner of Foster Street and Campbell Street. Two hundred feet to the south is the Marine Corps Air Station fire station. The taxiway is located approximately 800 feet to the south of the site. Office buildings, aircraft hangers, machine shops and a commissary are located in close proximity to the site.

The site consists of an area which was once occupied by three aboveground storage tanks (AGSTs), each with a 25,000 gallon capacity. The tanks were surrounded by an earthen berm and a pump house. It has been reported that the tanks were used to store No. 6 fuel oil and waste oil. The tanks have been removed.

In November 1990, a soil and groundwater investigation of the area was completed. Total petroleum hydrocarbons (TPH) were detected in only one out of 22 surface soil samples above 10 ppm (124 ppm). The location and depth of soils containing TPH concentrations above the North Carolina action level of 10 ppm suggest the source to be from localized surficial spills. Although the soil only reflects minor problems associated with surficial product spills, groundwater was found to be contaminated with trichloroethene (TCE) above the MCL. For this reason, this site has been included with other CERCLA sites at MCB Camp Lejeune. The source of the TCE in groundwater is unknown.

2.2.7 Operable Unit No. 7 (Sites 1, 28, and 30)

Operable Unit No. 7 will consist of Site 1 (French Creek Disposal Area), Site 28 (Hadnot Point Burn Dump), and Site 30 (Sneads Ferry Road Fuel Tank Sludge Area). These sites are described below.

Site 1 - French Creek Liquids Disposal Area

This site is located on both the north and south sides of Main Service Road at the western edge of the Gun Park Area and Force Troops Complex. The total area for the site is approximately 7 to 8 acres. Site 1 has been used by many different Marine organizations since the 1940s. Liquid wastes from vehicle maintenance activities were poured on the ground as part of routine operations.

Batteries and used battery acid were also disposed of at this location. Suspected quantities of waste are estimated to be 5,000 to 20,000 gallons of waste petroleum, oil, and lubricants (POL) and 1,000 to 10,000 gallons of battery acid.

Site 28 - Hadnot Point Burn Dump

The Hadnot Point Burn Dump is located east of the Mainside Sewage Treatment Plant on both sides of Cogdels Creek. A variety of solid wastes, including mixed industrial waste, trash, garbage, oil-based paint, and refuse, was burned and subsequently covered with dirt on this 23-acre disposal area, which was in operation form 1946 to 1971. Upon its closure in 1971, the surface was graded, and grass was planted. The volume of fill is estimated at 185,000 to 379,000 cubic yards. Since the waste was burned, no approximation of the remaining amount of specific substances can reasonably be made. The site is currently used as a recreational area, including a stocked fishing pond.

Site 30 - Sneads Ferry Road Fuel Tank Sludge Area

The Sneads Ferry Road Fuel Tank Sludge Area is located along a tank trail that intersects Sneads Ferry Road from the west, about 6,000 feet south of the intersection with Marines Road. The site is located approximately 1,500 feet east of French Creek. In 1970, sludge from fuel storage tanks storing leaded gasoline (containing tetraethyl lead and related compounds) and tank washout waters were disposed of at the site by a private contractor. It is estimated that, at a minimum, 600 gallons of sludge or tank bottom deposits were dumped at the site. Two 12,000-gallon tanks were pumped out while the type of fuel stored was changed. The 600-gallon estimate is based on tank capacity below the tank outflow ports. Additional washout water may also have been present. Additional information suggests that the site had also been used for similar wastes from other tanks. Composition of the sludge and/or washout is unknown and may vary from containing substantial amounts of tetraethyl lead to containing mostly cleaning compounds.

2.2.8 Operable Unit No. 8 (Site 16)

Operable Unit No. 8 is the Montford Point Burn Dump (Site 16). Site 16 was opened about 1958 and was closed in 1972, although unauthorized dumping subsequently occurred. The site contains building debris, garbage, tires, and waste oils. The quantity of these wastes is not known, but only a small amount of oil disposal is suspected. Materials reportedly have been dumped on the surface and included asbestos insulation material for pipes. The asbestos on the surface has been removed from this 4-acre site.

2.2.9 Operable Unit No. 9 (Sites 65 and 73)

Operable Unit No. 9 consists of Site 65 (Engineer Area Dump) and Site 73 (Courthouse Bay Liquids Disposal Area). These sites are described below.

Site 65 - Engineer Area Dump

Site 65 is located in the Courthouse Bay area of MCB Camp Lejeune. The Courthouse Bay area ranges in elevation from about 45 feet to sea level. The terrain at Site 65 is relatively flat with an average elevation of 40 feet within the site area. Site 65 is a local high elevation area.

The Engineer Area Dump is approximately four to five acres in size. Two separate disposal areas have been reported: a battery acid disposal area and a liquids disposal area. The types of liquids which have been disposed are to be petroleum, oil, and lubricant products. In addition, the dump was used to burn construction debris. The dump was in operation from before 1958 until 1972.

There are two small ponds at the southeast part of Site 65. The area surrounding the ponds is marshy and wetland-like. The two ponds appear to be joined together during periods of high precipitation. A small intermittent stream runs from the southwest into the west pond. The ponds do not appear to drain to a specific location. Stormwater runoff from Site 65 and the surrounding areas eventually drains into Courthouse Bay.

The Site 65 area is no longer used for dumping. The area is currently heavily wooded with a marshy area existing around the two previously mentioned ponds. A large open area consisting of dirt is used for military training exercises. Heavy equipment operators use the area to train on their earthmoving machinery. The roads surrounding Site 65 are not paved.

There are no buildings or facilities existing on Site 65. The nearest facilities are Buildings BB-201, BB-239, and BB-237 located on an access road off of Poe Road. These facilities are used to store and transfer waste oil, diesel fuel, kerosene, and product POL. A generator building also exists to the northwest of the site.

Site 73 - Courthouse Bay Liquids Disposal Area

The Courthouse Bay Liquids Disposal Area is located on both sides of Courthouse Road approximately 200 feet northwest of Courthouse Bay. This AOC was used from 1946 until 1977. Available information indicates that disposal activities occurred within a 13-acre area. An estimated 400,000 gallons of waste oil were disposed of in this area. The waste oil was generated during routine vehicle maintenance. The oil drained directly on the ground surface. In addition, approximately 20,000 gallons of waste battery acid were reportedly disposed of in this area. Waste battery acid was poured into shallow hand-shoveled holes that were backfilled after disposal.

2.2.10 Operable Unit No. 10 (Site 35)

Camp Geiger Area Fuel Farm (Site 35) is located north of the intersection of G and Fourth Streets, approximately 400 feet southwest of Brinson Creek. This 2,500-square-foot site was used in 1957 and 1958 for storing and pumping fuel. Gas was released to the soil through a leak in an underground line near an aboveground storage tank and tank pad. The Camp Lejeune Fire Department has estimated the amount of fuel released to be in the thousands of gallons. Exact quantities released cannot be determined because the records were destroyed. The spill migrated east and northeast toward and into Brinson Creek. Fuel at the surface of the shallow aquifer was disposed of by digging holes to the water table and igniting the fuel. Fuel which contaminated Brinson Creek was also ignited and burned.

Little information is available with respect to another spill in 1990. Although a spill was reported at the site, the cause of the spill was not documented.

2.2.11 Operable Unit No. 11 (Sites 7 and 80)

Operable Unit No. 11 consists of Site 7 (Tarawa Terrace Dump) and Site 80 (Paradise Point). These sites are described below.

Site 7 - Tarawa Terrace Dump

Tarawa Terrace Dump is a landfill located east of the sewage treatment plant between Tarawa Boulevard and Northeast Creek. Its size is estimated at 5 acres. The landfill was closed in 1972, but the years of operation are not known. As far as is known, no hazardous materials were disposed of in this facility. Only construction debris, spiractor (water treatment plant filter media), and household trash are known to have been disposed.

Site 80 - Paradise Point Golf Course

The study area of this site consists of a 1-acre area at the back of the machine shop and the truck wash area at the Paradise Point Golf Course. The site contains an area of bare, hummocky soil, with a large soil mound. There are areas of dead and/or dying vegetation in the vicinity of the soil mound. In addition, there are unvegetated areas where soils have been disturbed. A drainage ditch runs from the truck wash area around the back of the machine shop.

In addition to the machine shop, which is a potential source of waste oils, the routine application of pesticides and herbicides on the golf course and the potential inadvertent disposal of excess pesticides and herbicides behind the machine shop may also have contributed to potential contamination in this area. The truck wash area consists of a concrete pad and sumps that collect washwater from the sprayers, but prior to the construction of this pad, the disposition of washwater may have been completely uncontrolled. The presence of dead vegetation indicates that, at a minimum, waste herbicides may have been disposed of behind the machine shop. There is no indication that other chemicals have been used or disposed of in this area.

2.2.12 Operable Unit No. 12 (Site 3)

Operable Unit No. 12 consists only of Site 3 (Old Creosote Plant). The old creosote plant operated from 1951 to 1952 to supply treated lumber during construction of the railroad on the base. The facility was located approximately 800 feet east of Building 613, on the opposite side of Holcomb Boulevard. Logs were cut into railroad ties at the on-site sawmill, then pressure treated with hot creosote stored in a railroad tank car. There is no indication of creosote disposal on site, and records show that creosote remaining in the pressure chamber at the end of a treatment cycle was stored for future use. Upon completion of the railroad, the plant and mill were dismantled and sold. The only site features remaining are concrete pads and the boiler chimney.

2.2.13 Operable Unit No. 13 (Site 63)

The Verona Loop Dump (Site 63) is located along Verona Loop Road, approximately one and one-half mile east of Highway 17. The site is located south of Marine Corps Air Station, New River.

The Verona Loop Dump is approximately three to four acres in size. The site is primarily wooded except for the haul roads formerly used to take debris to the dump. The site is bordered by Verona Loop Road to the south, an intermittent stream to the east, and woods to the north and south. The site is situated in a relatively flat area with an elevation of approximately 45 to 50 feet above mean sea level (msl). The area surrounding the disposal area, however, is hilly for the Camp Lejeune area. The site area slopes downward (i.e., west to east) toward an intermittent stream, which is at an elevation of about 20 feet msl. The area north of the site gradually increases in elevation.

Site 63 is no longer used for disposal. The area is heavily wooded. Approximately one mile north of the site is the advanced infantry training school. Ammo supply magazines are located approximately one-half mile east of the site. The only use of the land is for recreational hunting and training. In the vicinity of Site 63, infantry training is periodically conducted. Although hunting is permitted, a permit/pass must be obtained.

3.0 OPERABLE UNIT SCOPE OF WORK

The purpose of this section is to summarize completed, ongoing, and planned IRP activities at each Operable Unit.

Operable Unit No. 1 (Sites 21, 24, and 78)

During Fiscal Year 1992, an interim remedial action Record of Decision (ROD) was signed for the remediation of the shallow aquifer at Site 78 (HPIA). Remedial design activities were subsequently initiated in Fiscal Year 1992 (August 1992). The design of the interim remedial action was completed in August 1993. Remedial action startup is planned for the beginning of Fiscal Year 1994.

Also during Fiscal Year 1993, RI/FS Project Plans for Operable Unit No. 1 were initiated and completed. The RI/FS field investigations commenced in April, 1993. The RI/FS is scheduled to be completed in Fiscal Year 1994. A Final Record of Decision is scheduled to be signed before the end of Fiscal Year 1994. Remedial design activities are anticipated to begin in August of 1994. The remedial design will likely be completed in early Fiscal Year 1996 and remedial action initiated.

Operable Unit No. 2 (Sites 6, 9, and 82)

The RI/FS at Operable Unit No. 2 was initiated in Fiscal Year 1992 (July 1992) and completed in September 1993 with the signing of a Final Record of Decision. Remedial design activities associated with the ROD will be initiated on or before December 1, 1993. The remedial design is scheduled to be completed in February 1995. Remedial action for the final alternative is planned to begin in May 1995.

A Time-Critical Removal Action was initiated (i.e., preparation of specifications) in Fiscal Year 1993. The removal action will address surficial drums,stained soils (beneath the drums), and buried drums at two areas within the operable unit. The removal action will be initiated in the first quarter of Fiscal Year 1994.

Operable Unit No. 3 (Site 48)

A "no action" Record of Decision for Site 48 was signed in September 1993. There are no other IR activities associated with this site. Site 48 will be delisted from the IR program.

Operable Unit No. 4 (Sites 41, 69, and 74)

During Fiscal Year 1993, Sites 41 and 74 were combined with Site 69 to form Operable Unit No. 4. Previously, Sites 41 and 74 were part of Operable Unit No. 5. Both sites were combined with Site 69 since chemical agents may be present at both of these sites. All sites potentially involving chemical agents will be investigated together.

RI/FS Project Plans for Operable Unit No. 4 were initiated in April 1993. These plans are anticipated to be finalized in Fiscal Year 1994 (November 1993). The RI/FS is anticipated to begin in November 1993 (Fiscal Year 1994). The RI/FS is anticipated for completion in May 1995. Remedial design activities are scheduled to begin in May 1995.

Operable Unit No. 5 (Site 2)

RI/FS Project Plans for Site 2 were initiated in June 1992 and completed in March 1993. The RI/FS was initiated in April 1993. The RI/FS is scheduled to be completed in August 1994. Subsequent remedial design activities, if required, are planned to be initiated in Fiscal Year 1994.

A Time-Critical Removal Action will be initiated in Fiscal Year 1994. The removal action will address pesticide-contaminated soil and concrete at the former mixing area.

Operable Unit No. 6 (Sites 36, 43, 44, 54, and 86)

RI/FS Project Plans for Operable Unit No. 6 will be initiated in March 1994 and are scheduled to be completed in December 1994. Subsequent RI/FS activities will be determined following the completion of RI/FS Project Plans.

Operable Unit No. 7 (Sites 1, 28, and 30)

RI/FS Project Plans for Operable Unit No. 7 were initiated in March 1993. These plans are scheduled to be finalized in December 1993. The RI/FS phase is scheduled to begin in December 1993 and is anticipated to be completed in May 1995.

Operable Unit No. 8 (Site 16)

The RI/FS activities at Site 16 will begin in November 1993 with the preparation of RI/FS Project Plans. The RI/FS phase at Site 16 is scheduled to begin in September 1994 and will continue into Fiscal Year 1996.

Operable Unit No. 9 (Sites 65 and 73)

RI/FS Project Plans for Operable Unit No. 9 are scheduled to be initiated in April 1994 and completed in January 1995. The RI/FS schedule will be determined following the completion of RI/FS Project Plans.

Operable Unit No. 10 (Site 35)

RI/FS Project Plans for Site 35 were initiated in May 1993 and are scheduled to be finalized in February 1994. The RI/FS phase will begin in March 1994 and continue through May 1995. Remedial design activities will begin in May 1995.

An Interim Remedial Action (IRA) RI/FS was initiated in June 1993 to address petroleum-contaminated soils. The IRA RI/FS is scheduled to be completed in September 1994. The design phase is scheduled to begin in September 1994.

Operable Unit No. 11 (Sites 7 and 80)

RI/FS Project Plans will be prepared during Fiscal Year 1994. The initiation of RI/FS field work is scheduled for September 1994.

Operable Unit No. 12 (Site 3)

RI/FS Project Plans will be prepared during Fiscal Year 1994. The RI/FS field activities are scheduled to begin in September 1994.

Operable Unit No. 13 (Site 63)

No IR activities are planned for Fiscal Year 1994 at this operable unit. RI/FS Project Plans will be prepared at the beginning of Fiscal Year 1995.

Summary

Various IRP activities were either initiated or completed in Fiscal Year 1993 at 8 of the 13 operable units at MCB Camp Lejeune. IRP activities will continue at all eight of these Operable Units through Fiscal Year 1994. IRP activities at Operable Units 6, 9, 11, and 12 will begin in Fiscal Year 1994. IRP activities at Operable Unit 13 will be initiated in Fiscal Year 1995. Table 3-1 summarizes the ongoing and planned activities associated with Operable Units 1 through 13 for Fiscal years 1993 through 1998.

TABLE 3-1

ACTIVE OPERABLE UNIT IRP ACTIVITIES

Operable Unit	Site No.	Activity	Scheduled Start Up	Actual Start Up	Scheduled Completion	Actual Completion
1	78	Interim Remedial Action RI/FS, PRAP and ROD	FY 91	FY 91	FY 92	FY 92
		Interim Remedial Action Design	FY 92	FY 92	FY 94	FY 93
		Interim Remedial Action	FY 94	--	FY 94	--
1	21, 24 and 78	RI/FS Project Plans	FY 92	FY 92	FY 93	FY 93
		RI/FS, PRAP and ROD	FY 93	FY 93	FY 94	--
		Remedial Design/Remedial Action (1)	FY 94	--	FY 96	--
2	6, 9, and 82	RI/FS Project Plans	FY 91	FY 91	FY 92	FY 92
		RI/FS, PRAP and ROD	FY 92	FY 92	FY 94	FY 93
		Remedial Design/Remedial Action (1)	FY 94	--	FY 95	--
		Time-Critical Removal Action	FY 93	FY 93	FY 94	--
3	48	RI/FS Project Plans	FY 91	FY 91	FY 92	FY 92
		RI/FS, PRAP and ROD (2)	FY 92	FY 92	FY 94	FY 93
4 (3)	41, 69, and 74	RI/FS Project Plans	FY 93	FY 93	FY 94	--
		RI/FS, PRAP and ROD	FY 94	--	FY 95	--
		Remedial Design/Remedial Action (1)	FY 95	--	FY 96	--
5	2	RI/FS Project Plans	FY 92	FY 92	FY 93	FY 93
		RI/FS, PRAP and ROD	FY 93	FY 93	FY 94	--
		Remedial Design/Remedial Action (1)	FY 94	--	FY 96	--
		Time-Critical Removal Action	FY 94	--	FY 94	--

(1) Remedial construction activities must commence within 15 months following the Record of Decision.

(2) No action ROD.

(3) Amended schedule from FY 1993 Site Management Plan.

TABLE 3-1 (Continued)

ACTIVE OPERABLE UNIT IRP ACTIVITIES

Operable Unit	Site No.	Activity	Scheduled Start Up	Actual Start Up	Scheduled Completion	Actual Completion
6	36, 43, 44, 54, and 86	RI/FS Project Plans	FY 94	--	FY 95	--
		RI/FS, PRAP and ROD	FY 95	--	FY 96	--
		Remedial Design/Remedial Action (1)	FY 96	--	FY 97	--
7	1, 28 and 30	RI/FS Project Plans	FY 93	FY 93	FY 94	--
		RI/FS, PRAP and ROD	FY 94	--	FY 95	--
		Remedial Design/Remedial Action (1)	FY 95	--	FY 96	--
8 (3)	16	RI/FS Project Plans	FY 94	--	FY 94	--
		RI/FS, PRAP and ROD	FY 94	--	FY 96	--
		Remedial Design/Remedial Action (1)	FY 96	--	FY 97	--
9	65 and 73	RI/FS Project Plans	FY 94	--	FY 95	--
		RI/FS, PRAP and ROD	FY 95	--	FY 96	--
		Remedial Design/Remedial Action (1)	FY 96	--	FY 97	--
10 (3)	35	RI/FS Project Plans	FY 93	FY 93	FY 94	--
		RI/FS, PRAP, and ROD	FY 94	--	FY 95	--
		Remedial Design/Remedial Action(1)	FY 95	--	FY 96	--
		Interim Remedial Action (Soil) RI/FS, PRAP, and ROD	FY 93	FY 93	FY 94	--
		Interim Remedial Action Design (Soil)	FY 94	--	FY 94	--
		Interim Remedial Action (Soil)	FY 95	--	FY 96	--
11	7 and 80	RI/FS Project Plans	FY 94	--	FY 94	--
		RI/FS, PRAP and ROD	FY 94			
		Remedial Design/Remedial Action (1)				
12	3	RI/FS Project Plans	FY 94	--	FY 94	--
		RI/FS, PRAP and ROD	FY 95	--		
		Remedial Design/Remedial Action (1)	FY 94			

(1) Remedial construction activities must commence within 15 months following the Record of Decision.

(2) No action ROD.

(3) Amended schedule from FY 1993 Site Management Plan.

4.0 SITE MANAGEMENT SCHEDULES

The purpose of this section is to present project schedules for each of the 13 Operable Units for Fiscal Years 1994 through 1998. These schedules are adjusted annually in the Site Management Plan.

Operable Units and sites that will be active during Fiscal Year 1994 are summarized below.

Operable Unit	Site	Fiscal Year 1994 Activities
1	78	Interim Remedial Action of the Shallow Aquifer
1	21, 24 and 78	Complete RI/FS and sign ROD; begin RD
2	6, 9 and 82	Begin RD
3	48	No Action (Delisted)
4	41, 69, and 74	Complete RI/FS Project Plans; initiate RI/FS
5	2	Complete RI/FS, sign ROD, and initiate RD
6	36, 43, 44, 54, and 86	Initiate RI/FS Project Plans
7	1, 28, and 30	Complete RI/FS Project Plans and initiate RI/FS
8	16	Initiate and complete RI/FS Project Plans; initiate RI/FS
9	65 and 73	Initiate RI/FS Project Plans
10	35	Complete RI/FS Project Plans; initiate RI/FS; initiate IRA RI/FS for soil; sign IRA ROD; begin IRA design
11	7 and 80	Initiate and complete RI/FS Project Plans; initiate RI/FS
12	3	Initiate and complete RI/FS Project Plans; initiate RI/FS
13	63	No activities planned until Fiscal Year 95

The project schedules for these Operable Units are depicted on Tables 4-1 through 4-13. The project schedules include: a detailed listing of Fiscal Year 1994 activities for each Operable Unit; the duration (in calendar days) of each IRP activity; the deliverables (e.g., RI/FS Project Plans, RA Work Plans, etc.); and submittal dates. In addition, the project schedules include all activities through completion of the Remedial Design (RD) and startup of the Remedial

Table 4 - 1: Site Management Schedule

Sites 21, 24, and 78 (Operable Unit No. 1), MCB Camp Lejeune, NC

Activity	Days	Start	Finish
Project Management	490ed	4/15/93	8/18/94
Subcontractor Procurement	30ed	4/16/93	5/16/93
Field Investigation	90ed	4/16/93	7/15/93
Mobilization	30ed	4/16/93	5/16/93
Surveying (Pre-Inv.)	5ed	5/10/93	5/15/93
Soil Gas Investigation	7ed	5/10/93	5/17/93
Soil Investigation	30ed	5/17/93	6/16/93
Groundwater Investigation	24ed	6/21/93	7/15/93
SW/SD Investigation	3ed	6/9/93	6/12/93
Surveying (Post-Inv.)	10ed	6/21/93	7/1/93
Sample Analysis/Validation	127ed	5/17/93	9/21/93
Data Evaluation	21ed	9/21/93	10/12/93
Risk Assessment	42ed	10/12/93	11/23/93
RI Report	258ed	10/12/93	6/27/94
Preliminary Draft RI Report	42ed	10/12/93	11/23/93
Comment Period	28ed	11/23/93	12/21/93
Draft RI	28ed	12/21/93	1/18/94
Comment Period	60ed	1/18/94	3/19/94
Draft Final RI Report	42ed	3/19/94	4/30/94
Comment Period	30ed	4/30/94	5/30/94
Final RI	28ed	5/30/94	6/27/94

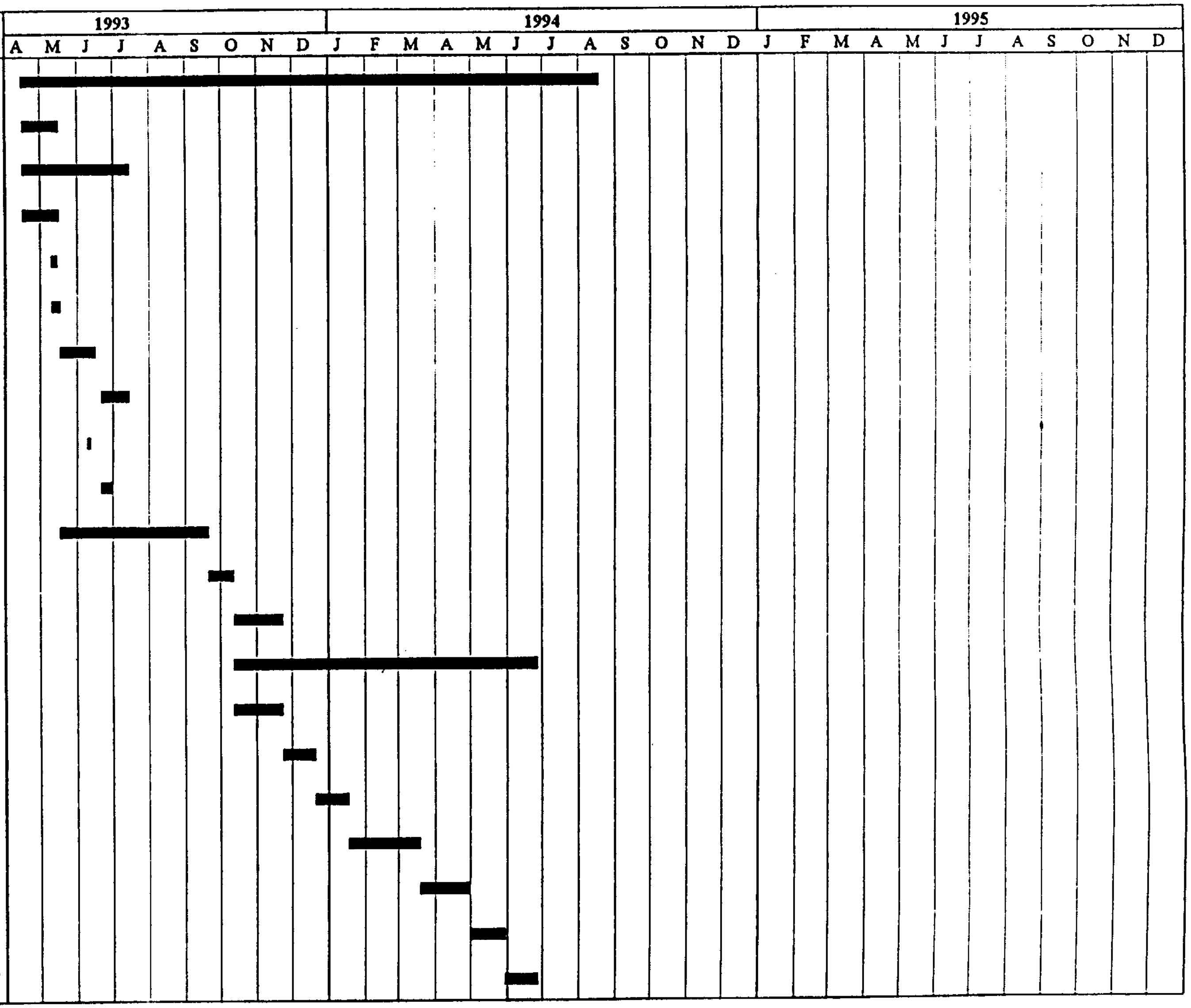
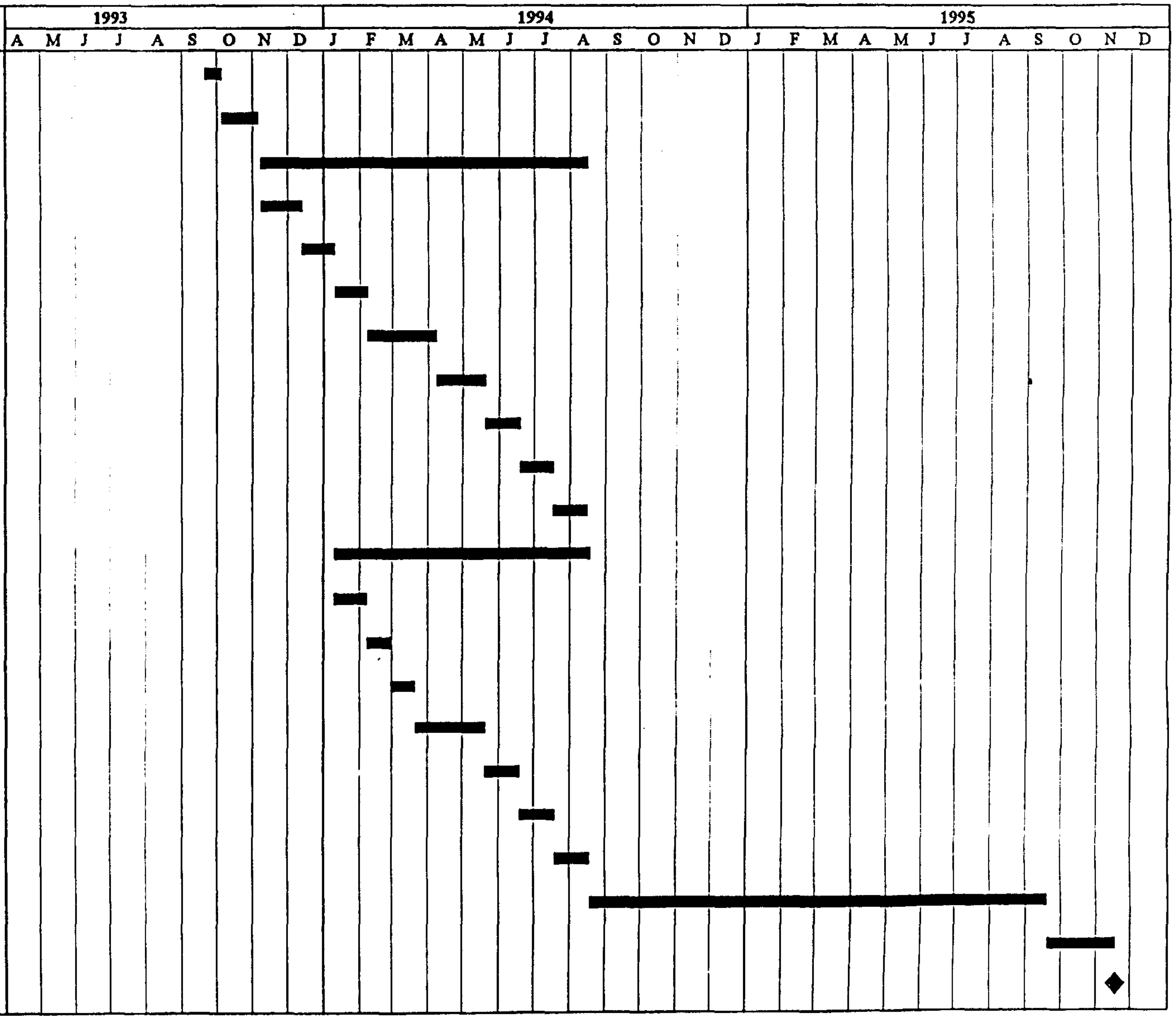


Table 4 - 1: Site Management Schedule

Sites 21, 24, and 78 (Operable Unit No. 1), MCB Camp Lejeune, NC

Activity	Days	Start	Finish
Alternative Screening	14ed	9/21/93	10/5/93
Alternative Evaluation	31ed	10/5/93	11/5/93
FS Report /PRAP	281ed	11/8/93	8/16/94
Preliminary Draft FS/PRAP	35ed	11/8/93	12/13/93
Comment Period	28ed	12/13/93	1/10/94
Draft FS/PRAP	28ed	1/10/94	2/7/94
Comment Period	60ed	2/7/94	4/8/94
Draft Final FS/PRAP	42ed	4/8/94	5/20/94
Comment Period	30ed	5/20/94	6/19/94
Final FS/PRAP	28ed	6/19/94	7/17/94
Public Comment Period	30ed	7/17/94	8/16/94
ROD	220ed	1/10/94	8/18/94
Preliminary Draft ROD	28ed	1/10/94	2/7/94
Comment Period	21ed	2/7/94	2/28/94
Draft ROD	21ed	2/28/94	3/21/94
Comment Period	60ed	3/21/94	5/20/94
Draft Final ROD	30ed	5/20/94	6/19/94
Comment Period	30ed	6/19/94	7/19/94
Final ROD	30ed	7/19/94	8/18/94
Remedial Design (1,2)	397ed	8/18/94	9/19/95
Procure RA Contractor (1,2)	60ed	9/19/95	11/18/95
Remedial Action (1,2)	0ed	11/18/95	11/18/95



(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

(2) Remedial Design (RD) duration (15 months) is based on the requirement of Section 120(e)(2) of CERCLA. Actual RD Schedule will be established following the RI/FS

Table 4 - 2: Site Management Schedule

Sites 6 , 9 and 82 (Operable Unit No. 2), MCB Camp Lejeune, NC

Task	Days	Start	Finish
Prepare Draft RD Work Plan	35ed	12/1/93	1/5/94
Submit Draft RD Work Plan to Agencies	0ed	1/5/94	1/5/94
Agency Review	60ed	1/5/94	3/6/94
Prepare Draft Final RD Work Plan	60ed	3/6/94	5/5/94
Submit Draft Final RD Work Plan	0ed	5/5/94	5/5/94
Agency Review	30ed	5/5/94	6/4/94
Prepare Final RD Work Plan	30ed	6/4/94	7/4/94
Submit Final RD Work Plan	0ed	7/4/94	7/4/94
Conduct Treatability Study	42ed	7/4/94	8/15/94
Prepare 30 % Design / Draft Design Report / Draft RA	63ed	7/4/94	9/5/94
Submit 30 % Design / Draft Design Report / Draft RA	0ed	9/5/94	9/5/94
Agency Review	53ed	9/5/94	10/28/94
Prepare 90 % Design / Draft Final Design Report	60ed	10/28/94	12/27/94
Submit 90 % Design / Draft Final Design Report	0ed	12/27/94	12/27/94
Agency Review	30ed	12/27/94	1/26/95
Prepare Final Design / Final Design Report / Final RA Work	30ed	1/26/95	2/25/95
Submit Final Design / Final Design Report / Final RA Work	0ed	2/25/95	2/25/95
Procure Remediation Contractor	70ed	2/25/95	5/6/95
Begin Construction (Mobilization)	0ed	5/6/95	5/6/95

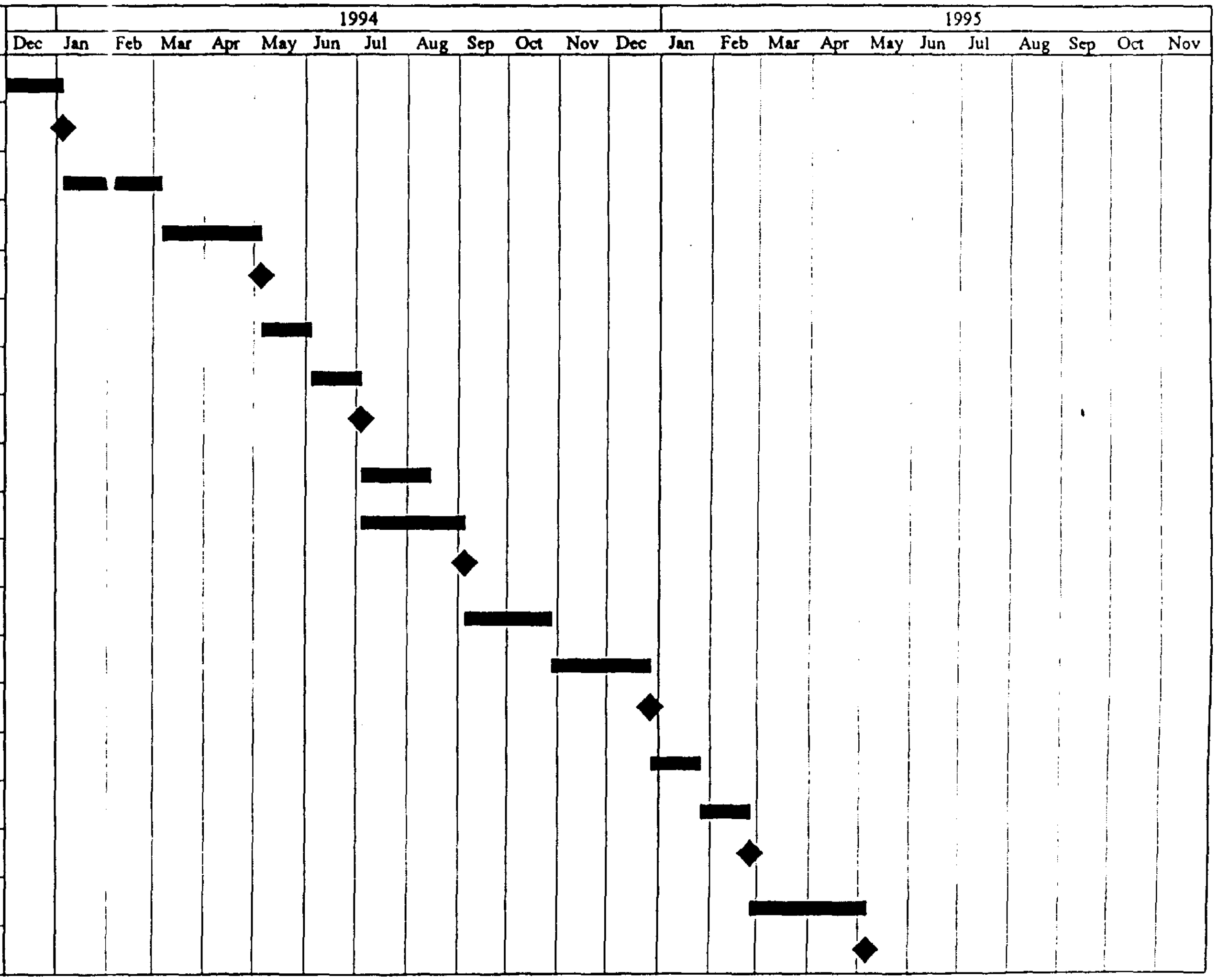


Table 4 - 3: Site Management Schedule

Sites 41, 69 and 74 (Operable Unit No. 4), MCB Camp Lejeune, NC

Task	Days	Start	Finish
Submit Draft Final RI/FS Project Plans	0ed	10/8/93	10/8/93
Agency Review	30ed	10/8/93	11/7/93
Prepare Final RI/FS Project Plans	21ed	11/7/93	11/28/93
Submit Final RI/FS Project Plan	0ed	11/28/93	11/28/93
RI Field Investigation	442ed	11/28/93	2/13/95
Mobilization	30ed	11/28/93	12/28/93
Field Investigation	60ed	12/28/93	2/26/94
Data Analysis/Validation	116ed	12/28/93	4/23/94
Data Evaluation	42ed	4/23/94	6/4/94
RI / RA	28ed	6/4/94	7/2/94
Prepare Preliminary Draft RI	42ed	6/4/94	7/16/94
Submit Preliminary Draft RI	0ed	7/16/94	7/16/94
LANTDIV Review	30ed	7/16/94	8/15/94
Prepare Draft RI	30ed	8/15/94	9/14/94
Submit Draft RI	0ed	9/14/94	9/14/94
Agency Review	60ed	9/14/94	11/13/94
Prepare Draft Final RI	60ed	11/13/94	1/12/95
Submit Draft Final RI	0ed	1/12/95	1/12/95
Agency Review	30ed	1/12/95	2/11/95
Prepare Final RI	30ed	2/11/95	3/13/95
Submit Final RI	0ed	3/13/95	3/13/95
Prepare Preliminary Draft FS	42ed	7/4/94	8/15/94
Submit Preliminary Draft FS	0ed	8/15/94	8/15/94
LANTDIV Review	28ed	8/15/94	9/12/94

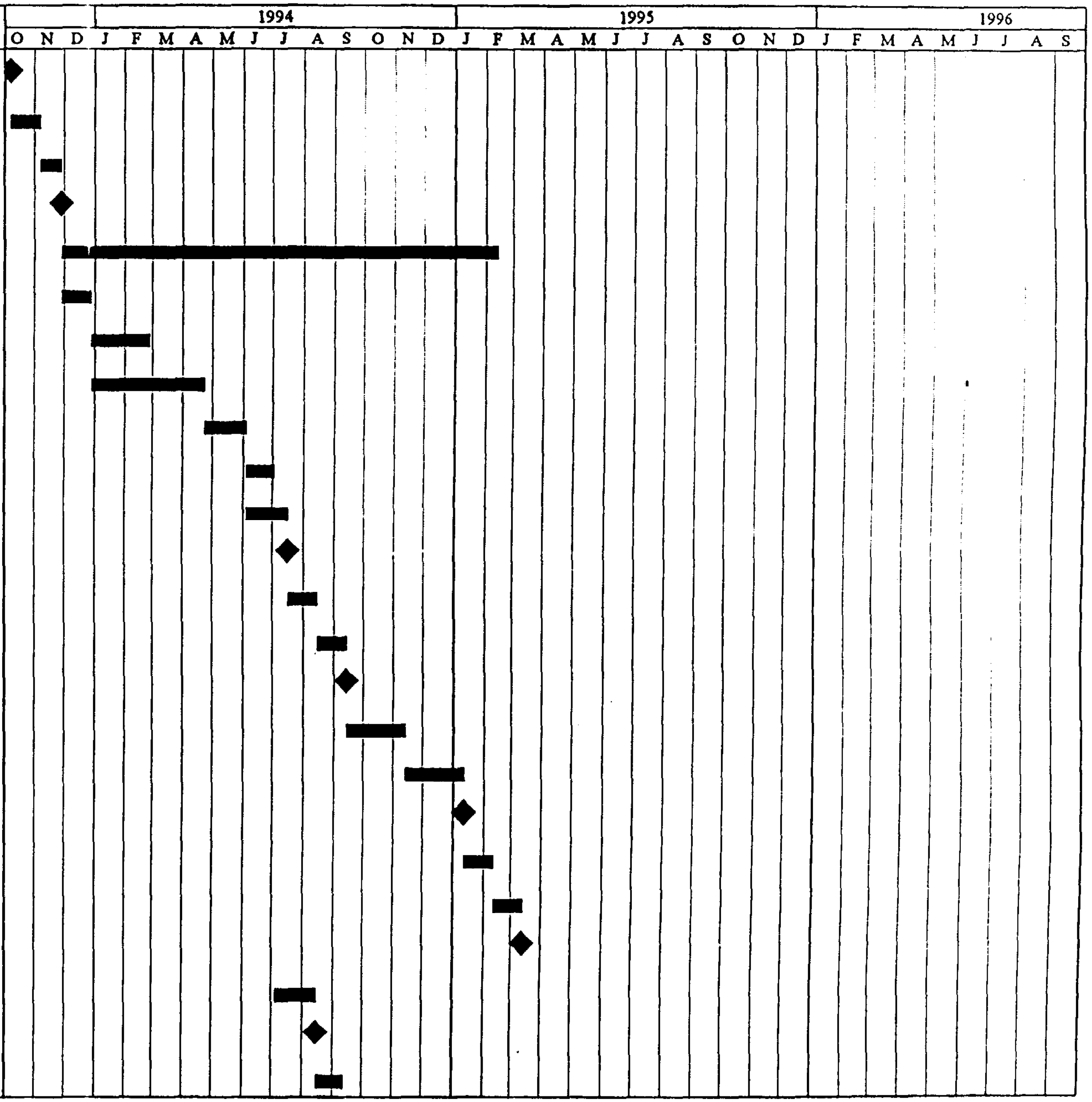
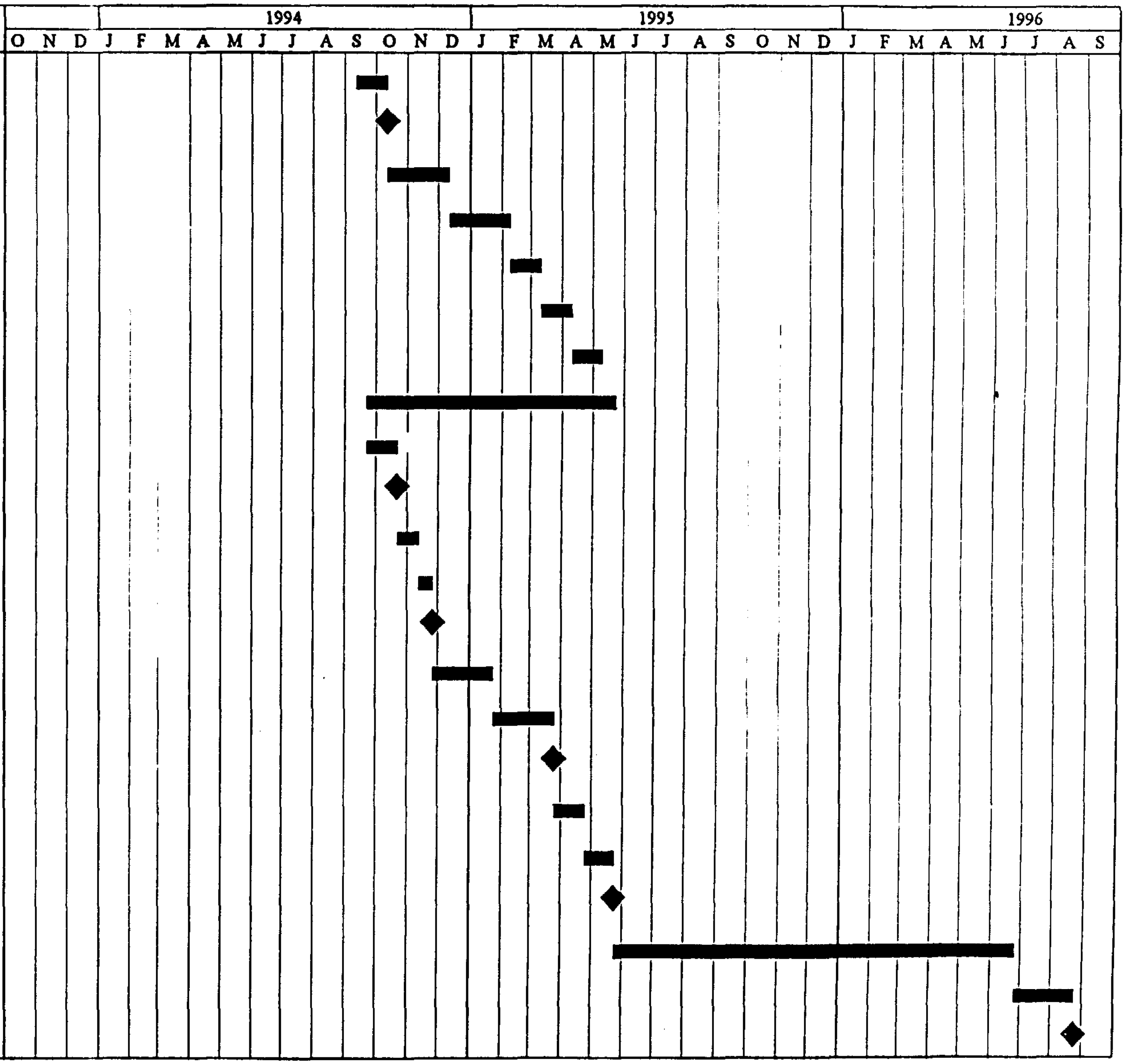


Table 4 - 3: Site Management Schedule

Sites 41, 69 and 74 (Operable Unit No. 4), MCB Camp Lejeune, NC

Task	Days	Start	Finish
Prepare Draft FS /PRAP	30ed	9/12/94	10/12/94
Submit Draft FS/PRAP	0ed	10/12/94	10/12/94
Agency Review	60ed	10/12/94	12/11/94
Prepare Draft Final FS/PRAP	60ed	12/11/94	2/9/95
Agency Review	30ed	2/9/95	3/11/95
Prepare Final FS/PRAP	30ed	3/11/95	4/10/95
Public Comment Period	30ed	4/10/95	5/10/95
ROD	244ed	9/22/94	5/24/95
Prepare Preliminary Draft ROD	30ed	9/22/94	10/22/94
Submit Preliminary Draft ROD	0ed	10/22/94	10/22/94
LANTDIV Review	21ed	10/22/94	11/12/94
Prepare Draft ROD	14ed	11/12/94	11/26/94
Submit Draft ROD	0ed	11/26/94	11/26/94
Agency Review	59ed	11/26/94	1/24/95
Prepare Draft Final ROD	60ed	1/24/95	3/25/95
Submit Draft Final ROD	0ed	3/25/95	3/25/95
Agency Review	30ed	3/25/95	4/24/95
Prepare Final ROD	30ed	4/24/95	5/24/95
Submit Final ROD	0ed	5/24/95	5/24/95
Remedial Design (1,2)	398ed	5/24/95	6/25/96
Procure RA Contractor (1,2)	60ed	6/25/96	8/24/96
Remedial Action (1,2)	0ed	8/24/96	8/24/96



(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

(2) Remedial Design (RD) duration (15 months) is based on the requirement of Section

Table 4 - 4: Site Management Schedule

Site 2 (Operable Unit No. 5), MCB Camp Lejeune, NC

Activity	Days	Start	Finish
Project Management	283d	4/15/93	5/16/94
Subcontractor Procurement	30ed	4/16/93	5/16/93
Field Investigation	41d	4/16/93	6/12/93
Mobilization	30ed	4/16/93	5/16/93
Surveying (Pre-Inv.)	5ed	5/10/93	5/15/93
Soil Investigation	24ed	5/17/93	6/10/93
Groundwater Investigation	5ed	5/28/93	6/2/93
SW/SD Investigation	2ed	5/24/93	5/26/93
Surveying (Post-Inv.)	2ed	6/1/93	6/3/93
Aquifer Tests	5ed	6/7/93	6/12/93
Sample Analysis/Validation	93ed	5/17/93	8/18/93
Data Evaluation	21ed	8/18/93	9/8/93
Risk Assessment	42ed	9/8/93	10/20/93
Treatability Studies	63ed	8/18/93	10/20/93
RI Report	198d	9/8/93	6/13/94
Preliminary Draft RI	49ed	9/8/93	10/27/93
Comment Period	28ed	10/27/93	11/24/93
Draft RI Report	28ed	11/24/93	12/22/93
Comment Period	60ed	12/22/93	2/20/94
Draft Final RI	53ed	2/20/94	4/14/94
Comment Period	30ed	4/14/94	5/14/94
Final RI Report	30ed	5/14/94	6/13/94

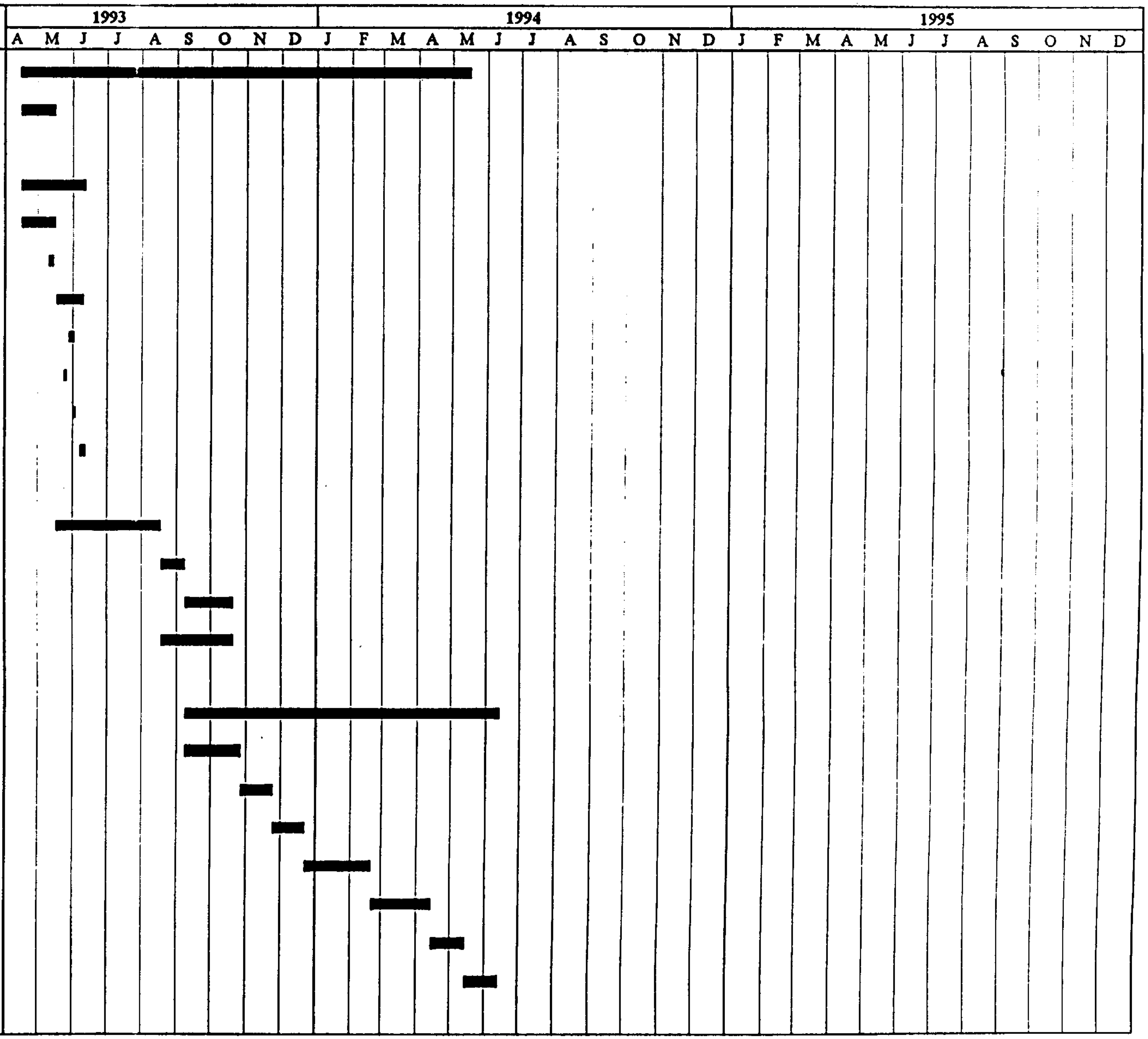
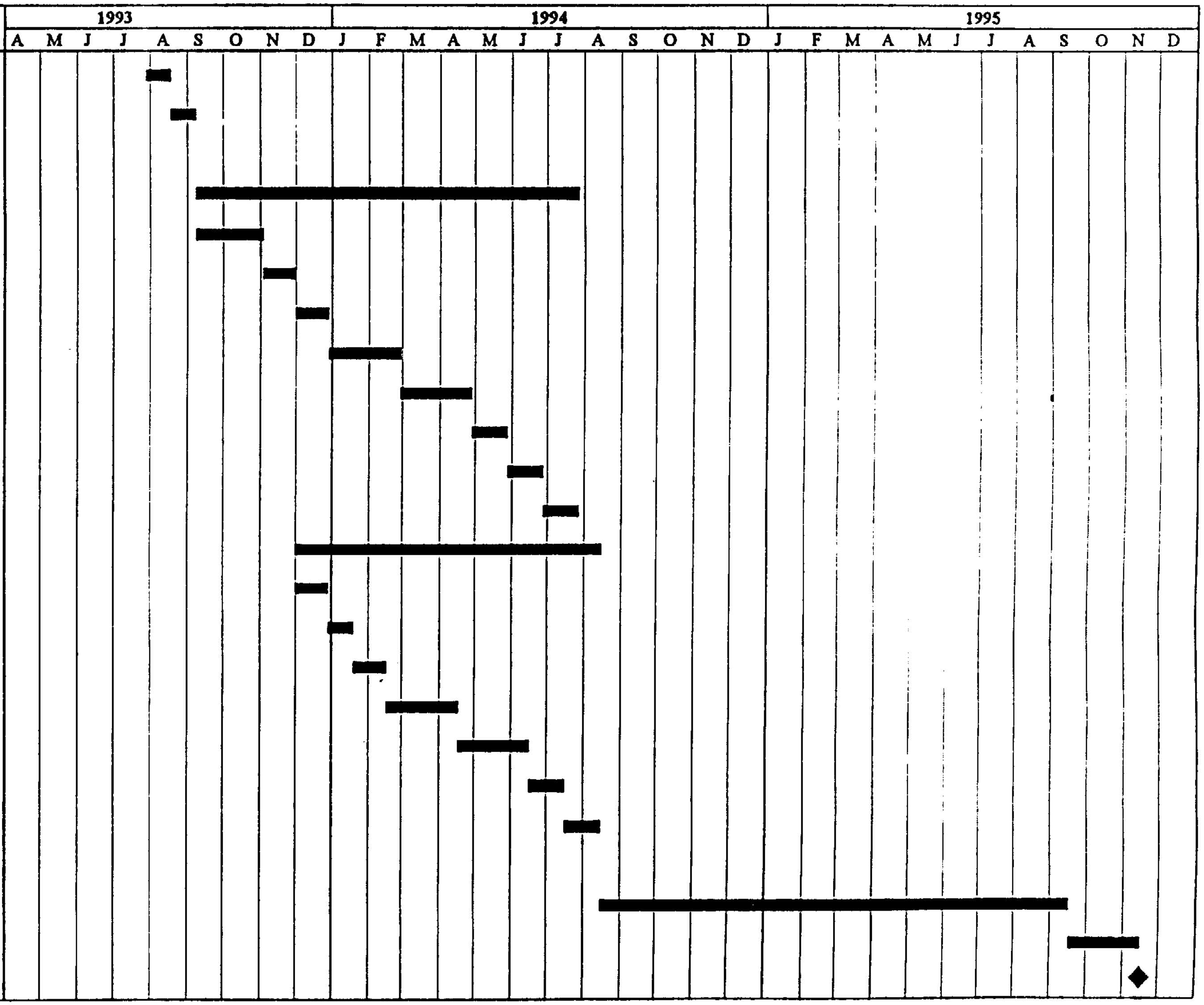


Table 4 - 4: Site Management Schedule

Site 2 (Operable Unit No. 5), MCB Camp Lejeune, NC

Activity	Days	Start	Finish
Alternative Screening	21ed	7/28/93	8/18/93
Alternative Evaluation	21ed	8/18/93	9/8/93
FS Report	230d	9/8/93	7/27/94
Preliminary Draft FS	56ed	9/8/93	11/3/93
Comment Period	28ed	11/3/93	12/1/93
Draft FS/PRAP	28ed	12/1/93	12/29/93
Comment Period	60ed	12/29/93	2/27/94
Draft Final FS/PRAP	60ed	2/27/94	4/28/94
Comment Period	30ed	4/28/94	5/28/94
Final FS/PRAP	30ed	5/28/94	6/27/94
Public Comment	30ed	6/27/94	7/27/94
ROD	183d	12/1/93	8/15/94
Preliminary Draft ROD	28ed	12/1/93	12/29/93
Comment Period	21ed	12/29/93	1/19/94
Draft ROD	28ed	1/19/94	2/16/94
Comment Period	60ed	2/16/94	4/17/94
Draft Final ROD	60ed	4/17/94	6/16/94
Comment Period	30ed	6/16/94	7/16/94
Final ROD	30ed	7/16/94	8/15/94
Remedial Design (1,2)	397ed	8/15/94	9/16/95
Procure RA Contractor (1,2)	60ed	9/16/95	11/15/95
Remedial Action (1,2)	0ed	11/15/95	11/15/95



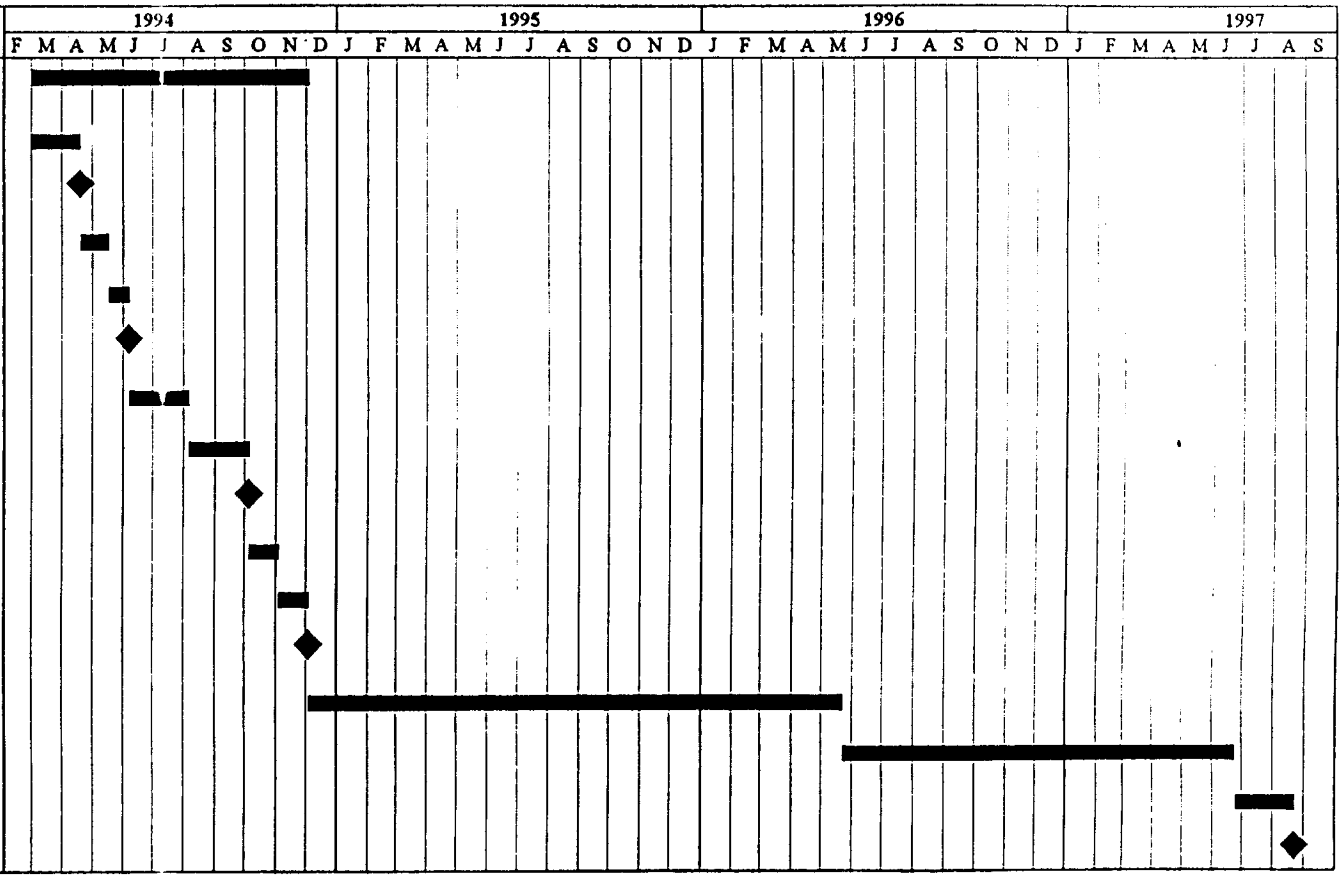
(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

(2) Remedial Design (RD) duration (15 months) is based on the requirement of Section 120(e)(2) of CERCLA. Actual RD Schedule will be established following the RI/FS.

Table 4 - 5: Site Management Schedule

Sites 36, 43, 44, 54 and 86 (Operable Unit No. 6), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	199d	3/1/94	12/4/94
Prepare Prelim. Draft RI/FS Proj. Plans	49ed	3/1/94	4/19/94
Submit Prelim. Draft RI/FS Proj. Plans	0ed	4/19/94	4/19/94
LANTDIV Review	28ed	4/19/94	5/17/94
Prepare Draft RI/FS Project Plans	21ed	5/17/94	6/7/94
Submit Draft RI/FS Project Plans	0ed	6/7/94	6/7/94
Agency Review	60ed	6/7/94	8/6/94
Prepare Draft Final RI/FS Project Plans	60ed	8/6/94	10/5/94
Submit Draft Final RI/FS Project Plans	0ed	10/5/94	10/5/94
Agency Review	30ed	10/5/94	11/4/94
Prepare Final RI/FS Project Plans	30ed	11/4/94	12/4/94
Submit Final RI/FS Project Plans	0ed	12/4/94	12/4/94
RI/FS, PRAP, and ROD (1)	536ed	12/4/94	5/23/96
Remedial Design (2)	397ed	5/23/96	6/24/97
Procure RA Contractor (2)	60ed	6/24/97	8/23/97
Begin Remedial Action (2)	0ed	8/23/97	8/23/97



(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

(2) Remedial Design (RD) duration (15 months) is based on the requirement of Section 120(c)(2) of CERCLA. Actual RD Schedule will be established following the RI/FS.

Table 4 - 6: Site Management Schedule

Sites 1, 28, and 30 (Operable Unit No. 7), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	215d	3/1/93	12/26/93
Prepare Prelim Draft RI/FS Project Plans	60ed	3/1/93	4/30/93
Submit Prelim Draft RI/FS Project Plans	0ed	4/30/93	4/30/93
LANTDIV Review	30d	4/30/93	6/10/93
Prepare Draft RI/FS Project Plans	30ed	5/30/93	6/29/93
Submit Draft RI/FS Project Plans	0ed	6/29/93	6/29/93
Agency Review	60ed	6/29/93	8/28/93
Prepare Draft Final RI/FS Project Plans	60ed	8/28/93	10/27/93
Submit Draft Final RI/FS Project Plans	0ed	10/27/93	10/27/93
Agency Review	30ed	10/27/93	11/26/93
Prepare Final RI/FS Project Plans	30ed	11/26/93	12/26/93
Submit Final RI/FS Project Plans	0ed	12/26/93	12/26/93
Field Investigation	63ed	1/3/94	3/7/94
Sample Analysis / Validation	119ed	1/3/94	5/2/94
Data Evaluation	21ed	5/2/94	5/23/94
Risk Assessment	42ed	5/23/94	7/4/94
RI Report	200d	6/6/94	3/11/95
Preliminary Draft RI Report	42ed	6/6/94	7/18/94
Comment Period	28ed	7/18/94	8/15/94
Draft RI	28ed	8/15/94	9/12/94
Comment Period	60ed	9/12/94	11/11/94
Draft Final RI Report	60ed	11/11/94	1/10/95
Comment Period	30ed	1/10/95	2/9/95
Final RI	30ed	2/9/95	3/11/95

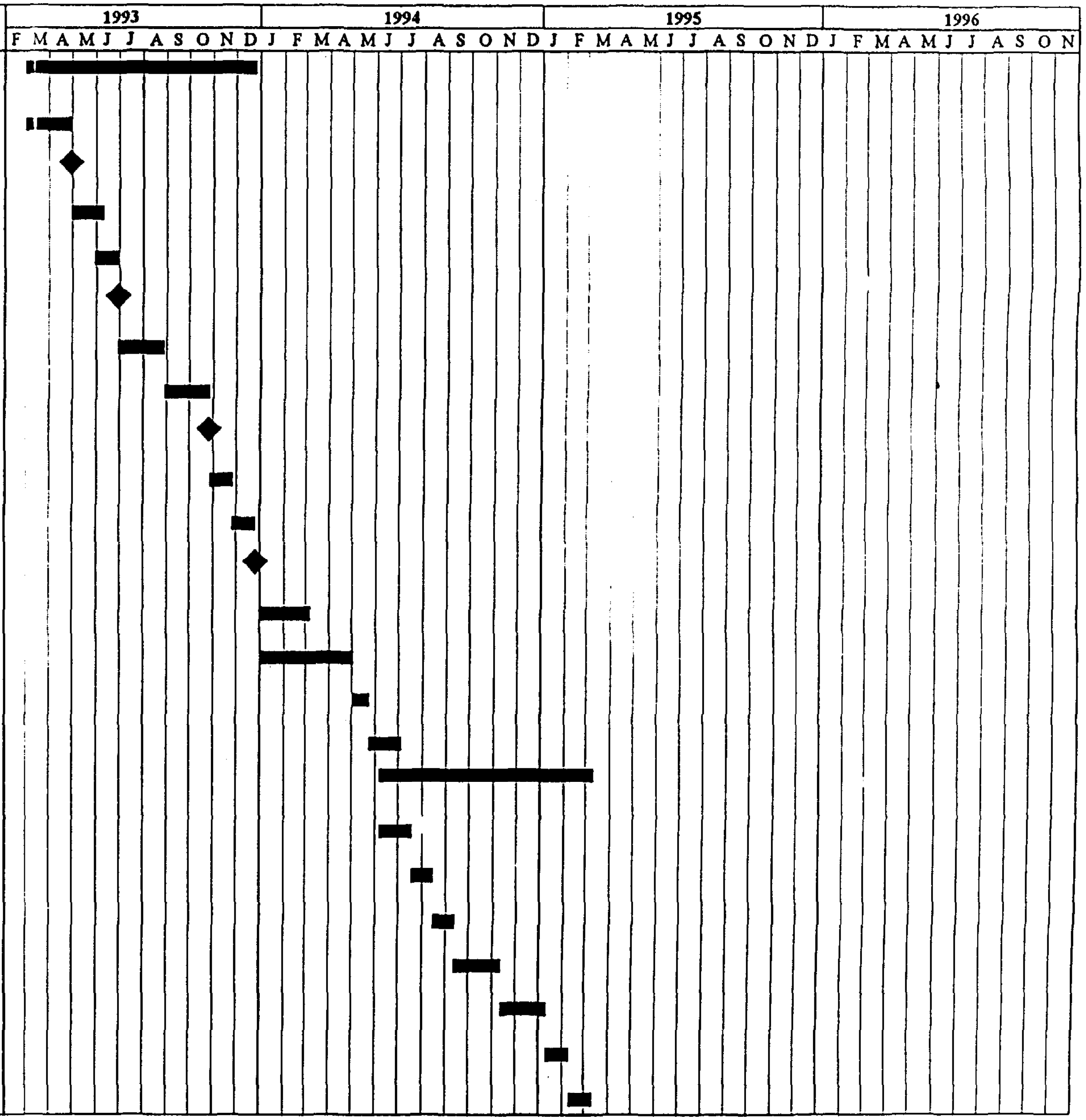
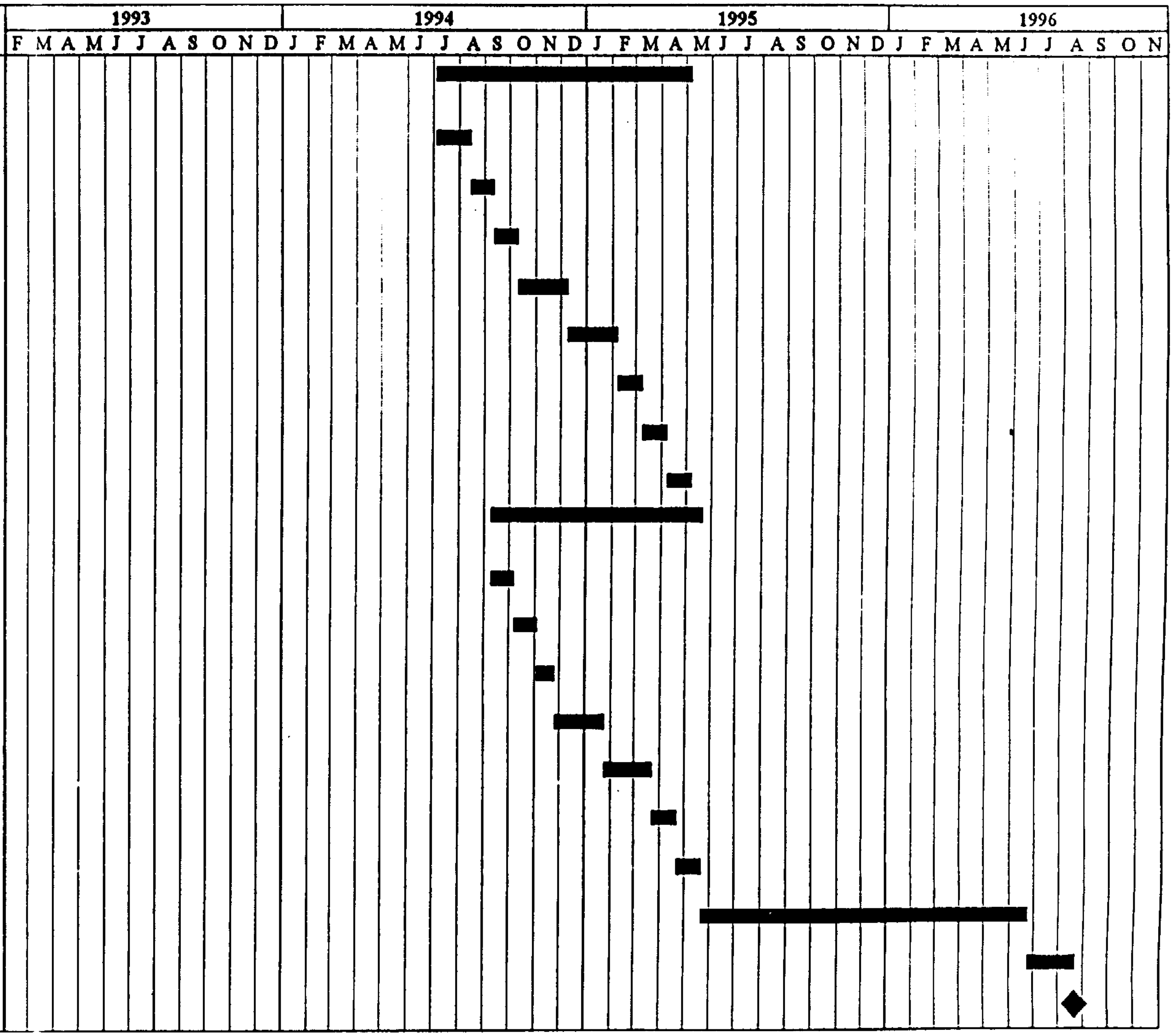


Table 4 - 6: Site Management Schedule

Sites 1, 28, and 30 (Operable Unit No. 7), MCB Camp Lejeune, NC

Task	Days	Start	Finish
FS Report / PRAP	220d	7/4/94	5/8/95
Preliminary Draft FS / PRAP	42ed	7/4/94	8/15/94
Comment Period	28ed	8/15/94	9/12/94
Draft FS / PRAP	28ed	9/12/94	10/10/94
Comment Period	60ed	10/10/94	12/9/94
Draft Final FS / PRAP	60ed	12/9/94	2/7/95
Comment Period	30ed	2/7/95	3/9/95
Final FS / PRAP	30ed	3/9/95	4/8/95
Public Comment Period	30ed	4/8/95	5/8/95
ROD	181d	9/9/94	5/22/95
Preliminary Draft ROD	28ed	9/9/94	10/7/94
Comment Period	28ed	10/7/94	11/4/94
Draft ROD	21ed	11/4/94	11/25/94
Comment Period	60ed	11/25/94	1/24/95
Draft Final ROD	58ed	1/24/95	3/23/95
Comment Period	30ed	3/23/95	4/22/95
Final ROD	30ed	4/22/95	5/22/95
Remedial Design (1,2)	398ed	5/22/95	6/23/96
Procure RA Contractor	60ed	6/23/96	8/22/96
Begin RA (1,2)	0ed	8/22/96	8/22/96



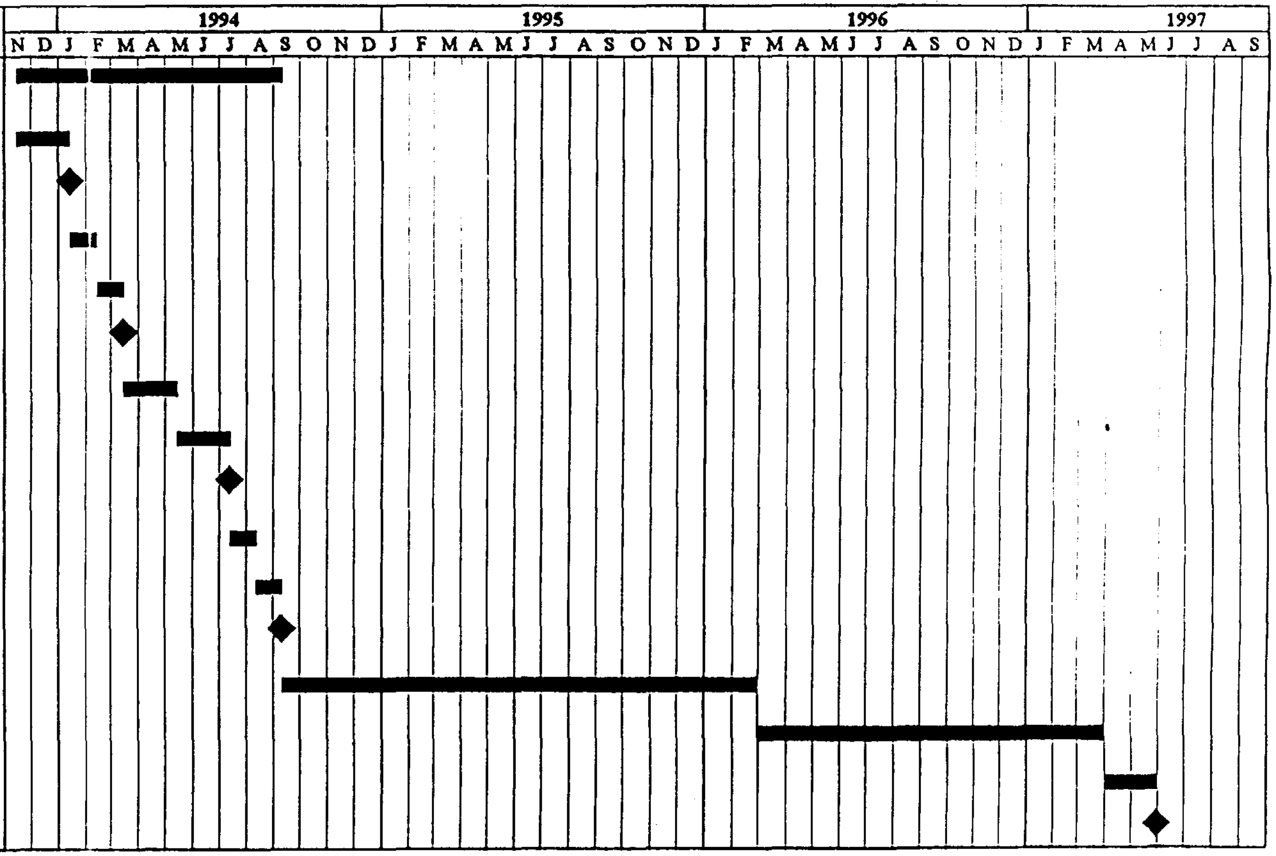
(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

(2) Remedial Design (RD) duration (15 months) is based on the requirement of Section 120(c)(2) of CERCLA. Actual RD Schedule will be established following the RI/FS.

Table 4 - 7: Site Management Schedule

Site 16 (Operable Unit No. 8), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	215d	11/15/93	9/11/94
Prepare Prelim Draft RI/FS Project Plans	60ed	11/15/93	1/14/94
Submit Prelim Draft RI/FS Project Plans	0ed	1/14/94	1/14/94
LANTDIV Review	30ed	1/14/94	2/13/94
Prepare Draft RI/FS Project Plans	30ed	2/13/94	3/15/94
Submit Draft RI/FS Project Plans	0ed	3/15/94	3/15/94
Agency Review	60ed	3/15/94	5/14/94
Prepare Draft Final RI/FS Project Plans	60ed	5/14/94	7/13/94
Submit Draft Final RI/FS Project Plans	0ed	7/13/94	7/13/94
Agency Review	30ed	7/13/94	8/12/94
Prepare Final RI/FS Project Plans	30ed	8/12/94	9/11/94
Submit Final RI/FS Project Plans	0ed	9/11/94	9/11/94
RI/FS, PRAP, and ROD (1)	536ed	9/11/94	2/29/96
Remedial Design (2)	397ed	2/29/96	4/1/97
Procure RA Contractor (2)	60ed	4/1/97	5/31/97
Begin Remedial Action (2)	0ed	5/31/97	5/31/97



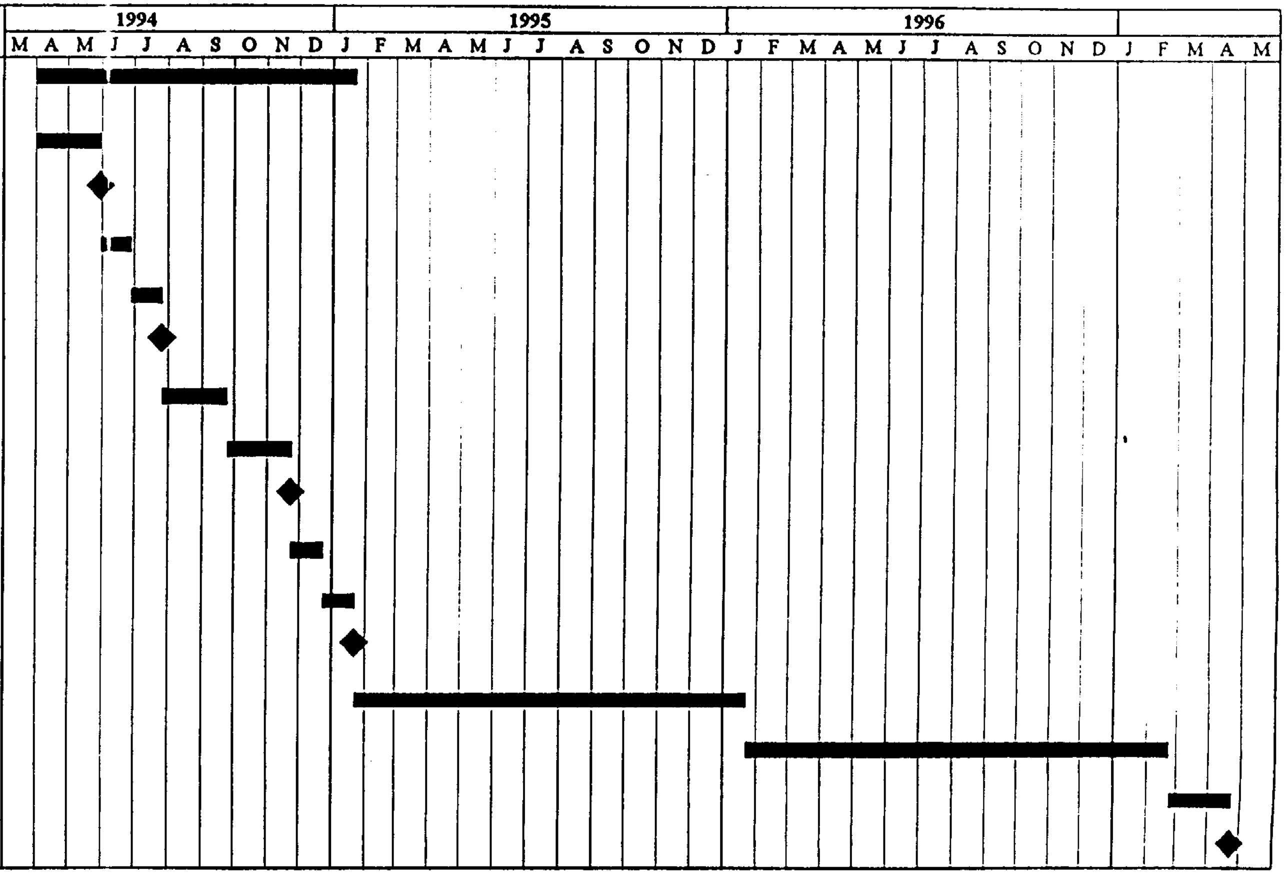
(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

(2) Remedial Design (RD) duration (15 months) is based on the requirement of Section 120(c)(2) of CERCLA. Actual RD Schedule will be established following the RI/FS.

Table 4 - 8: Site Management Schedule

Sites 65 and 73 (Operable Unit No. 9), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	211d	4/1/94	1/22/95
Prepare Prelim Draft RI/FS Project Plans	60ed	4/1/94	5/31/94
Submit Prelim Draft RI/FS Project Plans	0ed	5/31/94	5/31/94
LANTDIV Review	28ed	5/31/94	6/28/94
Prepare Draft RI/FS Project Plans	28ed	6/28/94	7/26/94
Submit Draft RI/FS Project Plans	0ed	7/26/94	7/26/94
Agency Review	60ed	7/26/94	9/24/94
Prepare Draft Final RI/FS Project Plans	60ed	9/24/94	11/23/94
Submit Draft Final RI/FS Project Plans	0ed	11/23/94	11/23/94
Agency Review	30ed	11/23/94	12/23/94
Prepare Final RI/FS Project Plans	30ed	12/23/94	1/22/95
Submit Final RI/FS Project Plans	0ed	1/22/95	1/22/95
RI/FS PRAP, and ROD (1)	365ed	1/22/95	1/22/96
Remedial Design (2)	397ed	1/22/96	2/22/97
Procure RA Contractor (2)	60ed	2/22/97	4/23/97
Begin Remedial Action (2)	0ed	4/23/97	4/23/97



(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

(2) Remedial Design (RD) duration (15 months) is based on the requirement of Section 120(c)(2) of CERCLA. Actual RD Schedule will be established following the RI/FS.

Table 4 - 9: Site Management Schedule

Site 35 (Operable Unit no. 10), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	214d	5/1/93	2/25/94
Prepare Prelim Draft RI/FS Project Plans	60ed	5/1/93	6/30/93
Submit Prelim Draft RI/FS Project Plans	0ed	6/30/93	6/30/93
LANTDIV Review	30ed	6/30/93	7/30/93
Prepare Draft RI/FS Project Plans	30ed	7/30/93	8/29/93
Submit Draft RI/FS Project Plans	0ed	8/29/93	8/29/93
Agency Review	60ed	8/29/93	10/28/93
Prepare Draft Final RI/FS Project Plans	60ed	10/28/93	12/27/93
Submit Draft Final RI/FS Project Plans	0ed	12/27/93	12/27/93
Agency Review	30ed	12/27/93	1/26/94
Prepare Final RI/FS Project Plans	30ed	1/26/94	2/25/94
Submit Final RI/FS Project Plans	0ed	2/25/94	2/25/94
Field Investigation	42ed	3/1/94	4/12/94
Sample Analysis/Validation	84ed	3/1/94	5/24/94
Data Evaluation	21ed	5/24/94	6/14/94
Risk Assessment	28ed	6/14/94	7/12/94
RI Report	199d	6/14/94	3/19/95
Preliminary Draft RI Report	42ed	6/14/94	7/26/94
Comment Period	28ed	7/26/94	8/23/94
Draft RI Report	28ed	8/23/94	9/20/94
Comment Period	60ed	9/20/94	11/19/94
Draft Final RI Report	60ed	11/19/94	1/18/95
Comment Period	30ed	1/18/95	2/17/95
Final RI	30ed	2/17/95	3/19/95

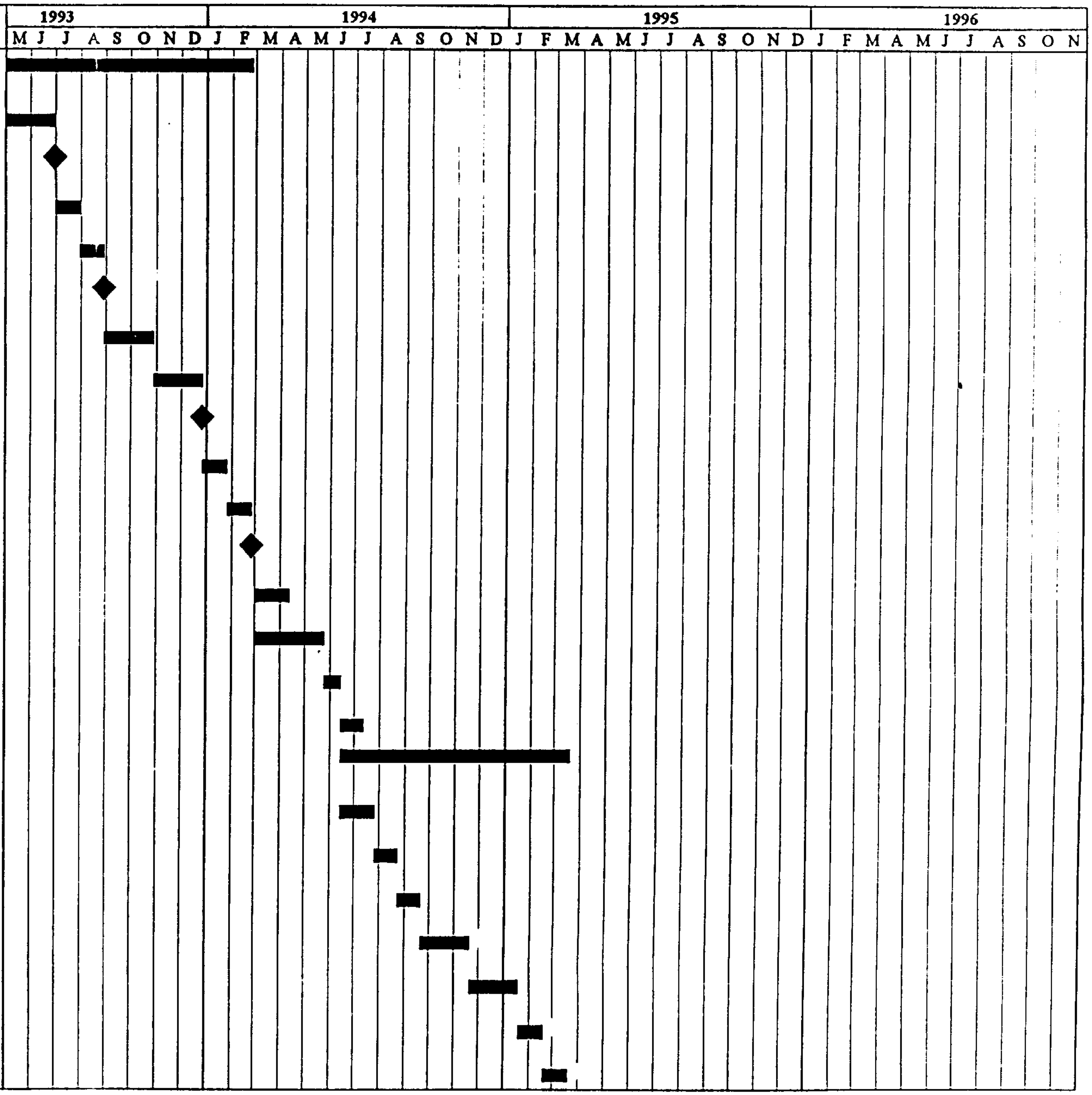
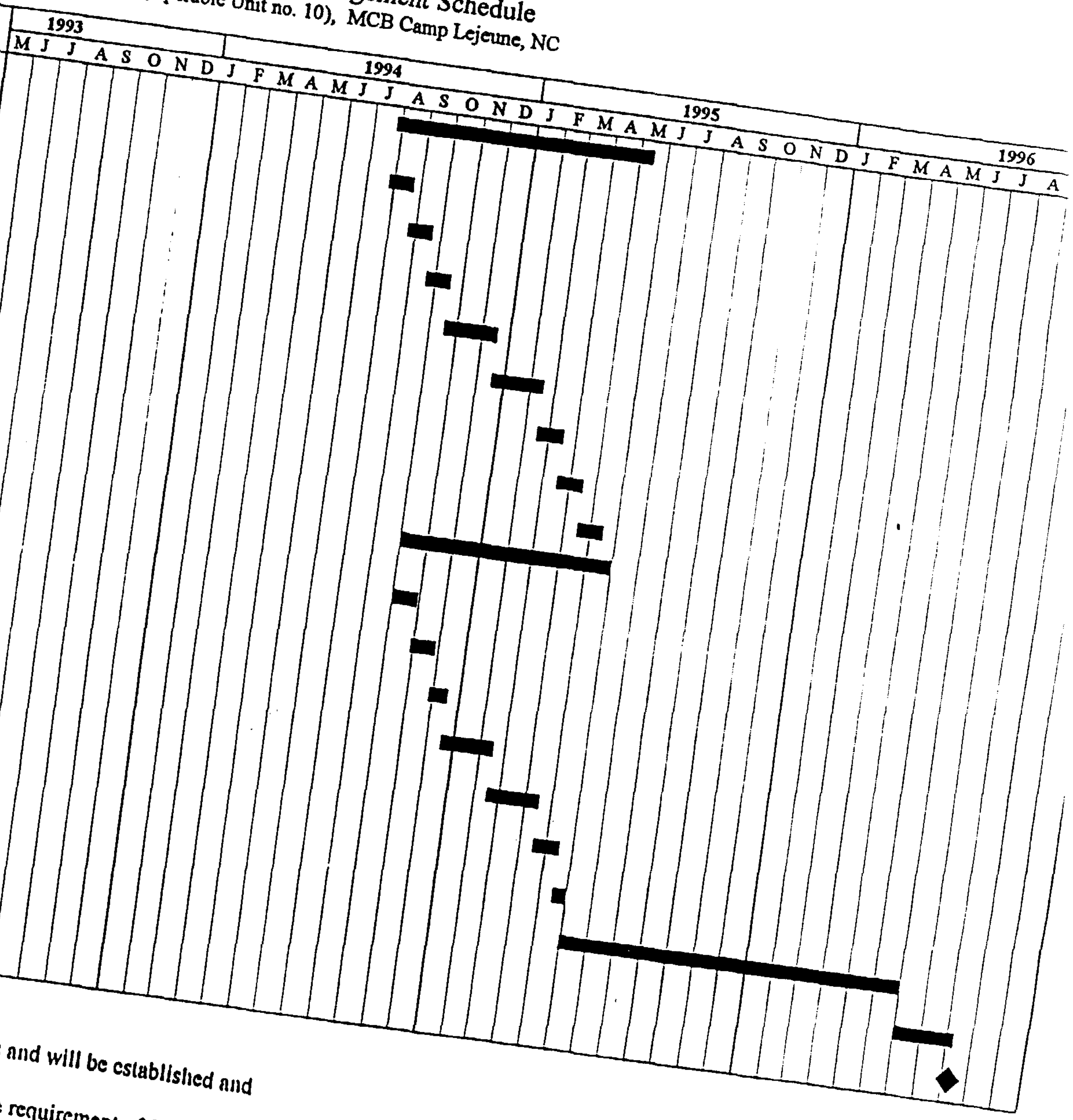


Table 4 - 9: Site Management Schedule

Site 35 (Operable Unit no. 10), MCB Camp Lejeune, NC

Task	Days	Start	Finish
FS Report/PRAP	210d	7/26/94	5/16/95
Preliminary Draft FS/PRAP	28ed	7/26/94	8/23/94
Comment Period	28ed	8/23/94	9/20/94
Draft FS/PRAP	28ed	9/20/94	10/18/94
Comment Period	60ed	10/18/94	12/17/94
Draft Final FS/PRAP	60ed	12/17/94	2/15/95
Comment Period	30ed	2/15/95	3/17/95
Final FS/PRAP	30ed	3/17/95	4/16/95
Public Comment Period	30ed	4/16/95	5/16/95
ROD	171d	10/1/94	5/30/95
Preliminary Draft ROD	28ed	10/1/94	10/29/94
Comment Period	28ed	10/29/94	11/26/94
Draft ROD	21ed	11/26/94	12/17/94
Comment Period	60ed	12/17/94	2/15/95
Draft Final ROD	60ed	2/15/95	4/16/95
Comment Period	30ed	4/16/95	5/16/95
Final ROD	14ed	5/16/95	5/30/95
Remedial Design (1,2)	398ed	5/30/95	7/1/96
Procure RA Contractor	70ed	7/1/96	9/9/96
Begin RA (1,2)	0ed	9/9/96	9/9/96



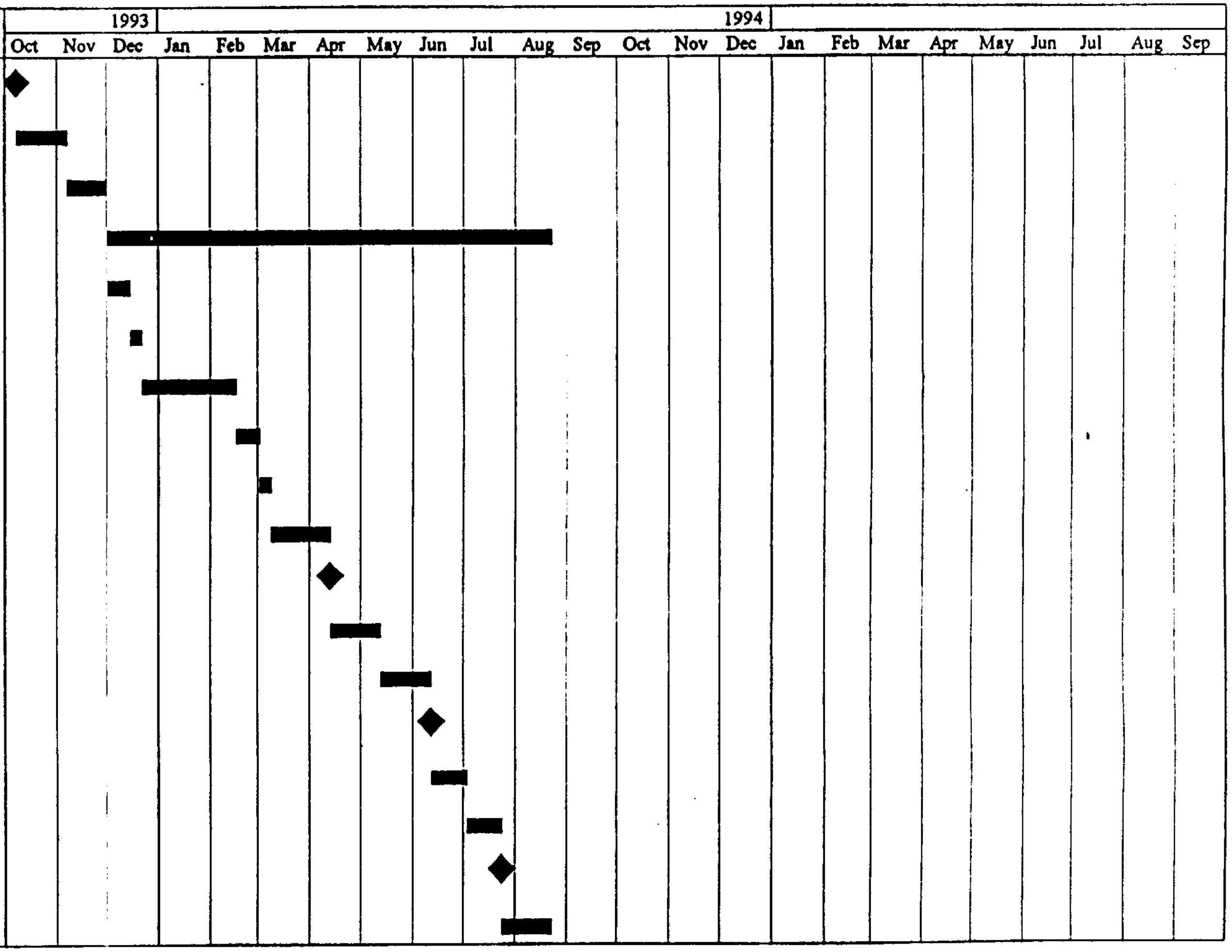
(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

(2) Remedial Design (RD) duration (15 months) is based on the requirement of Section 120(c)(2) of CERCLA. Actual RD Schedule will be established following the RI/FS.

Table 4 - 10: Site Management Schedule

Interim Remedial Action (IRA) RI/FS Schedule, Site 35 (Operable Unit No. 10), MCB Camp Lejeune, NC

Task	Days	Start	Finish
Submit Draft Final IRA Project Plans	0ed	10/8/93	10/8/93
Agency Review	30ed	10/8/93	11/7/93
Final IRA Project Plans	24ed	11/7/93	12/1/93
RI/FS	265ed	12/1/93	8/23/94
Notice to Proceed/Mobilization	14ed	12/1/93	12/15/93
Field Investigation	7ed	12/15/93	12/22/93
Data Analysis/Validation	56ed	12/22/93	2/16/94
Data Evaluation	14ed	2/16/94	3/2/94
Risk Assessment	7ed	3/2/94	3/9/94
Prepare Draft RI/FS and PRAP	35ed	3/9/94	4/13/94
Submit Draft RI/FS and PRAP	0ed	4/13/94	4/13/94
Government Review	30ed	4/13/94	5/13/94
Prepare Draft Final RI/FS and PRAP	30ed	5/13/94	6/12/94
Submit Draft Final RI/FS and PRAP	0ed	6/12/94	6/12/94
Agency Review	21ed	6/12/94	7/3/94
Prepare Final RI/FS and PRAP	21ed	7/3/94	7/24/94
Submit Final RI/FS and PRAP	0ed	7/24/94	7/24/94
Public Comment Period	30ed	7/24/94	8/23/94

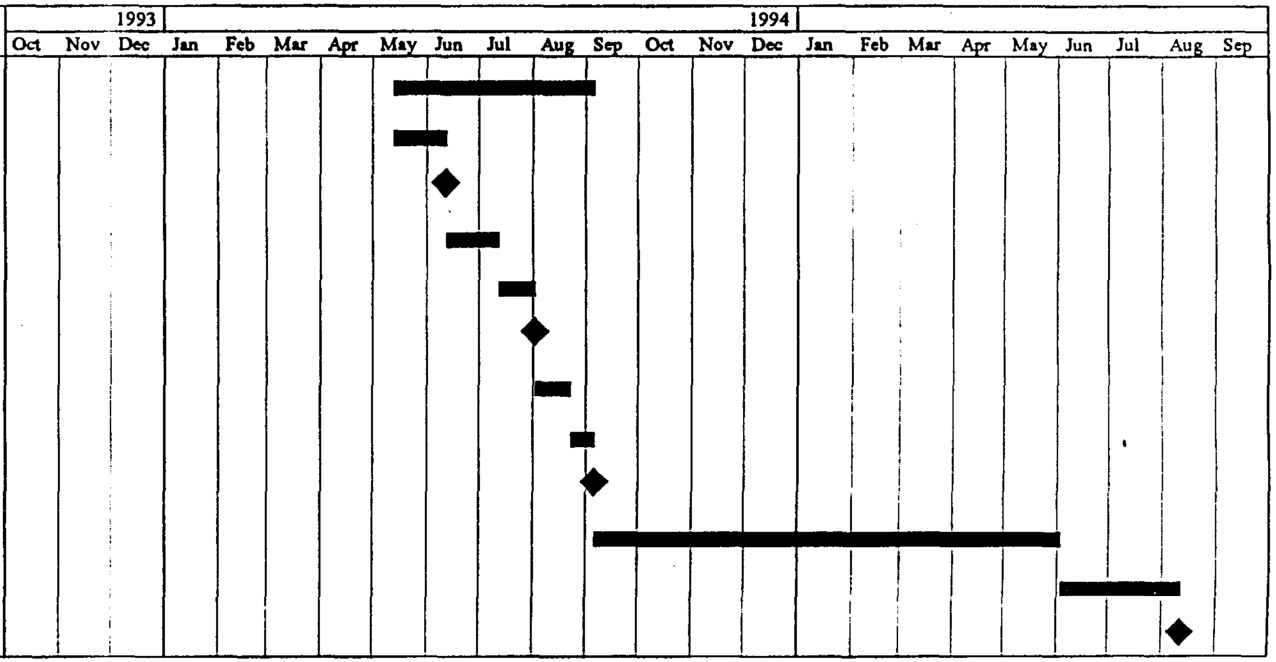


Note: Review/Responce durations are accelerated and are shorter than the FFA periods.

Table 4 - 10: Site Management Schedule

Interim Remedial Action (IRA) RI/FS Schedule, Site 35 (Operable Unit No. 10), MCB Camp Lejeune, NC

Task	Days	Start	Finish
ROD	116ed	5/13/94	9/6/94
Prepare Draft ROD	30ed	5/13/94	6/12/94
Submit Draft ROD	0ed	6/12/94	6/12/94
Agency Review	30ed	6/12/94	7/12/94
Prepare Draft Final ROD	21ed	7/12/94	8/2/94
Submit Draft Final ROD	0ed	8/2/94	8/2/94
Agency Review	21ed	8/2/94	8/23/94
Prepare Final ROD	14ed	8/23/94	9/6/94
Submit Final ROD	0ed	9/6/94	9/6/94
Remedial Design (1)	270ed	9/6/94	6/3/95
Procure RA Contractor (1)	70ed	6/3/95	8/12/95
Initiate Interim RA	0ed	8/12/95	8/12/95



(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

Note: Review/Responce durations are accelerated and are shorter than the FFA periods.

Table 4 - 11 Site Management Schedule

Site 7 and 80 (Operable Unit No. 11), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	213d	12/1/93	9/26/94
Prepare Prelim Draft RI/FS Project Plans	60ed	12/1/93	1/30/94
Submit Prelim Draft RI/FS Project Plans	0ed	1/31/94	1/31/94
LANTDIV Review	28ed	1/31/94	2/28/94
Prepare Draft RI/FS Project Plans	28ed	2/28/94	3/28/94
Submit Draft RI/FS Project Plans	0ed	3/28/94	3/28/94
Agency Review	60ed	3/28/94	5/27/94
Prepare Draft Final RI/FS Project Plans	60ed	5/27/94	7/26/94
Submit Draft Final RI/FS Project Plans	0ed	7/26/94	7/26/94
Agency Review	30ed	7/26/94	8/25/94
Prepare Final RI/FS Project Plans	30ed	8/25/94	9/24/94
Submit Final RI/FS Project Plans	0ed	9/26/94	9/26/94
RI/FS PRAP, and ROD (1)	365ed	9/26/94	9/26/95
Remedial Design (2)	397ed	9/26/95	10/27/96
Procure RA Contractor (2)	60ed	10/28/96	12/27/96
Begin Remedial Action (2)	0ed	12/27/96	12/27/96

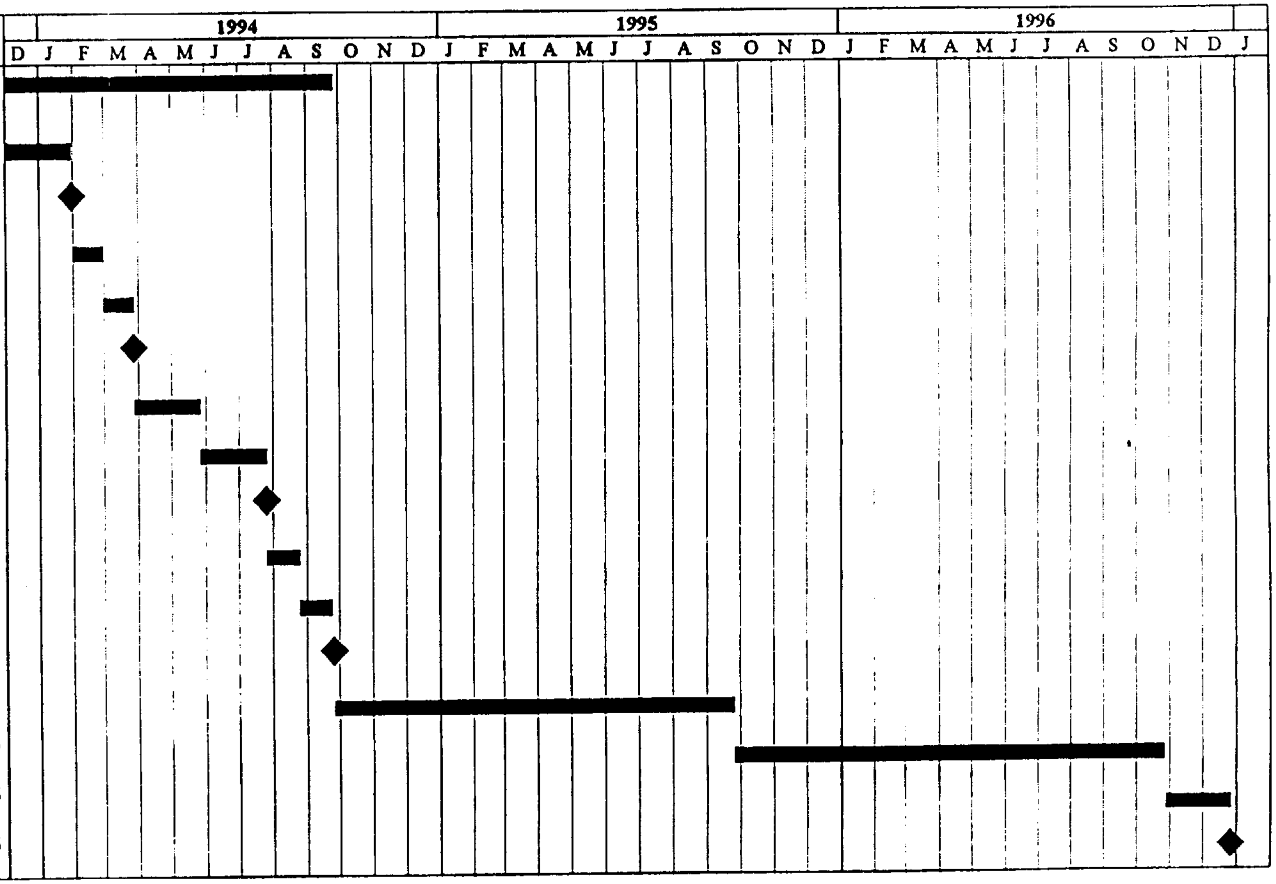
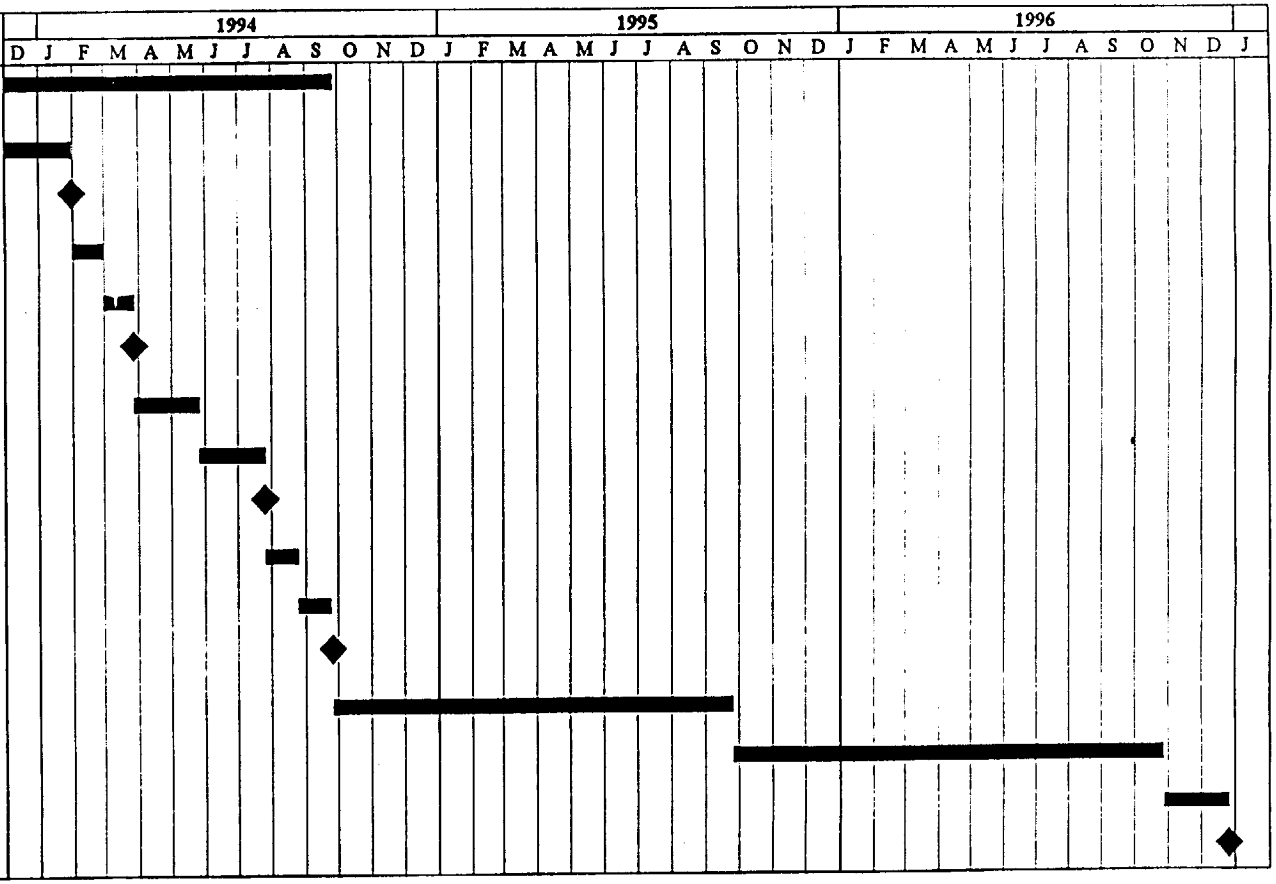


Table 4 - 12 Site Management Schedule

Site 3 (Operable Unit No. 12), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	213d	12/1/93	9/26/94
Prepare Prelim Draft RI/FS Project Plans	60ed	12/1/93	1/30/94
Submit Prelim Draft RI/FS Project Plans	0ed	1/31/94	1/31/94
LANTDIV Review	28ed	1/31/94	2/28/94
Prepare Draft RI/FS Project Plans	28ed	2/28/94	3/28/94
Submit Draft RI/FS Project Plans	0ed	3/28/94	3/28/94
Agency Review	60ed	3/28/94	5/27/94
Prepare Draft Final RI/FS Project Plans	60ed	5/27/94	7/26/94
Submit Draft Final RI/FS Project Plans	0ed	7/26/94	7/26/94
Agency Review	30ed	7/26/94	8/25/94
Prepare Final RI/FS Project Plans	30ed	8/25/94	9/24/94
Submit Final RI/FS Project Plans	0ed	9/26/94	9/26/94
RI/FS PRAP, and ROD (1)	365ed	9/26/94	9/26/95
Remedial Design (2)	397ed	9/26/95	10/27/96
Procure RA Contractor (2)	60ed	10/28/96	12/27/96
Begin Remedial Action (2)	0ed	12/27/96	12/27/96



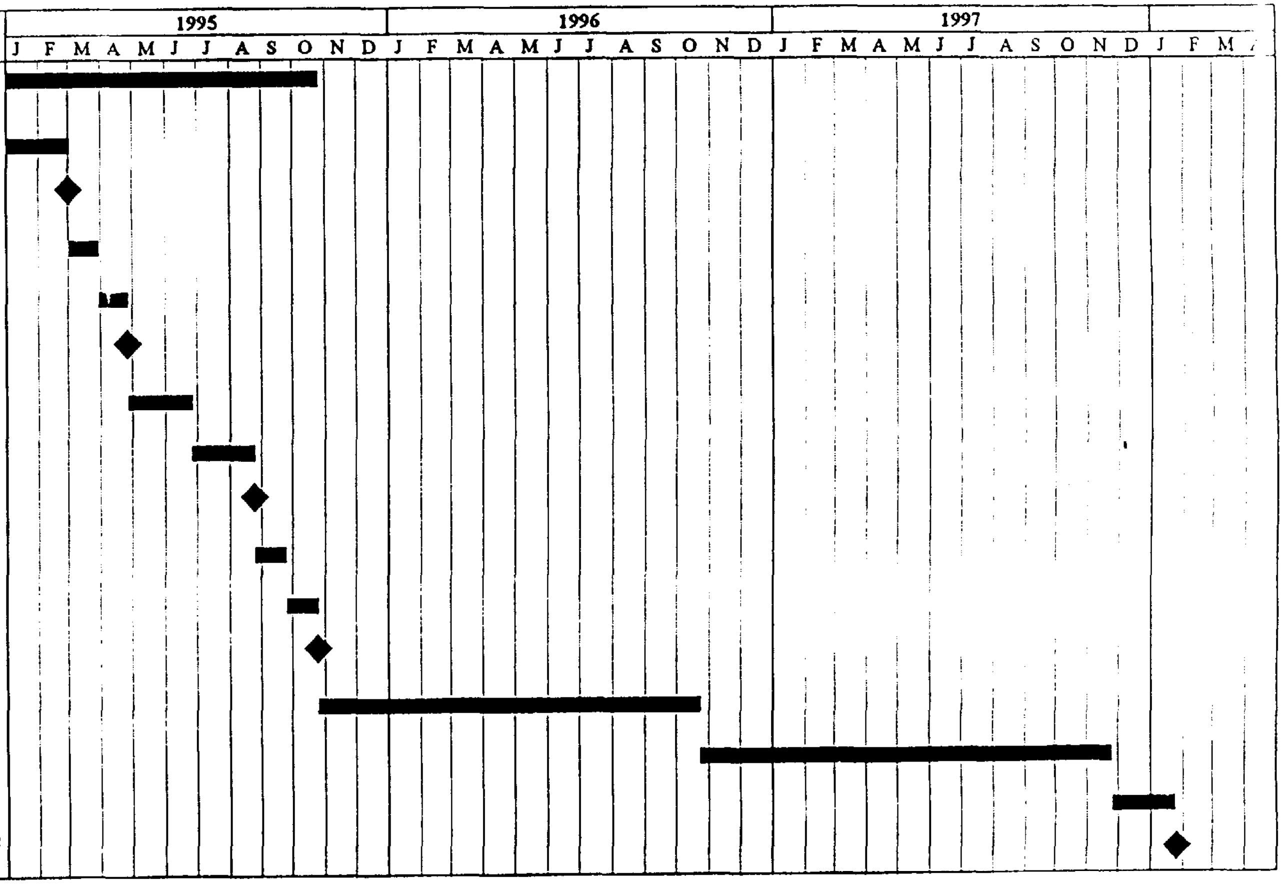
(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

(2) Remedial Design (RD) duration (15 months) is based on the requirement of Section 120(c)(2) of CERCLA. Actual RD Schedule will be established following the RI/FS.

Table 4 - 13 Site Management Schedule

Site 63 (Operable Unit No. 13), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	212d	1/1/95	10/25/95
Prepare Prelim Draft RI/FS Project Plans	60ed	1/1/95	3/2/95
Submit Prelim Draft RI/FS Project Plans	0ed	3/2/95	3/2/95
LANTDIV Review	28ed	3/2/95	3/30/95
Prepare Draft RI/FS Project Plans	28ed	3/30/95	4/27/95
Submit Draft RI/FS Project Plans	0ed	4/27/95	4/27/95
Agency Review	60ed	4/27/95	6/26/95
Prepare Draft Final RI/FS Project Plans	60ed	6/26/95	8/25/95
Submit Draft Final RI/FS Project Plans	0ed	8/25/95	8/25/95
Agency Review	30ed	8/25/95	9/24/95
Prepare Final RI/FS Project Plans	30ed	9/25/95	10/25/95
Submit Final RI/FS Project Plans	0ed	10/25/95	10/25/95
RI/FS PRAP, and ROD (1)	365ed	10/25/95	10/24/96
Remedial Design (2)	397ed	10/24/96	11/25/97
Procure RA Contractor (2)	60ed	11/25/97	1/24/98
Begin Remedial Action (2)	0ed	1/26/98	1/26/98



(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

(2) Remedial Design (RD) duration (15 months) is based on the requirement of Section 120(c)(2) of CERCLA. Actual RD Schedule will be established following the RI/FS.

Action. A listing of deliverables associated with Fiscal Year 1994 IRP activities are summarized on Table 4-14.

The project schedules for the 13 Operable Units reflect Government review times specified in the FFA and Navy/Marine Corps turnaround times. These review durations are as follows.

- Draft Primary Documents: 60 days to review and 60 days to prepare and submit the Draft Final document.

- Draft Final Primary Documents: 30 days to review and 30 days to finalize. Draft Final documents will become final if no comments are received within 30 days unless an extension is requested in accordance with the FFA.

The FFA does not address Preliminary Draft Documents, which are prepared by the Navy/Marine Corps for internal review only (i.e., reviewed only by the Navy/Marine Corps). The duration for reviewing Preliminary Draft Primary documents is 30 days. The duration for revising the Preliminary Draft document to a Draft document is also 30 days.

Project schedules for some RI/FS or RD/RA activities have been estimated at this time until the RI/FS Project Plans are completed or until the RI/FS is completed. For example, Operable Unit No. 10 is currently in the Project Planning stage. Therefore, the schedule for RI/FS activities is only an estimation since the field investigation duration is unknown at this time.

In addition, the project schedule for Remedial Design activities cannot be established until the RI/FS is completed. For remedial design activities, a project duration of 15 months has been established since Section 120(e)(2) of CERCLA requires that remedial action activities begin within 15 months following the Record of Decision.

TABLE 4-14

PRIMARY AND SECONDARY DOCUMENT SUBMITTALS FOR FISCAL YEAR 1994 MCB CAMP LEJEUNE, NORTH CAROLINA

Operable Unit	Site	Activity	Primary Document Submittals	Anticipated Submittal Date
1	21, 24 and 78	RI/FS	Draft RI	January 18, 1994
			Draft FS and PRAP	February 7, 1994
			Draft ROD	March 21, 1994
			Draft Final RI	April 30, 1994
			Draft Final FS and PRAP	May 20, 1994
			Draft Final ROD	June 19, 1994
			Final RI	June 27, 1994
			Final FS and PRAP	July 17, 1994
			Final ROD	August 18, 1994
2	6, 9, and 82	RI/FS	Draft RD Work Plan	January 1, 1994
			Draft Final RD Work Plan	May 5, 1994
			Final RD Work Plan	July 4, 1994
			30 Percent Design	September 5, 1994
4	41, 69, and 74	RI/FS	Draft Final RI/FS Project Plans	October 8, 1993
			Final RI/FS Project Plans	November 28, 1993
			Draft RI	September 14, 1994
5	2	RI/FS	Draft RI	December 22, 1993
			Draft FS and PRAP	December 29, 1993
			Draft ROD	February 16, 1994
			Draft Final RI	April 14, 1994
			Draft Final FS and PRAP	April 28, 1994
			Draft Final ROD	June 16, 1994
			Final RI	June 13, 1994
			Final FS and PRAP	June 27, 1994
			Final ROD	August 15, 1994

TABLE 4-14
(Continued)
PRIMARY AND SECONDARY DOCUMENT SUBMITTALS FOR FISCAL YEAR 1994
MCB CAMP LEJEUNE, NORTH CAROLINA

Operable Unit	Site	Activity	Primary Document Submittals	Anticipated Submittal Date
6	36, 43, 44, 54, and 86	RI/FS Project Plans	Draft RI/FS Project Plans	June 7, 1994
7	1, 28, and 30	RI/FS Project Plans	Draft Final RI/FS Project Plans	October 27, 1993
			Final RI/FS Project Plans	December 26, 1993
			Draft RI Report	September 12, 1994
8	16	RI/FS Project Plans	Draft RI/FS Project Plans	March 15, 1994
			Draft Final RI/FS Project Plans	July 13, 1994
			Final RI/FS Project Plans	September 11, 1994
9	65 and 73	RI/FS Project Plans	Draft RI/FS Project Plans	July 26, 1994
10	35	RI/FS Project Plans	Draft Final RI/FS Project Plans	December 27, 1993
			Final RI/FS Project Plans	February 25, 1994
			Draft RI Report	September 20, 1994
10	35	IRA	Draft Final IRA Project Plans	October 8, 1993
			Final IRA Project Plans	December 1, 1993
			Draft RI/FS/PRAP	April 13, 1994
			Draft Final RI/FS/PRAP	June 12, 1994
			Draft ROD	June 12, 1994
			Final RI/FS/PRAP	July 24, 1994
			Draft Final ROD	August 2, 1994
			Final ROD	September 6, 1994

Notes:

(1) Submittal of Draft Final Reports are based on a Government review period of 60 days. The actual submittal date will be in proportion to the increase or decrease of review calendar days.

(2) Draft Final Reports are Final if no Government comments are received within 30 days.

(3) Based on a Government review period of 30 days.

TABLE 4-14
(Continued)
PRIMARY AND SECONDARY DOCUMENT SUBMITTALS FOR FISCAL YEAR 1994
MCB CAMP LEJEUNE, NORTH CAROLINA

Operable Unit	Site	Activity	Primary Document Submittals	Anticipated Submittal Date
11	7 and 80	None	Draft RI/FS Project Plans	March 28, 1994
			Draft Final RI/FS Project Plans	July 26, 1994
			Final RI/FS Project Plans	September 26, 1994
12	3	None	Draft RI/FS Project Plans	September 26, 1994
			Draft Final RI/FS Project Plans	July 26, 1994
			Final RI/FS Project Plans	September 26, 1994
13	63	None	None	--

Notes:

(1) Submittal of Draft Final Reports are based on a Government review period of 60 days. The actual submittal date will be in proportion to the increase or decrease of review calendar days.

(2) Draft Final Reports are Final if no Government comments are received within 30 days.

(3) Based on a Government review period of 30 days.

5.0 SITE INSPECTION

5.1 Introduction

This section identifies Fiscal Year 1994-1998 IRP activities for sites scheduled for Site Inspections (SIs). It is important to note that these SI sites are not required to adhere to the same reporting requirements as defined in the Camp Lejeune Federal Facilities Agreement for RI/FS sites. If these sites warrant further investigation based on the SI results, the sites will be added to the FFA list of RI/FS sites (e.g., Sites 3, 7, 43, 44, 54, 63, 65, 80, and 82 were added to this SMP as RI/FS sites).

5.2 Sites

The list of sites at MCB Camp Lejeune that require Site Inspections to determine whether additional RI/FS activities are needed is shown in Table 5-1.

Following are brief descriptions of the sites where SIs are being conducted or are scheduled to be performed.

5.2.1 Site 12 - Explosive Ordnance Disposal (G-4A)

Site 12 covers approximately 8 to 10 acres. During the early 1960s, ordnance was disposed of by burning or exploding when it was found to be inert, unserviceable, or defective. Materials disposed of included ordnance, colored smokes, and white phosphorous. Any undestroyed residues were typically less than 1 pound.

5.2.2 Site 68 - Rifle Range Dump

The Rifle Range Dump is located west of Range Road approximately 2,000 feet west of the Rifle Range water treatment plant and 800 feet east of Stone Creek. This 3- to 4-acre area was used as a disposal site for various types of wastes, including garbage, building debris, waste treatment sludge, and solvents. The fill lies within a 30- to 40-acre area that showed, in aerial photographs, signs of previous disturbance. However, this disturbance may be related to logging activities. The depth of the fill area is approximately 10 feet, and the amount of material deposited has been estimated to be 100,000 cubic yards. An estimated 2,000 gallons of waste solvents were reportedly deposited.

TABLE 5-1

REPORTED DISPOSAL SITES REQUIRING SITE INSPECTIONS
MCB CAMP LEJEUNE, NORTH CAROLINA

Site No.	Site Description	Dates Used	Material Deposited
12	Exposure Ordnance Disposal (EOD) (G-4)	Early 1960s	Ordnance burned or exploded, colored smokes, white phosphorus
68	Rifle Range Dump	1942-1972	Solvents, WTP sludge, construction materials
75	MCAS Basketball Court Site	Early 1950s	Training agents (CN, CNC, CNB, and/or CNS)
76	MCAS Curtis Road Site	1949	Training agents (CN, CNC, CNB, and/or CNS)
84	Building 45 Area	1940s - Unknown	Capacitors, transformers, and construction debris
85	Camp Johnson Battery Dump	1950s	Batteries, charcoal canisters
A	MCAS Officer's Housing Area	Unknown	Hospital wastes

This currently inactive landfill was utilized as a disposal facility for a period of 30 years from 1942 to 1972. The major concern is the potential for waste solvents to affect the groundwater quality beneath the site. Organic compounds were identified in the potable supply wells RR-45 and RR-97. Even though these wells are located upgradient from the site, it was suspected that continuous pumping of the wells may have drawn contaminants to the wells.

5.2.3 Site 75 - MCAS Basketball Court Site

The MCAS Basketball Court Site is located along the north side of Curtis Road. This AOC was reportedly a drum burial area that was used on at least one occasion in the early 1950s. The excavation as seen in an aerial photograph was an oval shaped pit approximately 90 feet long by 70 feet wide and was sufficiently deep to have encountered the water table. An estimated 75 to 100 55-gallon drums were placed in this pit. The drums reportedly contained a chloroacetophenone tear gas solution used for training. Additional organic chemicals, such as chloroform, carbon tetrachloride, benzene, and chloropicrin, may have been present in the solution. Degradation of the drums could have resulted in the release of the suspected materials into the groundwater. This was of particular concern due to the proximity of several water supply wells in the area, two of them being within 500 feet of the alleged disposal site.

5.2.4 Site 76 - MCAS Curtis Road Site

The MCAS Curtis Road Site is located in the vicinity of and along the north side of Curtis Road. The precise location of the site is unknown, and two possible locations have been identified based on interviews and aerial photography. This alleged dump site was reportedly used as a drum disposal area on two occasions in 1949. The estimated area of the disposal unit is 1/4 acre and approximately 25 to 75 55-gallon drums were allegedly involved. It is believed that the drums contained a chloroacetophenone tear gas agent similar to that allegedly buried in the MCAS Basketball Court Site (Site 75). Potential contaminants are chloroform, carbon tetrachloride, benzene, and chloropicrin.

5.2.5 Site A - MCAS (H) Officer's Housing Area

The MCAS (H) Officers' Housing Area site is located on the west bank of the New River. This area was identified during the second round of sampling conducted in 1986. Waste was identified eroding out of a cut bank along the New River in the vicinity of an officers' housing area. The materials were tentatively identified as hospital wastes. Various hospital waste materials were noted, including hypodermic needles and vials of white powder that were believed to contain a chlorine-based substance. No information was available regarding the volume of the waste or the mode of disposal.

5.2.6 Site 84 - Building 45 Area

The Building 45 Area site is located adjacent to Highway 24 and Northeast Creek just prior to the main entrance to MCB Camp Lejeune. The property and structure was purchased by the Marine Corps in 1942. Prior to 1942, this area was owned and operated by Tidewater Electric Company. MCB Camp Lejeune has no records concerning their operation and use of this area. Behind the building there is evidence of construction debris in the wooded area. This debris consist of concrete rubble, old power guide wires, and a recently removed capacitor.

5.2.7 Site 85 - Camp Johnson Battery Dump

The Camp Johnson Battery Dump was recently discovered off Wilson Drive in the Montford Point Area during road repairs. Decomposed batteries, which were used in military communication equipment during the Korean era, were unearthed as a roadway was being widened. Military personnel utilizing this area also discovered discarded charcoal canisters from old air purifying respirators. The discarded battery packs and charcoal canisters were observed in piles, randomly located throughout a 2 to 3 acre area.

5.3 Scope of Work

During Fiscal Year 1992 and Fiscal Year 1993, SIs were initiated by preparing SI Project Plans (Work Plan, Sampling and Analysis Plan, and Health and Safety Plan) and conducting the field investigations for Sites 3, 7, 43, 44, 54, 63, 65, 80, and 82. The Draft SI Reports were submitted in Fiscal Year 1993. Based on the results, all nine sites were added to the list of RI/FS sites due to either soil or groundwater contamination.

Site inspections at Sites A, 12, 68, 75, 76, 84, and 85 will begin in Fiscal Year 1994 with the preparation of SI Project Plans.

Most of the sites have been previously investigated in various stages of the NACIP Program, and there have been no sites identified that pose immediate threats to human health and the environment.

5.4 Site Management Schedules

Table 5-2 depicts the tentative schedule for site inspections. Based on the results of the SI, future RI/FS activities may be implemented. A summary of Fiscal Year 1994 deliverables is given in Table 5-3.

Table 5 - 2: Site Inspection Site Management Schedule

Sites A, 12, 68, 75, 76, 84, and 85 - MCB Camp Lejeune, NC

Task	Days	Start	Finish
SI Project Plans	**212d**	**9/21/93**	**7/14/94**
Prepare Prelim Draft SI Project Plans	58ed	9/21/93	11/18/93
Submit Prelim Draft SI Project Plans	0ed	11/18/93	11/18/93
LANTDIV Review	28ed	11/18/93	12/16/93
Prepare Draft SI Project Plans	30ed	12/16/93	1/15/94
Submit Draft SI Project Plans	0ed	1/15/94	1/15/94
Agency Review	60ed	1/15/94	3/16/94
Prepare Draft Final SI Proj Plans	60ed	3/16/94	5/15/94
Submit Draft Final SI Project Plans	0ed	5/15/94	5/15/94
Agency Review	30ed	5/15/94	6/14/94
Prepare Final SI Project Plans	30ed	6/14/94	7/14/94
Submit Final SI Project Plans	0ed	7/14/94	7/14/94

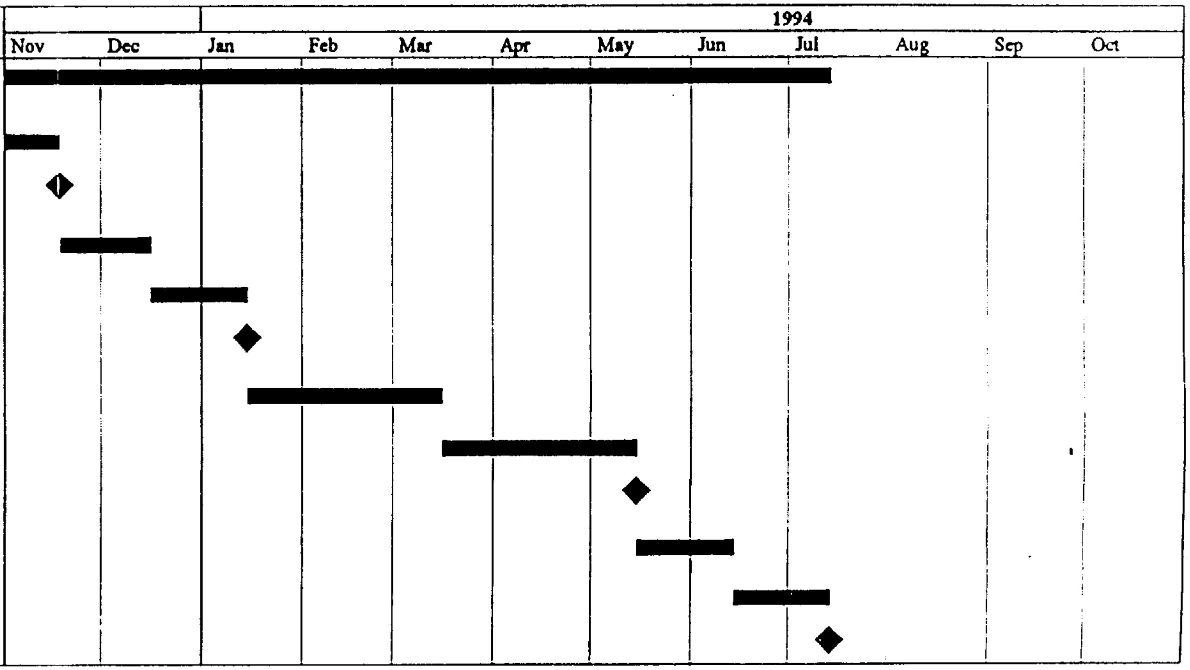


TABLE 5-3

SUMMARY OF FISCAL YEAR 1994 SUBMITTALS FOR SITE INSPECTION IRP SITES MCB CAMP LEJEUNE

Sites	Submittal Documents	Anticipated Submittal Date
A, 12, 68, 75, 76, 84, and 85	Preliminary Draft SI Project Plans	November 18, 1993
	Draft SI Project Plans	January 15, 1994
	Draft Final SI Project Plans	May 15, 1994
	Final SI Project Plans	July 14, 1994

6.0 REMOVAL/INTERIM REMEDIAL ACTIONS

Removal actions are taken to prevent immediate and substantial harm to human health. Examples are fencing, removal of aboveground drums, and removal of buried drums, if identified during geophysical surveys. Interim remedial actions are conducted to prevent a potential release of contaminants and/or further migration of contaminants.

A removal action will be conducted at Site 2 to remove approximately 1,700 cubic yards of soil contaminated with pesticides. The contaminated soils are adjacent to the former pesticide mixing area. The mixing area is located behind an administrative building along Holcomb Boulevard.

A removal action has been initiated at Site 6 to remove approximately 60 surface drums and buried drums at two areas of concern. The design phase of this removal action was initiated and completed in Fiscal Year 1993. The removal action is anticipated to be initiated in the first or second quarter of Fiscal Year 1994.

An Interim Remedial Action (IRA) design for the remediation of the shallow aquifer at Site 78 (Hadnot Point Industrial Area) was completed in Fiscal Year 1993 (August 1993). This IRA will be to pump and treat groundwater on site, then discharge the effluent to the Hadnot Point Industrial Area Sewage Treatment Plant (STP). Construction activities for this IRA are anticipated to begin in the first quarter of Fiscal Year 1994

Access restriction measures will be installed at Site 82, 44, and 74 since these sites may pose a danger to trespassers or military personnel.

The Navy will continue to identify possible removal/interim remedial actions as site investigations proceed.

7.0 REFERENCES

Baker, 1992. Draft Operable Unit Prioritization Report for MCB Camp Lejeune, North Carolina. April 24, 1992.

Camp Lejeune Federal Facility Agreement. February 1991.

ESE, 1990. Final Site Summary Report, MCB Camp Lejeune, North Carolina. September 1990.

Table 1: Expedited Site Management Schedule

Sites 21, 24, and 78 (Operable Unit No. 1), MCB Camp Lejeune, NC

Activity	Days	Start	Finish
Project Management	490ed	4/15/93	8/18/94
Subcontractor Procurement	30ed	4/16/93	5/16/93
Field Investigation	90ed	4/16/93	7/15/93
Mobilization	30ed	4/16/93	5/16/93
Surveying (Pre-Inv.)	5ed	5/10/93	5/15/93
Soil Gas Investigation	7ed	5/10/93	5/17/93
Soil Investigation	30ed	5/17/93	6/16/93
Groundwater Investigation	24ed	6/21/93	7/15/93
SW/SD Investigation	3ed	6/9/93	6/12/93
Surveying (Post-Inv.)	10ed	6/21/93	7/1/93
Sample Analysis/Validation	127ed	5/17/93	9/21/93
Data Evaluation	21ed	9/21/93	10/12/93
Risk Assessment	42ed	10/12/93	11/23/93
RI Report	186ed	10/12/93	4/16/94
Preliminary Draft RI Report	42ed	10/12/93	11/23/93
Comment Period	21ed	11/23/93	12/14/93
Draft RI	21ed	12/14/93	1/4/94
Comment Period	30ed	1/4/94	2/3/94
Draft Final RI Report	30ed	2/3/94	3/5/94
Comment Period	21ed	3/5/94	3/26/94
Final RI	21ed	3/26/94	4/16/94

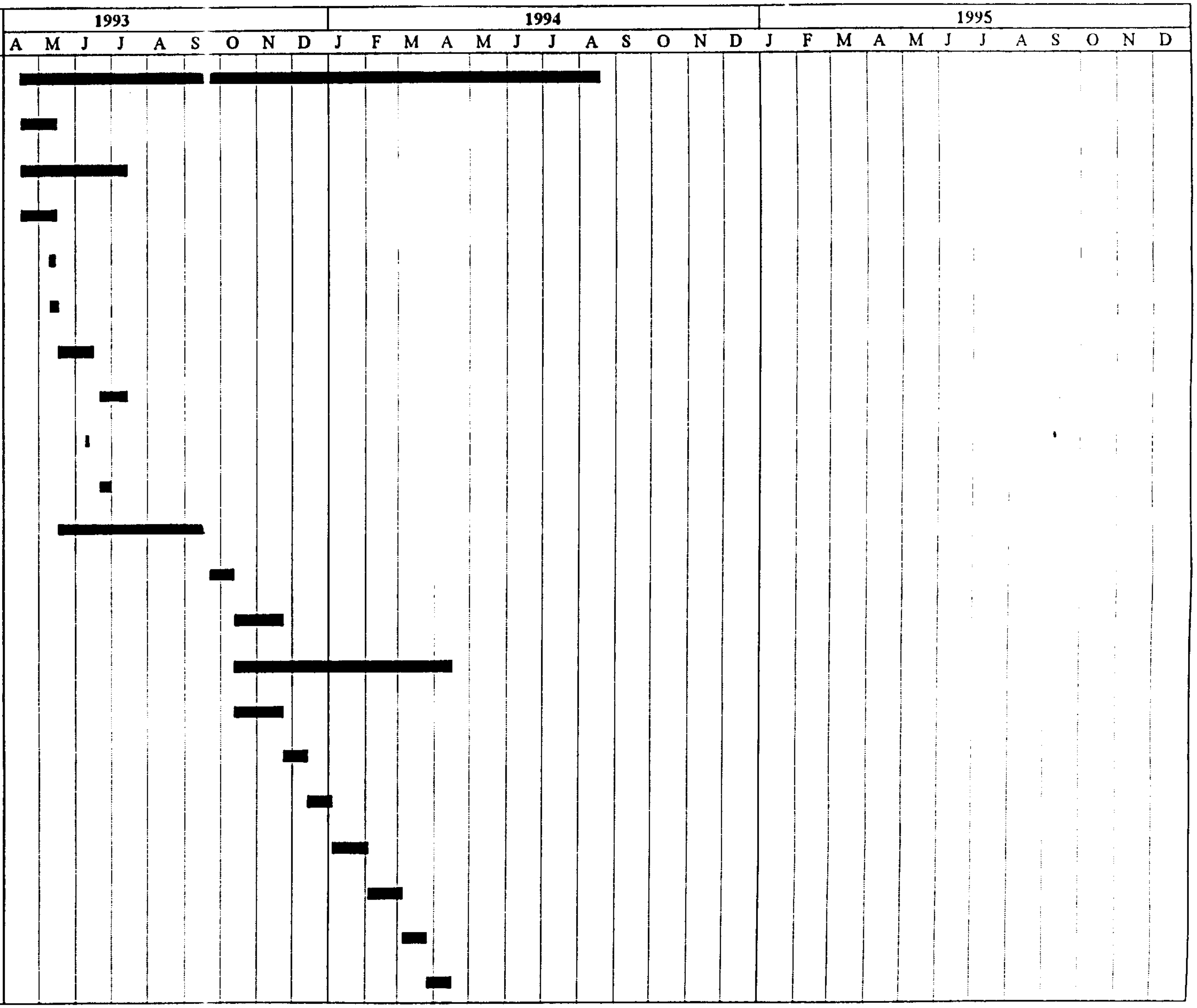


Table 1: Expedited Site Management Schedule

Sites 21, 24, and 78 (Operable Unit No. 1), MCB Camp Lejeune, NC

Activity	Days	Start	Finish
Alternative Screening	14ed	9/21/93	10/5/93
Alternative Evaluation	31ed	10/5/93	11/5/93
FS Report /PRAP	209ed	11/8/93	6/5/94
Preliminary Draft FS/PRAP	35ed	11/8/93	12/13/93
Comment Period	21ed	12/13/93	1/3/94
Draft FS/PRAP	21ed	1/3/94	1/24/94
Comment Period	30ed	1/24/94	2/23/94
Draft Final FS/PRAP	30ed	2/23/94	3/25/94
Comment Period	21ed	3/25/94	4/15/94
Final FS/PRAP	21ed	4/15/94	5/6/94
Public Comment Period	30ed	5/6/94	6/5/94
ROD	163ed	1/10/94	6/22/94
Preliminary Draft ROD	28ed	1/10/94	2/7/94
Comment Period	21ed	2/7/94	2/28/94
Draft ROD	21ed	2/28/94	3/21/94
Comment Period	30ed	3/21/94	4/20/94
Draft Final ROD	21ed	4/20/94	5/11/94
Comment Period	21ed	5/11/94	6/1/94
Final ROD	21ed	6/1/94	6/22/94
Remedial Design	305ed	6/22/94	4/23/95
Procure RA Contractor	60ed	4/23/95	6/22/95
Remedial Action	0ed	6/22/95	6/22/95

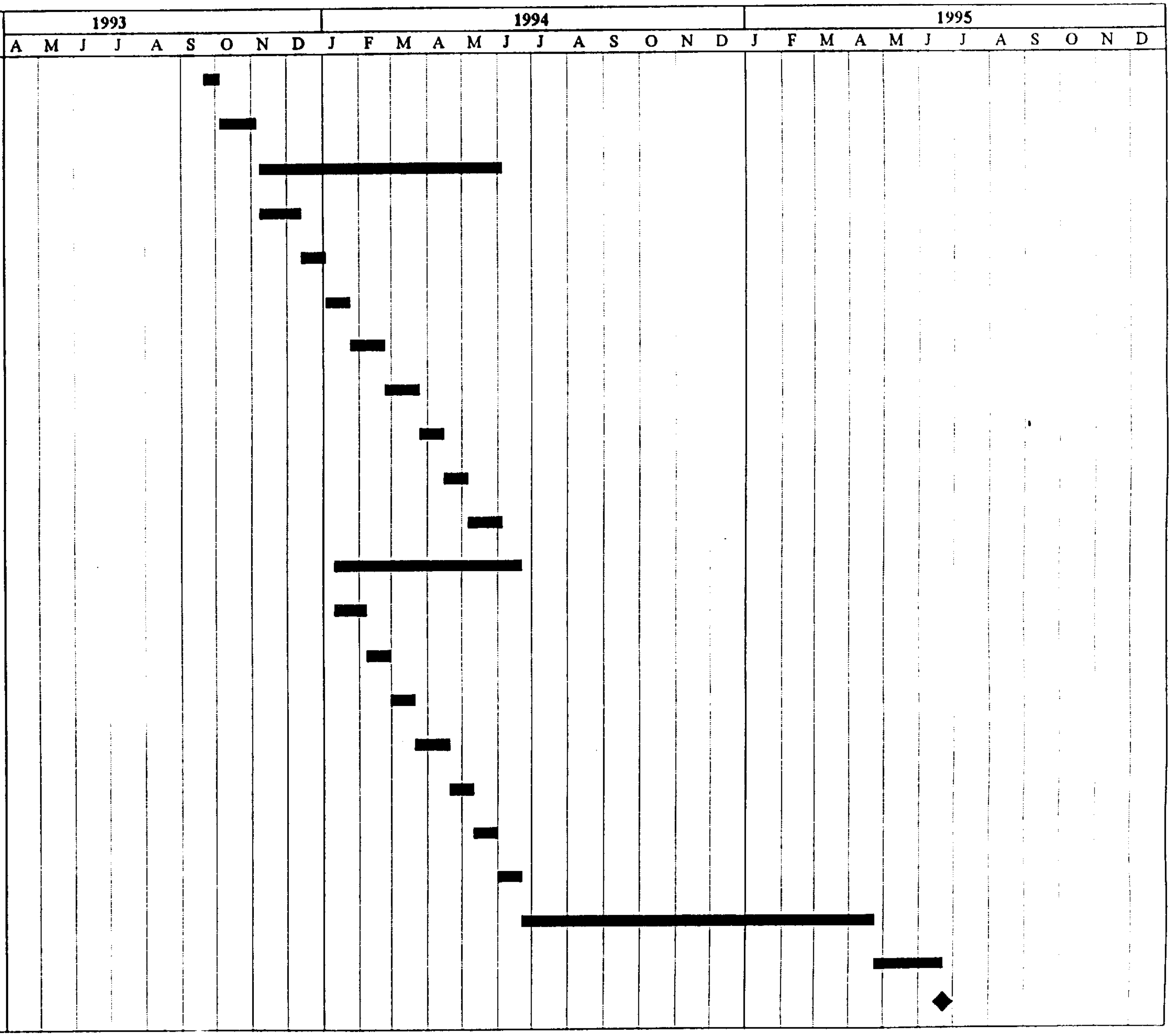


Table 2: Expedited Site Management Schedule

Sites 6 , 9 and 82 (Operable Unit No. 2), MCB Camp Lejeune, NC

Task	Days	Start	Finish
Prepare Draft RD Work Plan	35ed	12/1/93	1/5/94
Submit Draft RD Work Plan to Agencies	0ed	1/5/94	1/5/94
Agency Review	30ed	1/5/94	2/4/94
Prepare Draft Final RD Work Plan	30ed	2/4/94	3/6/94
Submit Draft Final RD Work Plan	0ed	3/7/94	3/7/94
Agency Review	21ed	3/7/94	3/28/94
Prepare Final RD Work Plan	21ed	3/28/94	4/18/94
Submit Final RD Work Plan	0ed	4/18/94	4/18/94
Conduct Treatability Study	42ed	4/18/94	5/30/94
Prepare 30 % Design / Draft Design Report / Draft RA	63ed	4/18/94	6/20/94
Submit 30 % Design / Draft Design Report / Draft RA	0ed	6/20/94	6/20/94
Agency Review	42ed	6/20/94	8/1/94
Prepare 90 % Design / Draft Final Design Report	42ed	8/1/94	9/12/94
Submit 90 % Design / Draft Final Design Report	0ed	9/12/94	9/12/94
Agency Review	21ed	9/12/94	10/3/94
Prepare Final Design / Final Design Report / Final RA Work	21ed	10/3/94	10/24/94
Submit Final Design / Final Design Report / Final RA Work	0ed	10/24/94	10/24/94
Procure Remediation Contractor	60ed	10/24/94	12/23/94
Begin Construction (Mobilization)	0ed	12/23/94	12/23/94

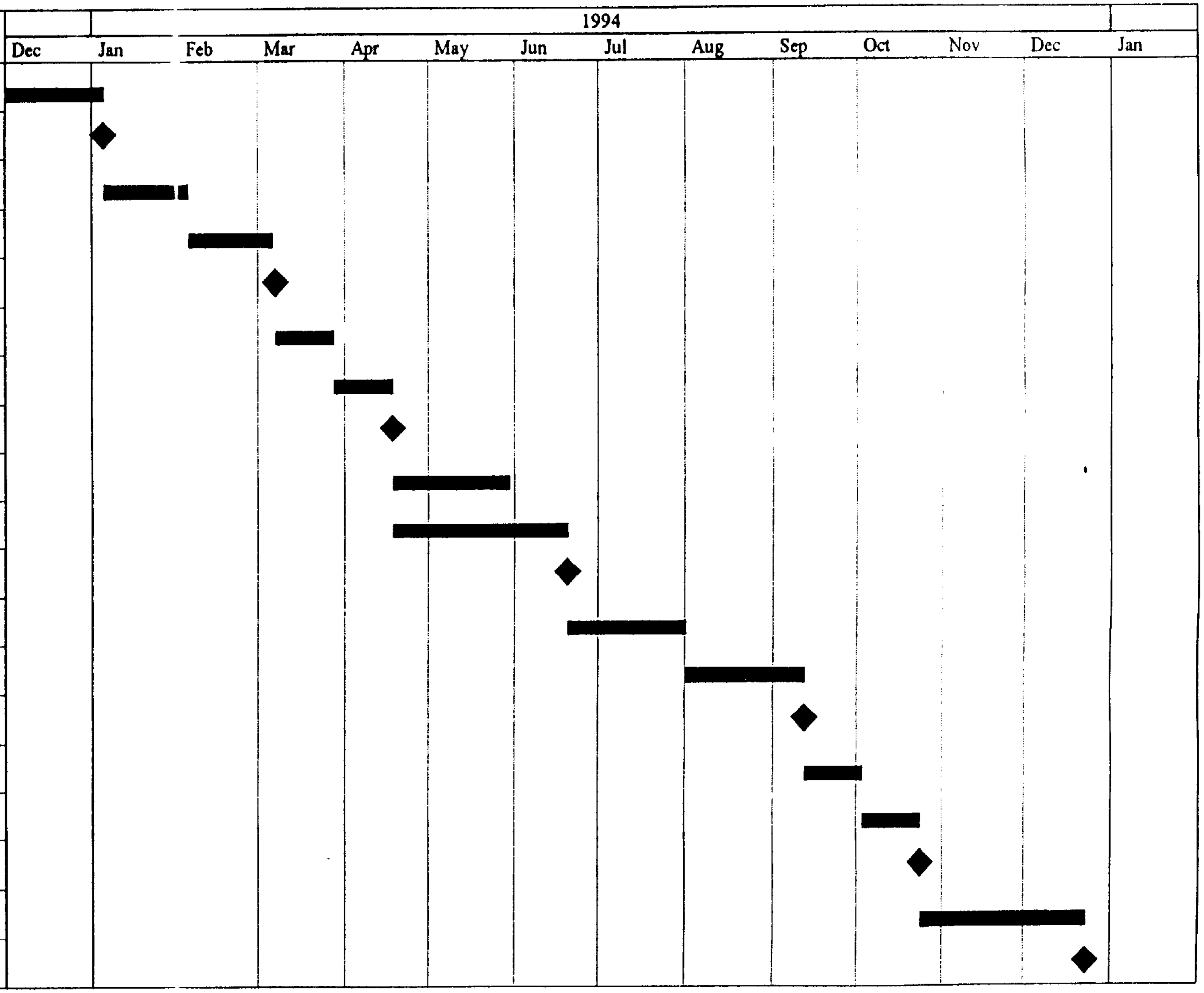


Table 3: Expedited Site Management Schedule

Sites 41, 69 and 74 (Operable Unit No. 4), MCB Camp Lejeune, NC

Task	Days	Start	Finish
Submit Draft Final RI/FS Project Plans	0ed	10/8/93	10/8/93
Agency Review	21ed	10/8/93	10/29/93
Prepare Final RI/FS Project Plans	21ed	10/29/93	11/19/93
Submit Final RI/FS Project Plan	0ed	11/19/93	11/19/93
RI Field Investigation	442ed	11/19/93	2/4/95
Mobilization	30ed	11/19/93	12/19/93
Field Investigation	60ed	12/19/93	2/17/94
Data Analysis/Validation	116ed	12/19/93	4/14/94
Data Evaluation	42ed	4/14/94	5/26/94
RI / RA	28ed	5/26/94	6/23/94
Prepare Preliminary Draft RI	42ed	5/26/94	7/7/94
Submit Preliminary Draft RI	0ed	7/7/94	7/7/94
LANTDIV Review	28ed	7/7/94	8/4/94
Prepare Draft RI	21ed	8/4/94	8/25/94
Submit Draft RI	0ed	8/25/94	8/25/94
Agency Review	30ed	8/25/94	9/24/94
Prepare Draft Final RI	30ed	9/24/94	10/24/94
Submit Draft Final RI	0ed	10/24/94	10/24/94
Agency Review	21ed	10/24/94	11/14/94
Prepare Final RI	21ed	11/14/94	12/5/94
Submit Final RI	0ed	12/5/94	12/5/94
Prepare Preliminary Draft FS	42ed	7/4/94	8/15/94
Submit Preliminary Draft FS	0ed	8/15/94	8/15/94
LANTDIV Review	28ed	8/15/94	9/12/94

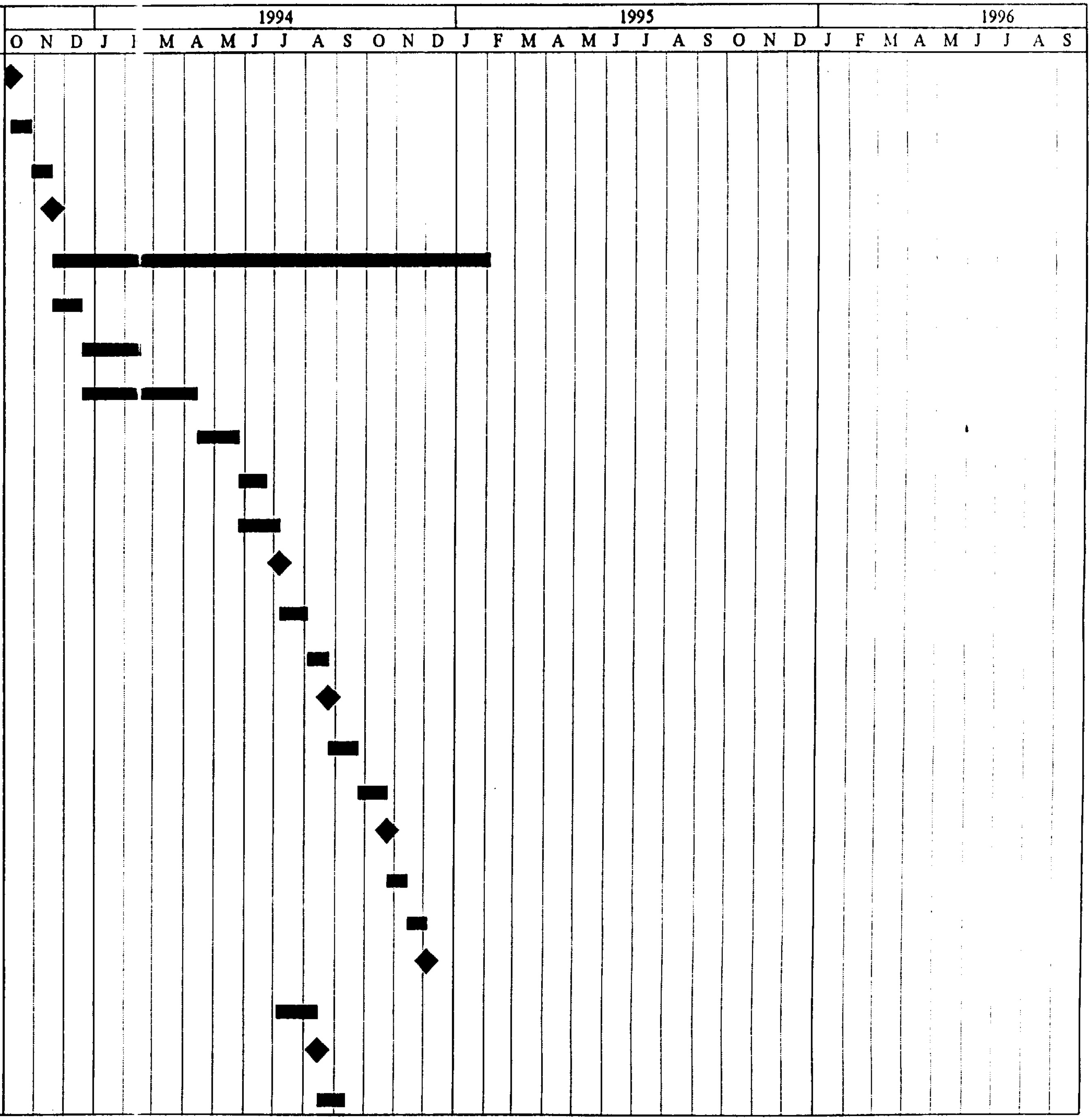
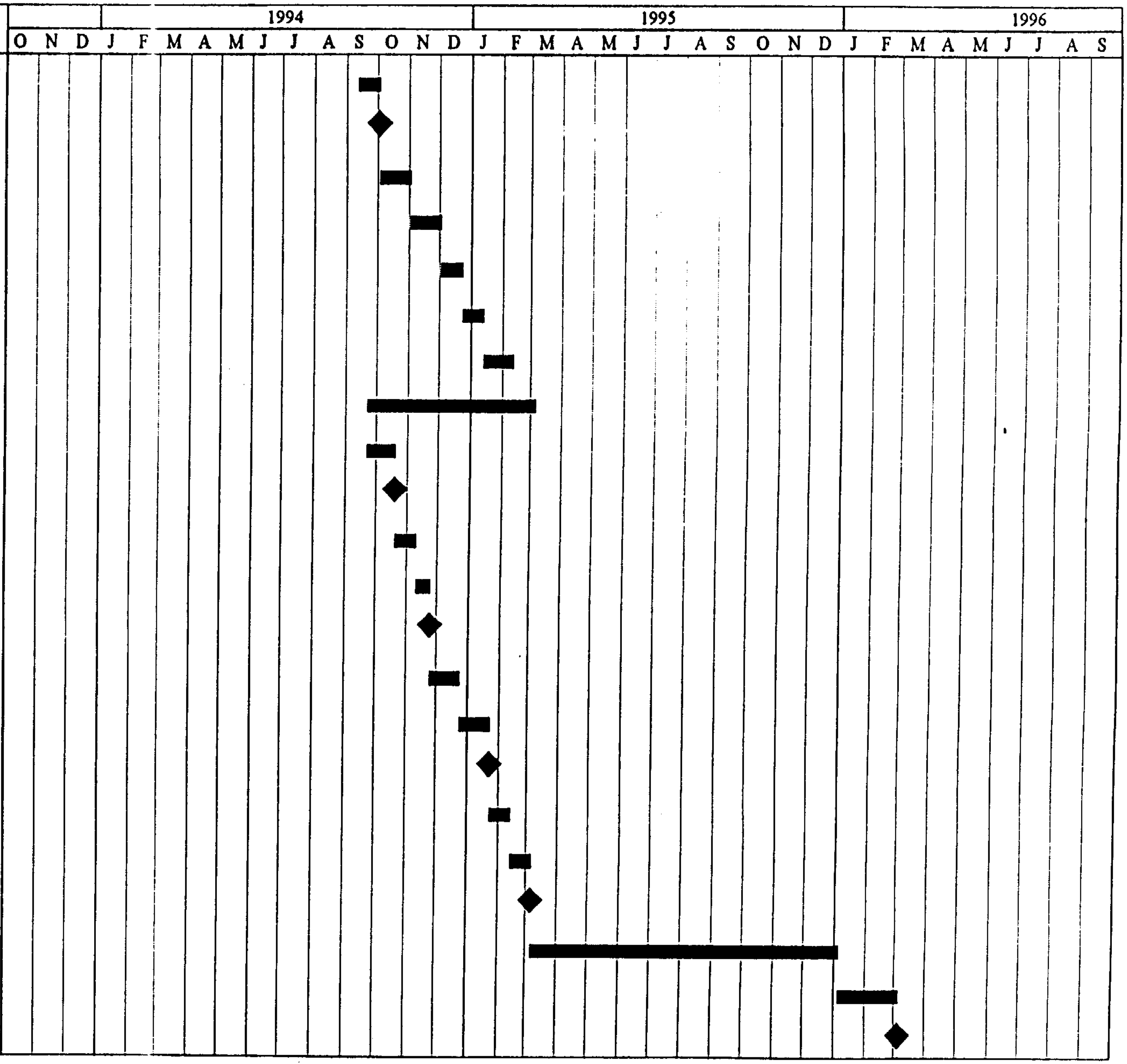


Table 3: Expedited Site Management Schedule

Sites 41, 69 and 74 (Operable Unit No. 4), MCB Camp Lejeune, NC

Task	Days	Start	Finish
Prepare Draft FS /PRAP	21ed	9/12/94	10/3/94
Submit Draft FS/PRAP	0ed	10/3/94	10/3/94
Agency Review	30ed	10/3/94	11/2/94
Prepare Draft Final FS/PRAP	30ed	11/2/94	12/2/94
Agency Review	21ed	12/2/94	12/23/94
Prepare Final FS/PRAP	21ed	12/23/94	1/13/95
Public Comment Period	30ed	1/13/95	2/12/95
ROD	165ed	9/22/94	3/6/95
Prepare Preliminary Draft ROD	28ed	9/22/94	10/20/94
Submit Preliminary Draft ROD	0ed	10/20/94	10/20/94
LANTDIV Review	21ed	10/20/94	11/10/94
Prepare Draft ROD	14ed	11/10/94	11/24/94
Submit Draft ROD	0ed	11/24/94	11/24/94
Agency Review	30ed	11/24/94	12/24/94
Prepare Draft Final ROD	30ed	12/24/94	1/23/95
Submit Draft Final ROD	0ed	1/23/95	1/23/95
Agency Review	21ed	1/23/95	2/13/95
Prepare Final ROD	21ed	2/13/95	3/6/95
Submit Final ROD	0ed	3/6/95	3/6/95
Remedial Design (1,2)	305ed	3/6/95	1/5/96
Procure RA Contractor (1,2)	60ed	1/5/96	3/5/96
Remedial Action (1,2)	0ed	3/5/96	3/5/96



(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

(2) Remedial Design (RD) duration (15 months) is based on the requirement of Section

Table 4 - 4: Site Management Schedule

Site 2 (Operable Unit No. 5), MCB Camp Lejeune, NC

Activity	Days	Start	Finish
Project Management	283d	4/15/93	5/16/94
Subcontractor Procurement	30ed	4/16/93	5/16/93
Field Investigation	41d	4/16/93	6/12/93
Mobilization	30ed	4/16/93	5/16/93
Surveying (Pre-Inv.)	5ed	5/10/93	5/15/93
Soil Investigation	24ed	5/17/93	6/10/93
Groundwater Investigation	5ed	5/28/93	6/2/93
SW/SD Investigation	2ed	5/24/93	5/26/93
Surveying (Post-Inv.)	2ed	6/1/93	6/3/93
Aquifer Tests	5ed	6/7/93	6/12/93
Sample Analysis/Validation	93ed	5/17/93	8/18/93
Data Evaluation	21ed	8/18/93	9/8/93
Risk Assessment	42ed	9/8/93	10/20/93
RI Report	193d	9/8/93	6/4/94
Preliminary Draft RI	49ed	9/8/93	10/27/93
Comment Period	21ed	10/27/93	11/17/93
Draft RI Report	21ed	11/24/93	12/15/93
Comment Period	30ed	12/22/93	1/21/94
Draft Final RI	30ed	2/20/94	3/22/94
Comment Period	21ed	4/14/94	5/5/94
Final RI Report	21ed	5/14/94	6/4/94

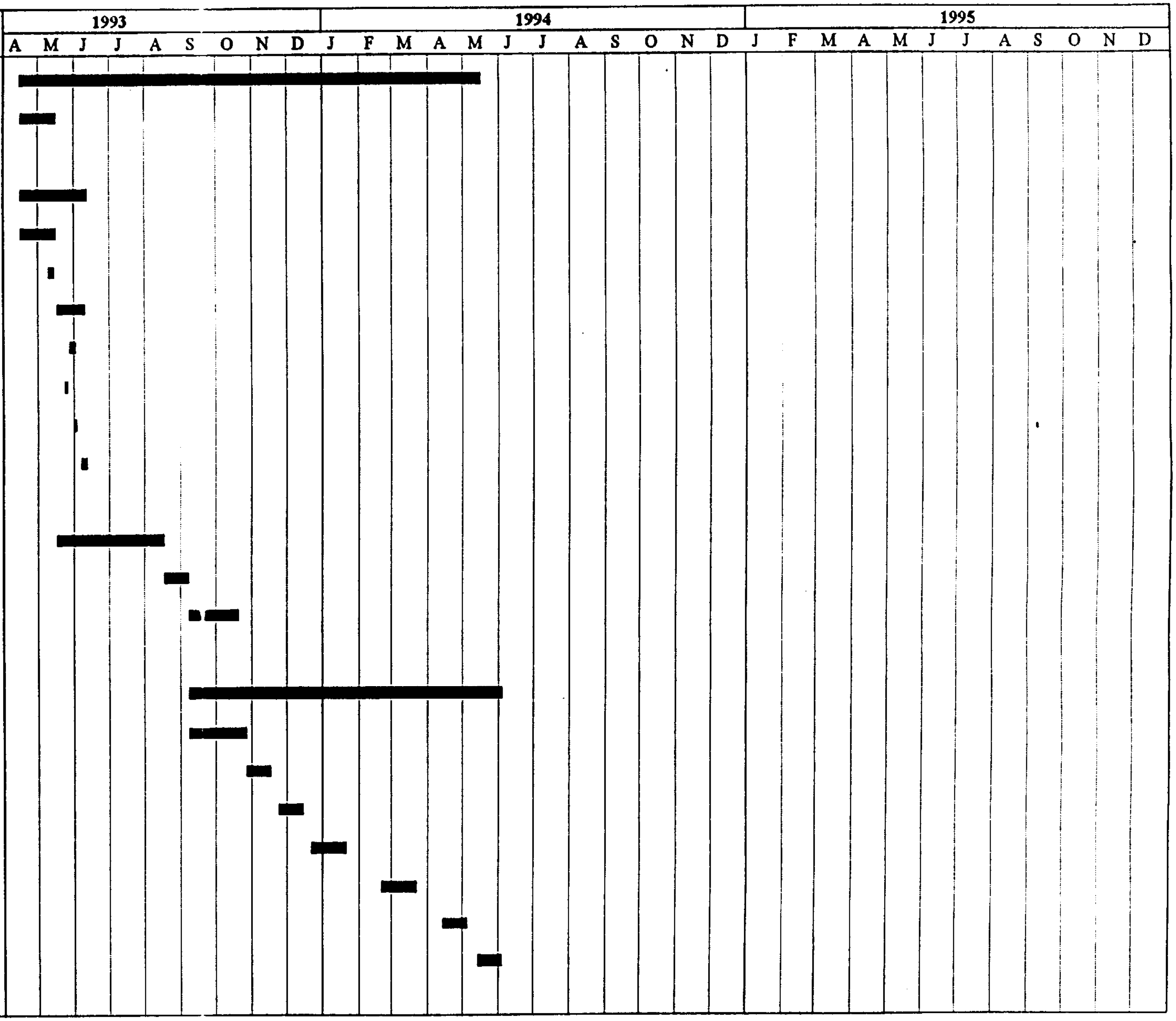


Table 4 - 4: Site Management Schedule

Site 2 (Operable Unit No. 5), MCB Camp Lejeune, NC

Activity	Days	Start	Finish
Alternative Screening	21ed	7/28/93	8/18/93
Alternative Evaluation	21ed	8/18/93	9/8/93
FS Report	169d	9/8/93	5/3/94
Preliminary Draft FS	56ed	9/8/93	11/3/93
Comment Period	28ed	11/3/93	12/1/93
Draft FS/PRAP	21ed	12/1/93	12/22/93
Comment Period	30ed	12/22/93	1/21/94
Draft Final FS/PRAP	30ed	1/21/94	2/20/94
Comment Period	21ed	2/20/94	3/13/94
Final FS/PRAP	21ed	3/13/94	4/3/94
Public Comment	30ed	4/3/94	5/3/94
ROD	102d	12/1/93	4/22/94
Preliminary Draft ROD	28ed	12/1/93	12/29/93
Comment Period	21ed	12/29/93	1/19/94
Draft ROD	14ed	1/19/94	2/2/94
Comment Period	30ed	2/2/94	3/4/94
Draft Final ROD	21ed	3/4/94	3/25/94
Comment Period	14ed	3/25/94	4/8/94
Final ROD	14ed	4/8/94	4/22/94
Remedial Design	305ed	4/22/94	2/21/95
Procure RA Contractor	60ed	2/21/95	4/22/95
Remedial Action	0ed	4/22/95	4/22/95

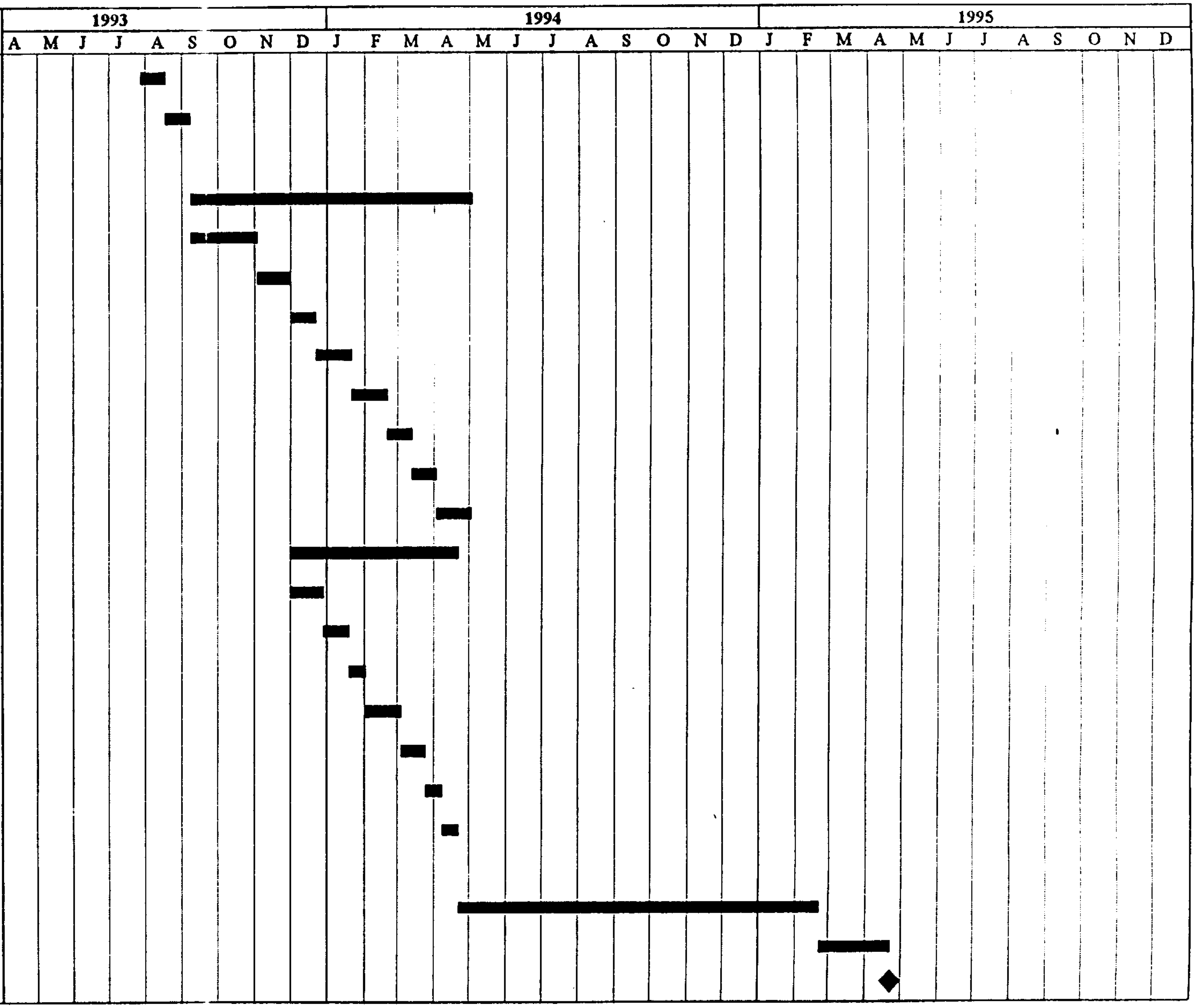
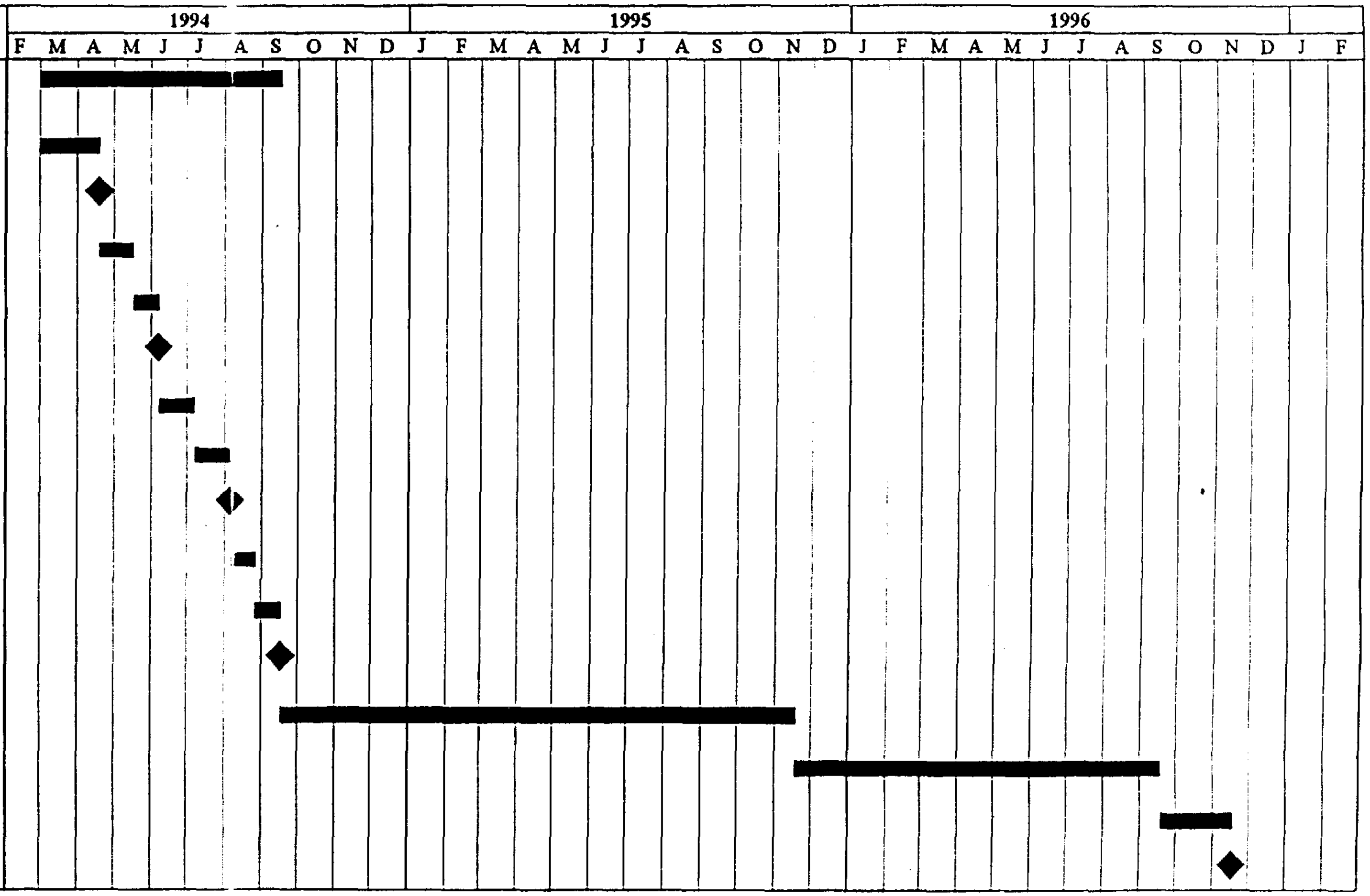


Table 5: Expedited Site Management Schedule

Sites 36, 43, 44, 54 and 86 (Operable Unit No. 6), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	144d	3/1/94	9/17/94
Prepare Prelim. Draft RI/FS Proj. Plans	49ed	3/1/94	4/19/94
Submit Prelim. Draft RI/FS Proj. Plans	0ed	4/19/94	4/19/94
LANTDIV Review	28ed	4/19/94	5/17/94
Prepare Draft RI/FS Project Plans	21ed	5/17/94	6/7/94
Submit Draft RI/FS Project Plans	0ed	6/7/94	6/7/94
Agency Review	30ed	6/7/94	7/7/94
Prepare Draft Final RI/FS Project Plans	30ed	7/7/94	8/6/94
Submit Draft Final RI/FS Project Plans	0ed	8/6/94	8/6/94
Agency Review	21ed	8/6/94	8/27/94
Prepare Final RI/FS Project Plans	21ed	8/27/94	9/17/94
Submit Final RI/FS Project Plans	0ed	9/17/94	9/17/94
RI/FS, PRAP, and ROD (1)	427ed	9/17/94	11/18/95
Remedial Design (2)	305ed	11/18/95	9/18/96
Procure RA Contractor (2)	60ed	9/18/96	11/17/96
Begin Remedial Action (2)	0ed	11/17/96	11/17/96



(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

(2) Remedial Design (RD) duration (15 months) is based on the requirement of Section 120(c)(2) of CERCLA. Actual RD Schedule will be established following the RI/FS.

Table 6: Expedited Site Management Schedule

Sites 1, 28, and 30 (Operable Unit No. 7), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	160d	3/1/93	10/9/93
Prepare Prelim Draft RI/FS Project Plans	60ed	3/1/93	4/30/93
Submit Prelim Draft RI/FS Project Plans	0ed	4/30/93	4/30/93
LANTDIV Review	30d	4/30/93	6/10/93
Prepare Draft RI/FS Project Plans	30ed	5/30/93	6/29/93
Submit Draft RI/FS Project Plans	0ed	6/29/93	6/29/93
Agency Review	30ed	6/29/93	7/29/93
Prepare Draft Final RI/FS Project Plans	30ed	7/29/93	8/28/93
Submit Draft Final RI/FS Project Plans	0ed	8/28/93	8/28/93
Agency Review	21ed	8/28/93	9/18/93
Prepare Final RI/FS Project Plans	21ed	9/18/93	10/9/93
Submit Final RI/FS Project Plans	0ed	10/9/93	10/9/93
Field Investigation	63ed	1/3/94	3/7/94
Sample Analysis / Validation	119ed	1/3/94	5/2/94
Data Evaluation	21ed	5/2/94	5/23/94
Risk Assessment	42ed	5/23/94	7/4/94
RI Report	144d	6/6/94	12/23/94
Preliminary Draft RI Report	42ed	6/6/94	7/18/94
Comment Period	28ed	7/18/94	8/15/94
Draft RI	28ed	8/15/94	9/12/94
Comment Period	30ed	9/12/94	10/12/94
Draft Final RI Report	30ed	10/12/94	11/11/94
Comment Period	21ed	11/11/94	12/2/94
Final RI	21ed	12/2/94	12/23/94

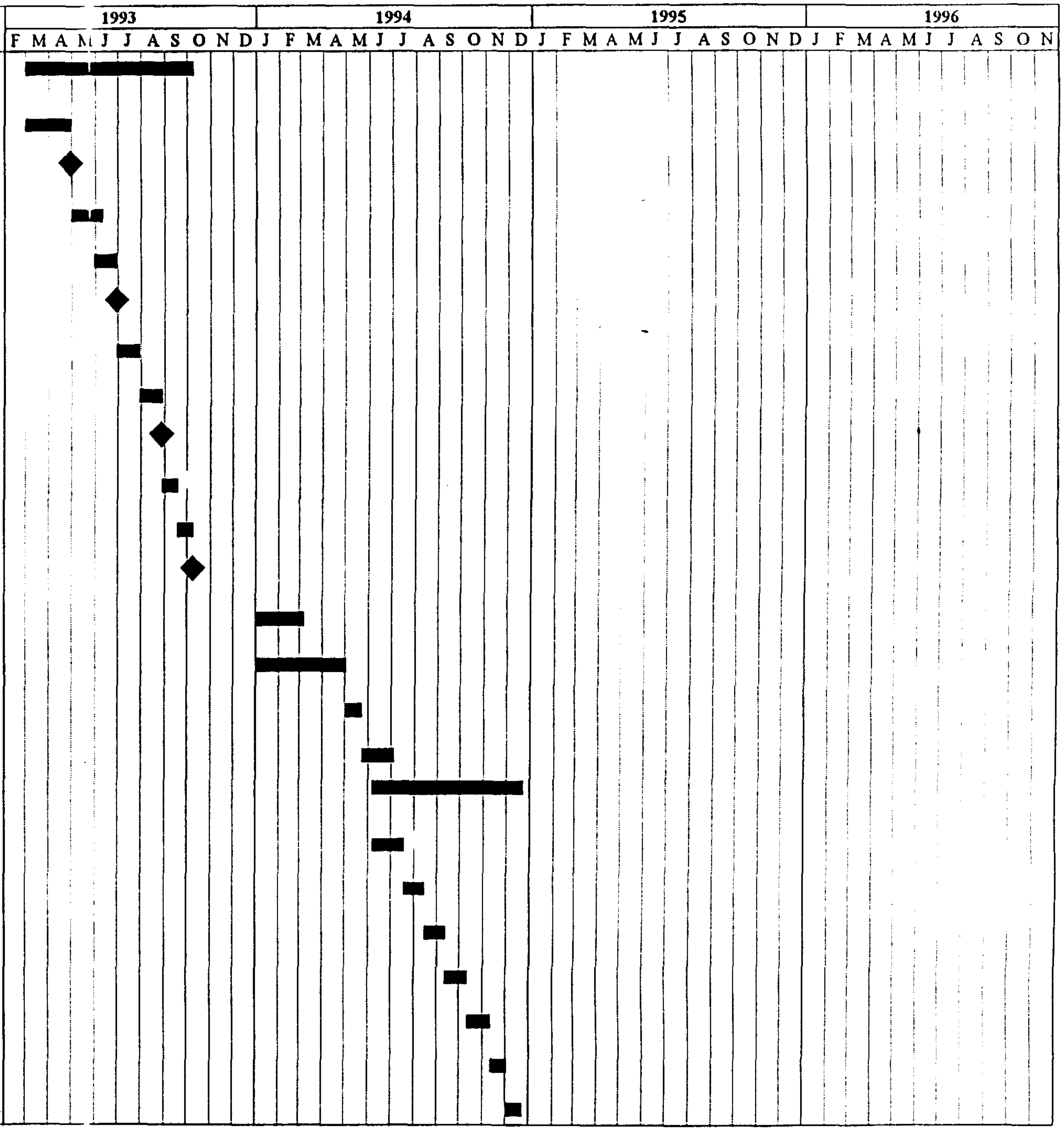
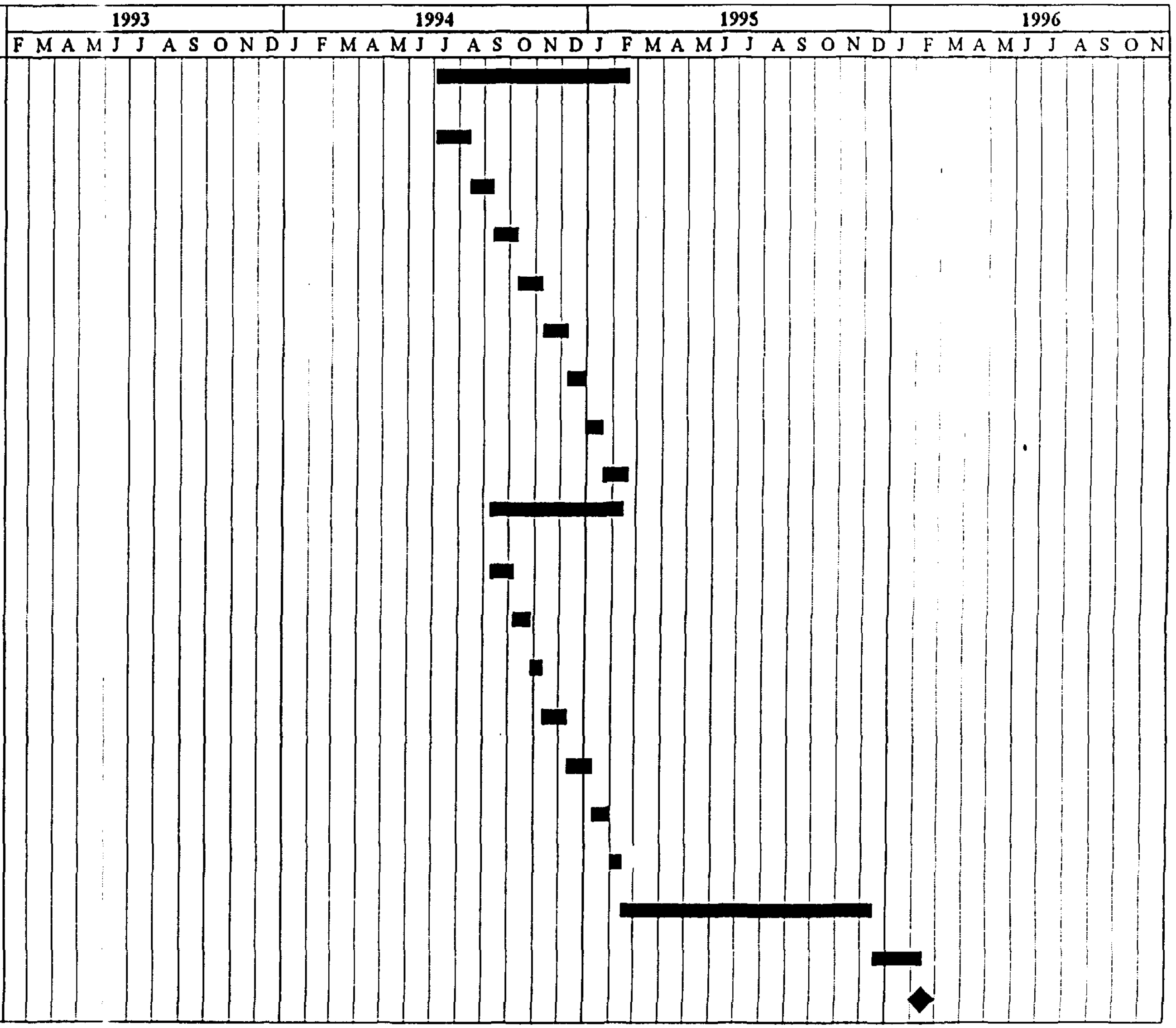


Table 6: Expedited Site Management Schedule

Sites 1, 28, and 30 (Operable Unit No. 7), MCB Camp Lejeune, NC

Task	Days	Start	Finish
FS Report / PRAP	165d	7/4/94	2/19/95
Preliminary Draft FS / PRAP	42ed	7/4/94	8/15/94
Comment Period	28ed	8/15/94	9/12/94
Draft FS / PRAP	28ed	9/12/94	10/10/94
Comment Period	30ed	10/10/94	11/9/94
Draft Final FS / PRAP	30ed	11/9/94	12/9/94
Comment Period	21ed	12/9/94	12/30/94
Final FS / PRAP	21ed	12/30/94	1/20/95
Public Comment Period	30ed	1/20/95	2/19/95
ROD	112d	9/9/94	2/14/95
Preliminary Draft ROD	28ed	9/9/94	10/7/94
Comment Period	21ed	10/7/94	10/28/94
Draft ROD	14ed	10/28/94	11/11/94
Comment Period	30ed	11/11/94	12/11/94
Draft Final ROD	30ed	12/11/94	1/10/95
Comment Period	21ed	1/10/95	1/31/95
Final ROD	14ed	1/31/95	2/14/95
Remedial Design (1,2)	305ed	2/14/95	12/16/95
Procure RA Contractor	60ed	12/16/95	2/14/96
Begin RA (1,2)	0ed	2/14/96	2/14/96



(1) Remedial Design/Remedial Action Schedules are estimates and will be established and detailed at the conclusion of RI/FS.

(2) Remedial Design (RD) duration (15 months) is based on the requirement of Section 120(c)(2) of CERCLA. Actual RD Schedule will be established following the RI/FS.

Table 7: Expedited Site Management Schedule

Site 16 (Operable Unit No. 8), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	146d	11/15/93	6/7/94
Prepare Prelim Draft RI/FS Project Plans	60ed	11/15/93	1/14/94
Submit Prelim Draft RI/FS Project Plans	0ed	1/14/94	1/14/94
LANTDIV Review	21ed	1/14/94	2/4/94
Prepare Draft RI/FS Project Plans	21ed	2/4/94	2/25/94
Submit Draft RI/FS Project Plans	0ed	2/25/94	2/25/94
Agency Review	30ed	2/25/94	3/27/94
Prepare Draft Final RI/FS Project Plans	30ed	3/27/94	4/26/94
Submit Draft Final RI/FS Project Plans	0ed	4/26/94	4/26/94
Agency Review	21ed	4/26/94	5/17/94
Prepare Final RI/FS Project Plans	21ed	5/17/94	6/7/94
Submit Final RI/FS Project Plans	0ed	6/7/94	6/7/94
RI/FS, PRAP, and ROD	427ed	6/7/94	8/8/95
Remedial Design	305ed	8/8/95	6/8/96
Procure RA Contractor	60ed	6/8/96	8/7/96
Begin Remedial Action	0ed	8/7/96	8/7/96

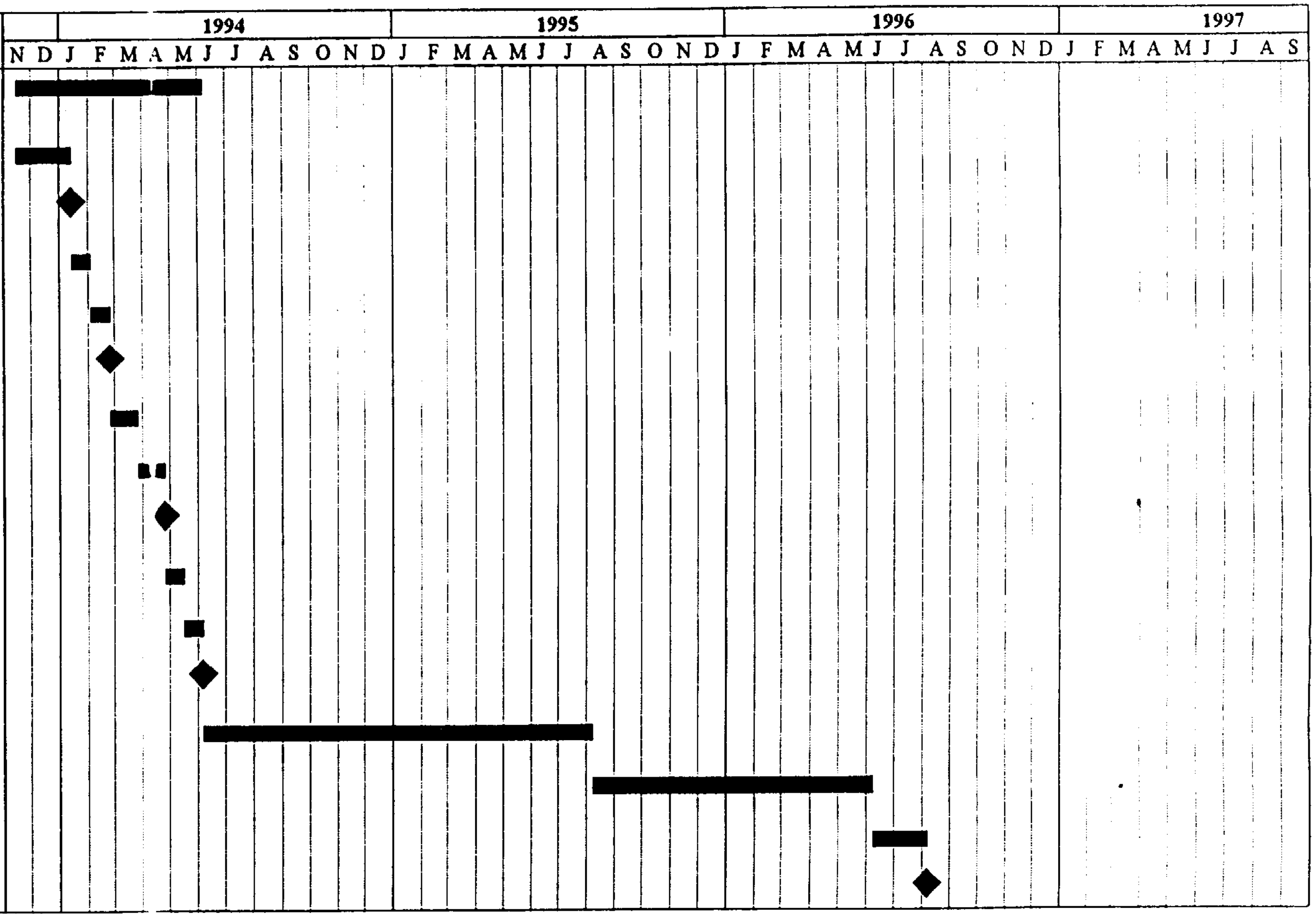


Table 8: Expedited Site Management Schedule

Sites 65 and 73 (Operable Unit No. 9), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	151d	4/1/94	10/29/94
Prepare Prelim Draft RI/FS Project Plans	60ed	4/1/94	5/31/94
Submit Prelim Draft RI/FS Project Plans	0ed	5/31/94	5/31/94
LANTDIV Review	28ed	5/31/94	6/28/94
Prepare Draft RI/FS Project Plans	21ed	6/28/94	7/19/94
Submit Draft RI/FS Project Plans	0ed	7/19/94	7/19/94
Agency Review	30ed	7/19/94	8/18/94
Prepare Draft Final RI/FS Project Plans	30ed	8/18/94	9/17/94
Submit Draft Final RI/FS Project Plans	0ed	9/17/94	9/17/94
Agency Review	21ed	9/17/94	10/8/94
Prepare Final RI/FS Project Plans	21ed	10/8/94	10/29/94
Submit Final RI/FS Project Plans	0ed	10/29/94	10/29/94
RI/FS PRAP, and ROD	427ed	10/29/94	12/30/95
Remedial Design	305ed	12/30/95	10/30/96
Procure RA Contractor	60ed	10/30/96	12/29/96
Begin Remedial Action	0ed	12/29/96	12/29/96

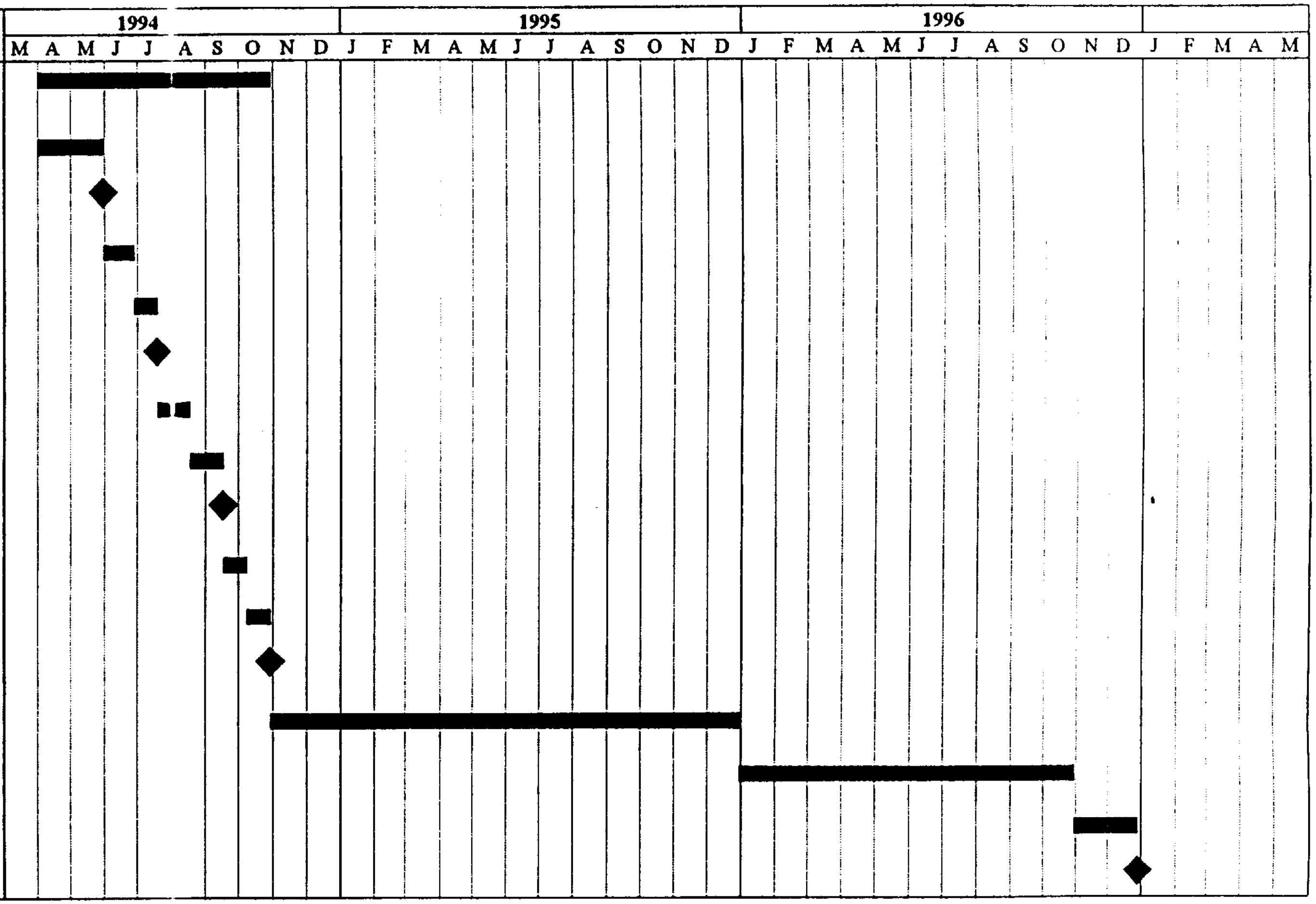


Table 9: Expedited Site Management Schedule

Site 35 (Operable Unit no. 10), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	180d	5/1/93	1/8/94
Prepare Prelim Draft RI/FS Project Plans	60ed	5/1/93	6/30/93
Submit Prelim Draft RI/FS Project Plans	0ed	6/30/93	6/30/93
LANTDIV Review	30ed	6/30/93	7/30/93
Prepare Draft RI/FS Project Plans	30ed	7/30/93	8/29/93
Submit Draft RI/FS Project Plans	0ed	8/29/93	8/29/93
Agency Review	60ed	8/29/93	10/28/93
Prepare Draft Final RI/FS Project Plans	30ed	10/28/93	11/27/93
Submit Draft Final RI/FS Project Plans	0ed	11/27/93	11/27/93
Agency Review	21ed	11/27/93	12/18/93
Prepare Final RI/FS Project Plans	21ed	12/18/93	1/8/94
Submit Final RI/FS Project Plans	0ed	1/8/94	1/8/94
Field Investigation	42ed	3/1/94	4/12/94
Sample Analysis/Validation	84ed	3/1/94	5/24/94
Data Evaluation	21ed	5/24/94	6/14/94
Risk Assessment	28ed	6/14/94	7/12/94
RI Report	144d	6/14/94	12/31/94
Preliminary Draft RI Report	42ed	6/14/94	7/26/94
Comment Period	28ed	7/26/94	8/23/94
Draft RI Report	28ed	8/23/94	9/20/94
Comment Period	30ed	9/20/94	10/20/94
Draft Final RI Report	30ed	10/20/94	11/19/94
Comment Period	21ed	11/19/94	12/10/94
Final RI	21ed	12/10/94	12/31/94

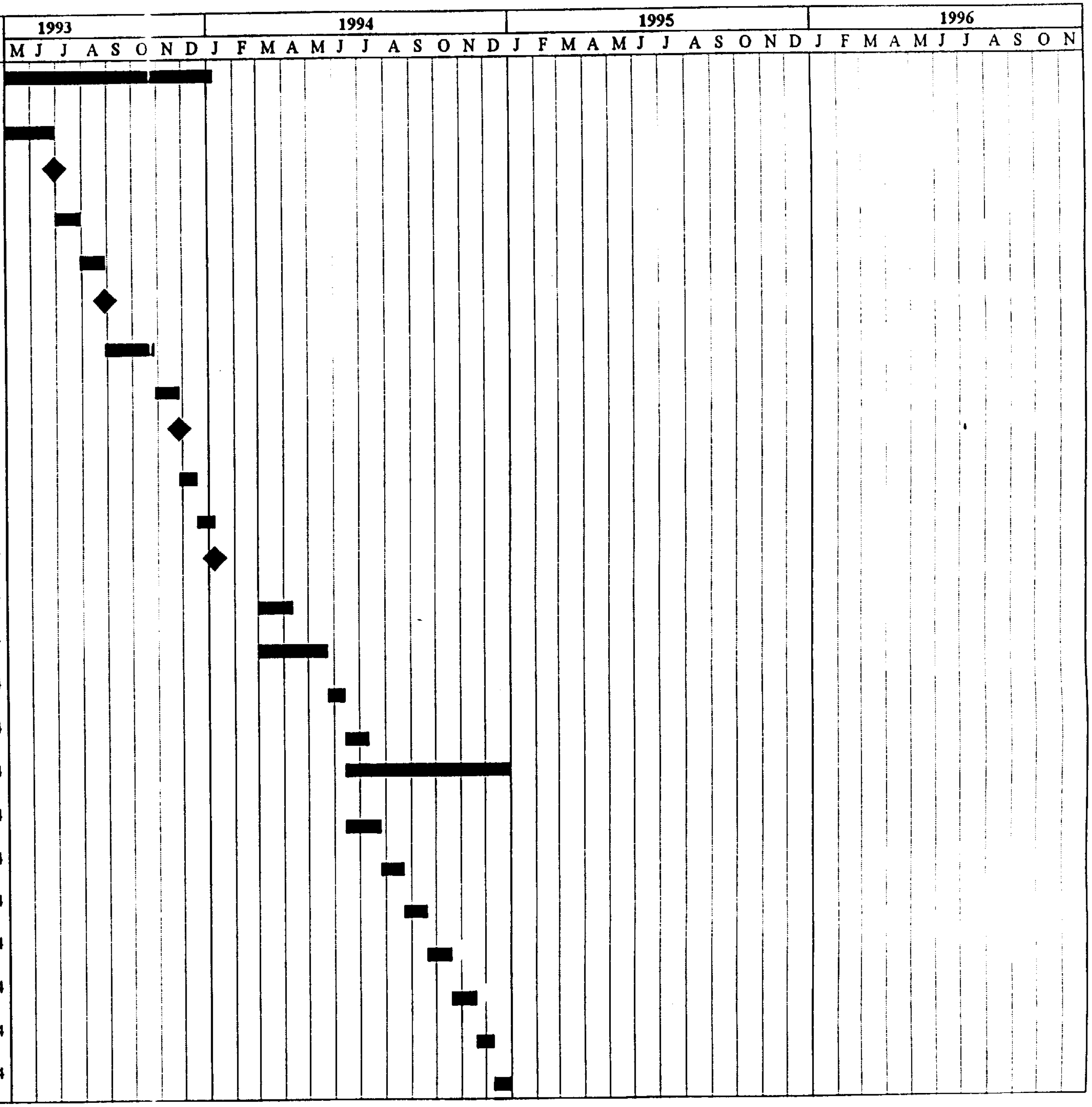


Table 9: Expedited Site Management Schedule

Site 35 (Operable Unit no. 10), MCB Camp Lejeune, NC

Task	Days	Start	Finish
FS Report/PRAP	139d	7/26/94	2/6/95
Preliminary Draft FS/PRAP	28ed	7/26/94	8/23/94
Comment Period	21ed	8/23/94	9/13/94
Draft FS/PRAP	21ed	9/13/94	10/4/94
Comment Period	30ed	10/4/94	11/3/94
Draft Final FS/PRAP	30ed	11/3/94	12/3/94
Comment Period	21ed	12/3/94	12/24/94
Final FS/PRAP	14ed	12/24/94	1/7/95
Public Comment Period	30ed	1/7/95	2/6/95
ROD	122d	10/1/94	3/22/95
Preliminary Draft ROD	28ed	10/1/94	10/29/94
Comment Period	28ed	10/29/94	11/26/94
Draft ROD	21ed	11/26/94	12/17/94
Comment Period	30ed	12/17/94	1/16/95
Draft Final ROD	30ed	1/16/95	2/15/95
Comment Period	21ed	2/15/95	3/8/95
Final ROD	14ed	3/8/95	3/22/95
Remedial Design	305ed	3/22/95	1/21/96
Procure RA Contractor	60ed	1/21/96	3/21/96
Begin RA	0ed	3/21/96	3/21/96

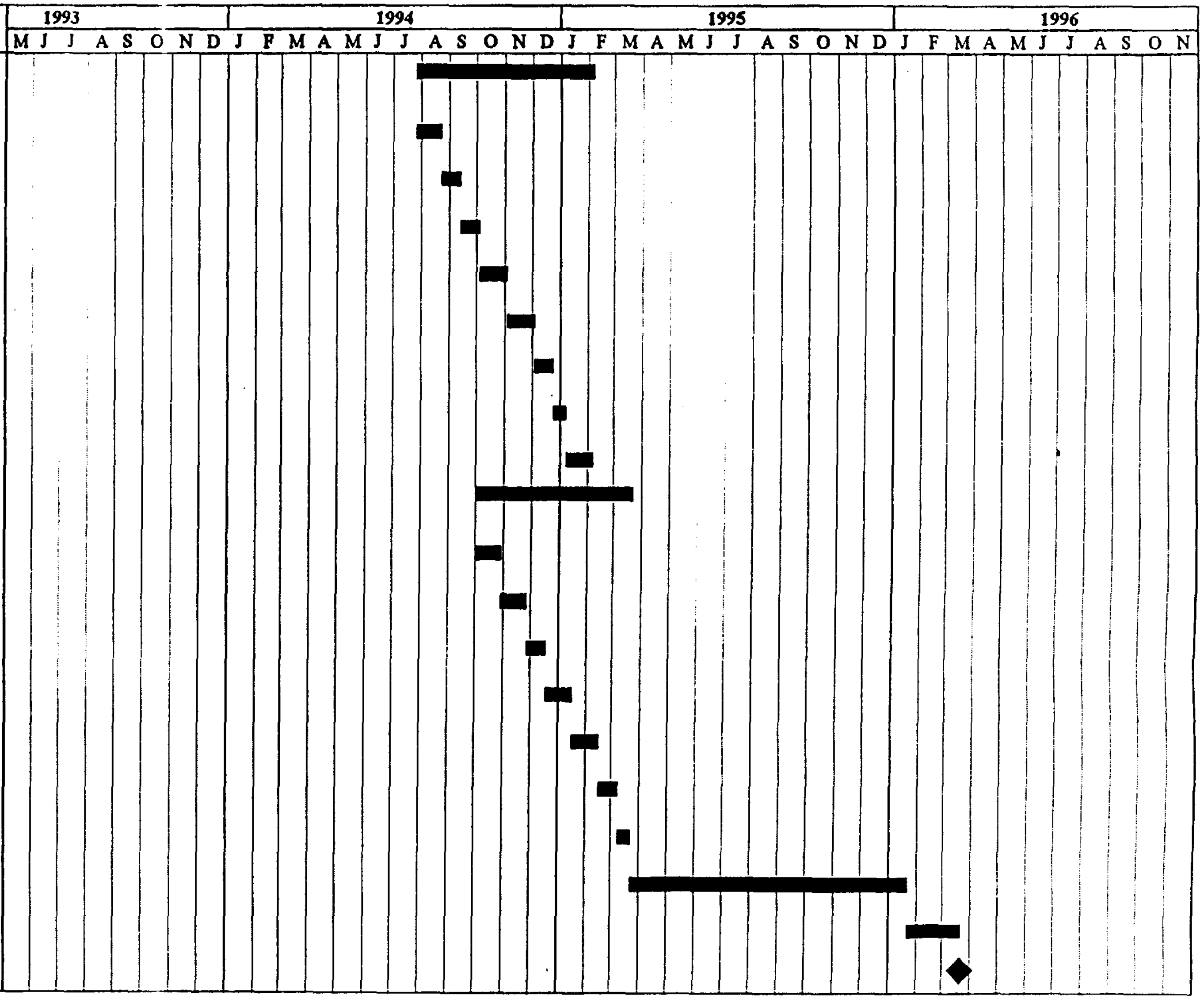
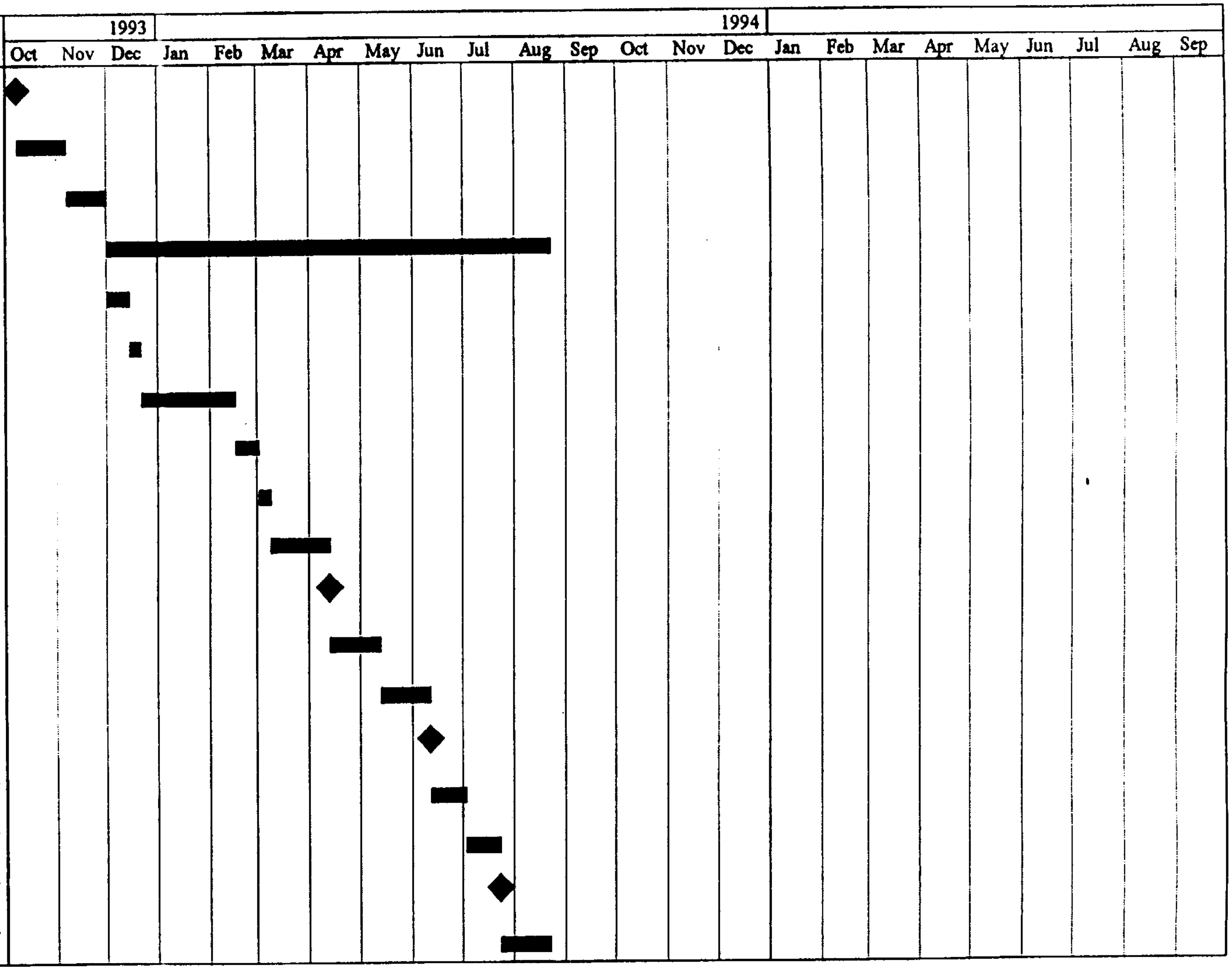


Table 10: Expedited Site Management Schedule

Interim Remedial Action (IRA) RI/FS Schedule, Site 35 (Operable Unit No. 10), MCB Camp Lejeune, NC

Task	Days	Start	Finish
Submit Draft Final IRA Project Plans	0ed	10/8/93	10/8/93
Agency Review	30ed	10/8/93	11/7/93
Final IRA Project Plans	24ed	11/7/93	12/1/93
RI/FS	265ed	12/1/93	8/23/94
Notice to Proceed/Mobilization	14ed	12/1/93	12/15/93
Field Investigation	7ed	12/15/93	12/22/93
Data Analysis/Validation	56ed	12/22/93	2/16/94
Data Evaluation	14ed	2/16/94	3/2/94
Risk Assessment	7ed	3/2/94	3/9/94
Prepare Draft RI/FS and PRAP	35ed	3/9/94	4/13/94
Submit Draft RI/FS and PRAP	0ed	4/13/94	4/13/94
Government Review	30ed	4/13/94	5/13/94
Prepare Draft Final RI/FS and PRAP	30ed	5/13/94	6/12/94
Submit Draft Final RI/FS and PRAP	0ed	6/12/94	6/12/94
Agency Review	21ed	6/12/94	7/3/94
Prepare Final RI/FS and PRAP	21ed	7/3/94	7/24/94
Submit Final RI/FS and PRAP	0ed	7/24/94	7/24/94
Public Comment Period	30ed	7/24/94	8/23/94

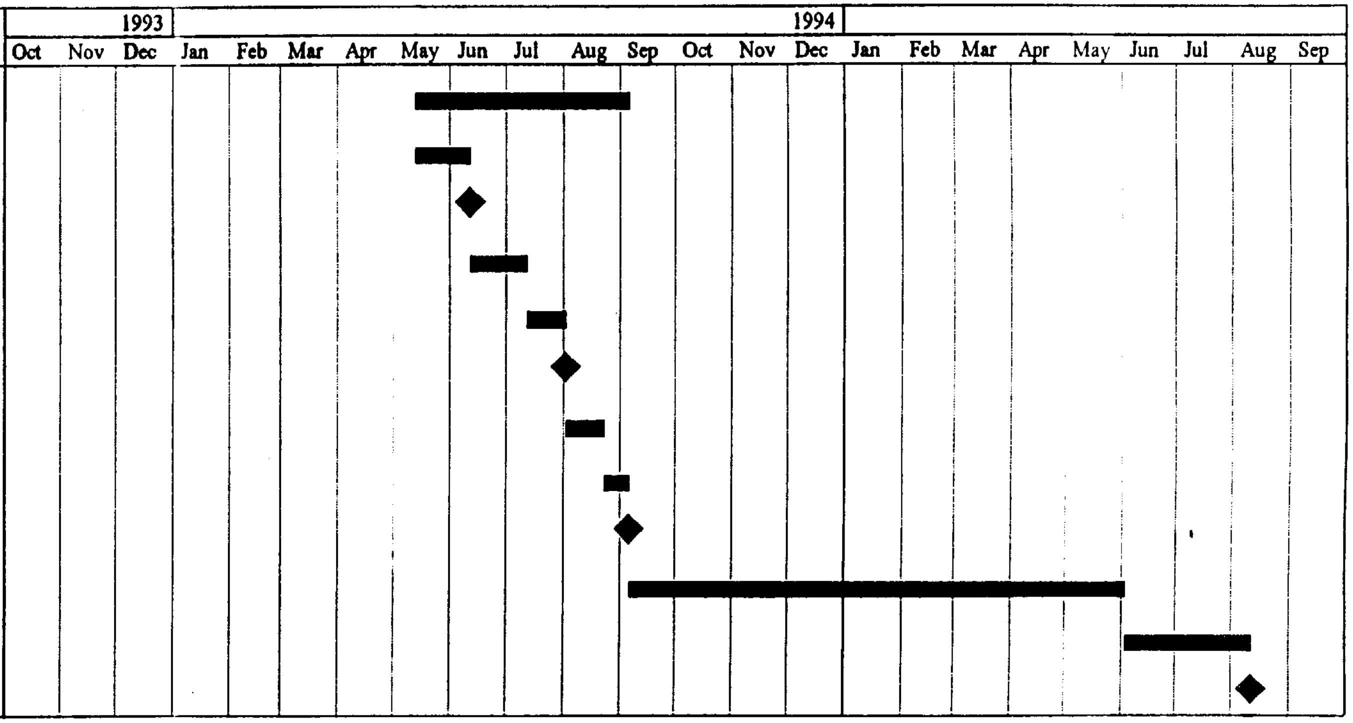


Note: Review/Responce durations are accelerated and are shorter than the FFA periods.

Table 10: Expedited Site Management Schedule

Interim Remedial Action (IRA) RI/FS Schedule, Site 35 (Operable Unit No. 10), MCB Camp Lejeune, NC

Task	Days	Start	Finish
ROD	116ed	5/13/94	9/6/94
Prepare Draft ROD	30ed	5/13/94	6/12/94
Submit Draft ROD	0ed	6/12/94	6/12/94
Agency Review	30ed	6/12/94	7/12/94
Prepare Draft Final ROD	21ed	7/12/94	8/2/94
Submit Draft Final ROD	0ed	8/2/94	8/2/94
Agency Review	21ed	8/2/94	8/23/94
Prepare Final ROD	14ed	8/23/94	9/6/94
Submit Final ROD	0ed	9/6/94	9/6/94
Remedial Design	270ed	9/6/94	6/3/95
Procure RA Contractor	70ed	6/3/95	8/12/95
Initiate Interim RA	0ed	8/12/95	8/12/95



Note: Review/Responce durations are accelerated and are shorter than the FFA periods.

Table 11 Expedited Site Management Schedule

Site 7 and 80 (Operable Unit No. 11), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	152d	12/1/93	7/1/94
Prepare Prelim Draft RI/FS Project Plans	60ed	12/1/93	1/30/94
Submit Prelim Draft RI/FS Project Plans	0ed	1/31/94	1/31/94
LANTDIV Review	28ed	1/31/94	2/28/94
Prepare Draft RI/FS Project Plans	21ed	2/28/94	3/21/94
Submit Draft RI/FS Project Plans	0ed	3/21/94	3/21/94
Agency Review	30ed	3/21/94	4/20/94
Prepare Draft Final RI/FS Project Plans	30ed	4/20/94	5/20/94
Submit Draft Final RI/FS Project Plans	0ed	5/20/94	5/20/94
Agency Review	21ed	5/20/94	6/10/94
Prepare Final RI/FS Project Plans	21ed	6/10/94	7/1/94
Submit Final RI/FS Project Plans	0ed	7/1/94	7/1/94
RI/FS PRAP, and ROD	427ed	7/1/94	9/1/95
Remedial Design	305ed	9/1/95	7/2/96
Procure RA Contractor	60ed	7/2/96	8/31/96
Begin Remedial Action	0ed	8/31/96	8/31/96

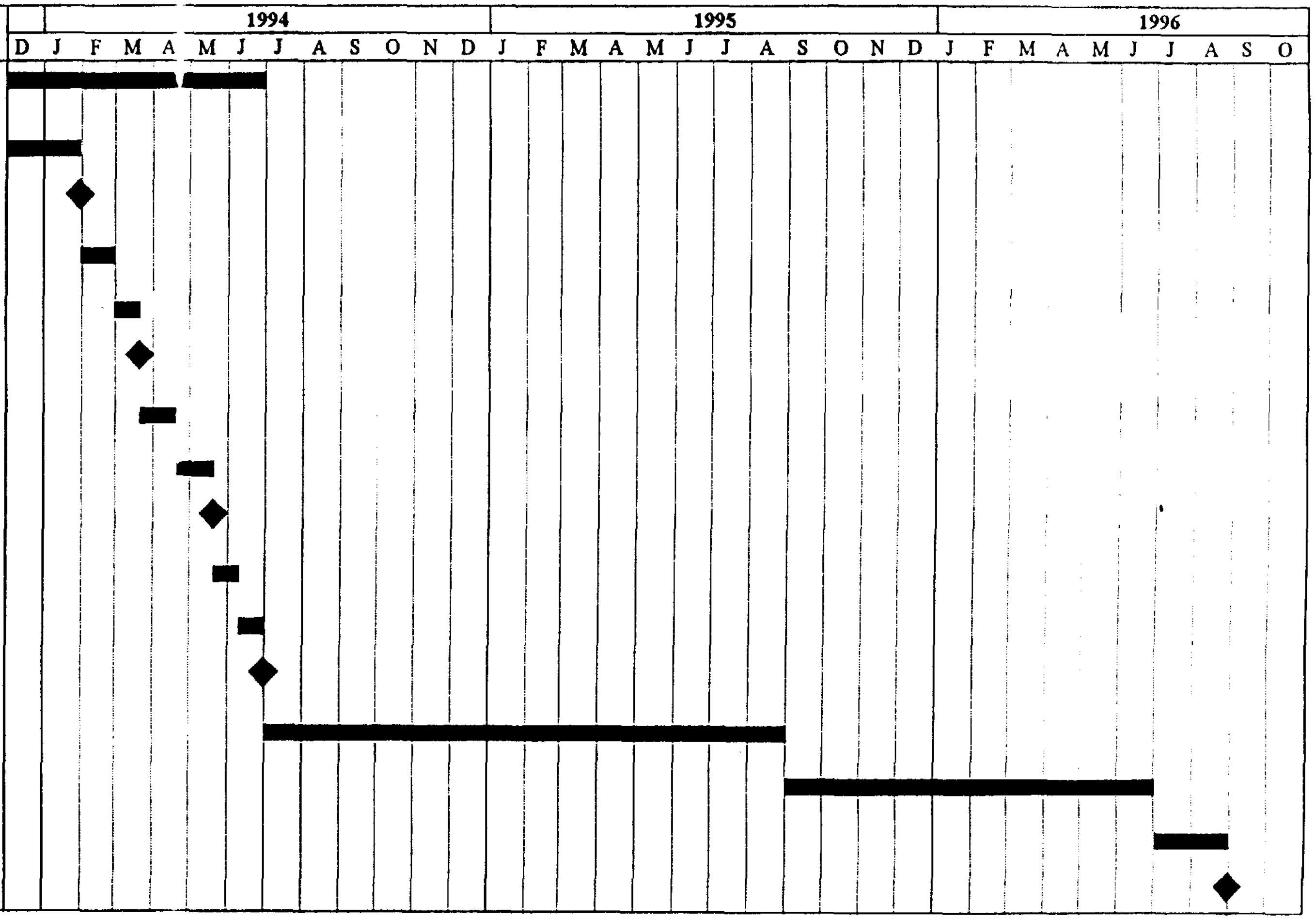


Table 12 Expedited Site Management Schedule

Site 3 (Operable Unit No. 12), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	152d	12/1/93	7/1/94
Prepare Prelim Draft RI/FS Project Plans	60ed	12/1/93	1/30/94
Submit Prelim Draft RI/FS Project Plans	0ed	1/31/94	1/31/94
LANTDIV Review	28ed	1/31/94	2/28/94
Prepare Draft RI/FS Project Plans	21ed	2/28/94	3/21/94
Submit Draft RI/FS Project Plans	0ed	3/21/94	3/21/94
Agency Review	30ed	3/21/94	4/20/94
Prepare Draft Final RI/FS Project Plans	30ed	4/20/94	5/20/94
Submit Draft Final RI/FS Project Plans	0ed	5/20/94	5/20/94
Agency Review	21ed	5/20/94	6/10/94
Prepare Final RI/FS Project Plans	21ed	6/10/94	7/1/94
Submit Final RI/FS Project Plans	0ed	7/1/94	7/1/94
RI/FS PRAP, and ROD (1)	427ed	7/1/94	9/1/95
Remedial Design (2)	305ed	9/1/95	7/2/96
Procure RA Contractor (2)	60ed	7/2/96	8/31/96
Begin Remedial Action (2)	0ed	9/2/96	9/2/96

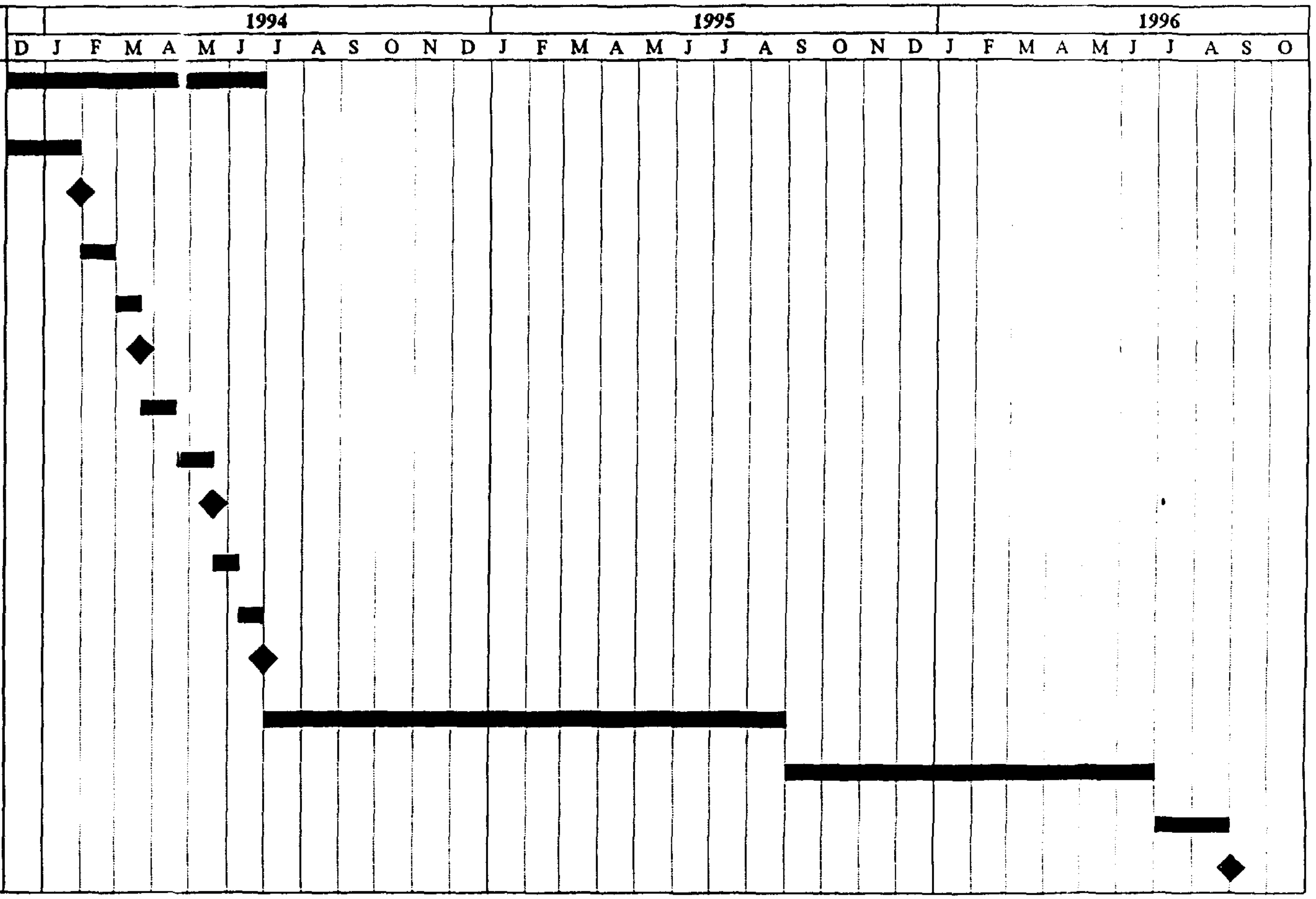


Table 13 Expedited Site Management Schedule

Site 63 (Operable Unit No. 13), MCB Camp Lejeune, NC

Task	Days	Start	Finish
RI/FS Project Plans	150d	1/1/95	7/31/95
Prepare Prelim Draft RI/FS Project Plans	60ed	1/1/95	3/2/95
Submit Prelim Draft RI/FS Project Plans	0ed	3/2/95	3/2/95
LANTDIV Review	28ed	3/2/95	3/30/95
Prepare Draft RI/FS Project Plans	21ed	3/30/95	4/20/95
Submit Draft RI/FS Project Plans	0ed	4/20/95	4/20/95
Agency Review	30ed	4/20/95	5/20/95
Prepare Draft Final RI/FS Project Plans	30ed	5/20/95	6/19/95
Submit Draft Final RI/FS Project Plans	0ed	6/19/95	6/19/95
Agency Review	21ed	6/19/95	7/10/95
Prepare Final RI/FS Project Plans	21ed	7/10/95	7/31/95
Submit Final RI/FS Project Plans	0ed	7/31/95	7/31/95
RI/FS PRAP, and ROD	427ed	7/31/95	9/30/96
Remedial Design	305ed	9/30/96	8/1/97
Procure RA Contractor	60ed	8/1/97	9/30/97
Begin Remedial Action	0ed	9/30/97	9/30/97