

SUMMARY OF AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST

FOR

**BUILDING AS-4141
MARINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA**

MARCH 14, 2007

**NAVY CONTRACT NO. N62470-05-D-6200
DELIVERY ORDER NO. 0029
CATLIN PROJECT NO. 206-074**



Prepared By:

**CATLIN ENGINEERS AND SCIENTISTS
P. O. BOX 10279
WILMINGTON, NORTH CAROLINA 28404-0279
(910) 452-5861**

TABLE OF CONTENTS

	<u>PAGE</u>
LIST OF ACRONYMS	i
1.0 INTRODUCTION	1
1.1 AUTHORIZATION	1
1.2 PURPOSE OF PILOT TEST	1
1.3 SCOPE OF WORK	1
2.0 SITE DESCRIPTION	2
3.0 SUMMARY OF FIELD ACTIVITIES	2
3.1 PHASE I - OBSERVATION WELL INSTALLATION	2
3.2 PHASE II - PILOT TEST	3
3.3 PHASE III - ADDITIONAL AFVR EVENTS	6
4.0 SUMMARY AND CONCLUSIONS	7
4.1 SUMMARY OF INFLUENCE	7
4.2 IMPLEMENTATION	7
4.3 DESIGN PARAMETERS FOR DUAL PHASE EXTRACTION SYSTEM	8
5.0 LIMITATIONS	9
6.0 REFERENCES	10

TABLES

TABLE 1	AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST – OBSERVATION WELL CONSTRUCTION DATA
TABLE 2	AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST – OBSERVATION WELL DATA
TABLE 3	AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST – STACK READINGS
TABLE 4	SHAW ENVIRONMENTAL, INC. AGGRESSIVE FLUID VAPOR RECOVERY EVENTS – OBSERVATION WELL DATA
TABLE 5	SHAW ENVIRONMENTAL, INC. AGGRESSIVE FLUID VAPOR RECOVERY EVENTS – STACK READINGS
TABLE 6	RECOVERED VOLUMES FROM ALL AGGRESSIVE FLUID VAPOR RECOVERY EVENTS

TABLE OF CONTENTS (continued)

FIGURES

- FIGURE 1 GENERAL SITE LOCATION**
- FIGURE 2 SITE PLAN WITH OBSERVATION WELL LOCATIONS**
- FIGURE 3 AFVR PILOT TEST WELL SCHEMATIC**
- FIGURE 4 PROPOSED LOCATIONS FOR DUAL PHASE EXTRACTION RECOVERY
WELLS**

APPENDICES

- APPENDIX A BORING LOGS AND WELL CONSTRUCTION RECORDS FOR
OBSERVATION WELLS INSTALLED AS PART OF AFVR PILOT TEST**
- APPENDIX B AFVR DATA FROM SHAW ENVIRONMENTAL, INC.**
- APPENDIX C GRAPHS**
 - GRAPH #1 GROUNDWATER ELEVATIONS DURING AFVR PILOT
TEST WITHIN 50 FEET OF RW-1**
 - GRAPH #2 GROUNDWATER ELEVATIONS DURING AFVR PILOT
TEST GREATER THAN 50 FEET FROM RW-1**
 - GRAPH #3 FREE-PHASE PRODUCT THICKNESS DURING AFVR
PILOT TEST**
 - GRAPH #4 FREE-PHASE PRODUCT THICKNESS COMPARISON
OF INITIAL GAUGING FOR EACH EVENT**

LIST OF ACRONYMS

2000 Guidelines	Groundwater Section Guidelines for Investigation and Remediation of Soil and Groundwater
2001 Guidelines	Guidelines for Assessment and Corrective Action, North Carolina Underground Storage Tank Section (Effective July 1, 2001)
2L GWQS	NCAC T15A:02L Groundwater Quality Standards
ARO	Asheville Regional Office
AS	Air Sparge
AST	Aboveground Storage Tank
BDL	Below Detection Limit
BN	Base/Neutral (extractables)
BNA	Base/Neutral/Acid (extractables)
BQL	Below Quantitation Limit
BLS	Below Land Surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAP	Corrective Action Plan
CATLIN	CATLIN Engineers and Scientists (Formerly RC&A)
CFR	Code of Federal Regulations
Cr	Chromium
CSA	Comprehensive Site Assessment
CNP	Carbon Nitrogen Phosphorous
CPT	Cone Penetrometer Test
DEM	Division of Environmental Management
DIPE	Diisopropyl Ether
DO	Dissolved Oxygen
DOD	Department of Defense
DPT	Direct Push Technology
DWQ	Division of Water Quality
DWM	Division of Waste Management
DTW	Depth to Water
EAD	Environmental Affairs Department
EDB	Ethylene di-bromide
EMD	Environmental Management Division
EPA	Environmental Protection Agency
EPH	Extractable Petroleum Hydrocarbons
EQB	Environmental Quality Branch
Fe	Iron
FID	Flame Ionization Detector
FOD	Foreign Object Debris
FRO	Fayetteville Regional Office
FT	Feet
GCL	Gross Contaminant Level
GIS	Geographic Information System
GPS	Global Positioning System

Guidelines Vol. I	Groundwater Section Guidelines for Investigation and Remediation of Soil and Groundwater, Volume I, Sources Other Than Petroleum Underground Storage Tanks (May 1998)
Guidelines Vol. II	Groundwater Section Guidelines for Investigation and Remediation of Soil and Groundwater, Volume II, Petroleum Underground Storage Tanks (January 2, 1998)
HDPE	High Density Polyethylene
I/C	Industrial/Commercial
ID	Identification
I&E	Installations and Environment Department
IGWQS	Interim Groundwater Quality Standards
IPE	Isopropyl Ether
LSA	Limited Site Assessment
LUST	Leaking Underground Storage Tank
m-	meta
m	meter
MADEP	Massachusetts Department of Environmental Protection
MCALF	Marine Corps Auxiliary Landing Field
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MCOLF	Marine Corps Outlying Landing Field
MDL	Method Detection Limit
mg/Kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MRO	Mooreville Regional Office
MSCC	Maximum Soil Contaminant Concentration
MSL	Mean Sea Level
MTBE	Methyl tertiary butyl ether
µg/Kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
NA	Not Analyzed
N/A	Not Applicable
NAVFAC	Naval Facilities Engineering Command
NC	North Carolina
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
NCDOC	North Carolina Department of Corrections
NCDOT	North Carolina Department of Transportation
NCSP	North Carolina State Plane
NCSPA	North Carolina State Ports Authority
NE	None Established
NM	Not Measured
NMT	No Measurable Thickness
NS	Not Sampled
o-	ortho
OVA	Organic Vapor Analyzer

p-	para
PAH	Polynuclear Aromatic Hydrocarbons
Pb	Lead
PPB	Parts Per Billion
PPM	Parts Per Million
PID	Photo Ionization Detector
PQL	Practical Quantitation Limit
PVC	Polyvinyl chloride
RBCA	Risk-Based Corrective Action
RCRA	Resource Conservation and Recovery Act
Res	Residential
ROI	Radius of Influence
RRO	Raleigh Regional Office
SOW	Scope of Work
STGW	Soil-to-Groundwater
SVE	Soil Vapor Extraction
SVOC	Semi Volatile Organic Compound
TDHF	Toxicologically Defined Hydrocarbons Fractions
TCLP	Toxicity Characteristic Leaching Procedure
TIC	Tentatively Identified Compound
TKN	Total Kjeldahl Nitrogen
TOC	Top of Casing
TPH	Total Petroleum Hydrocarbons
US	United States
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
VPH	Volatile Petroleum Hydrocarbons
WaRO	Washington Regional Office
WiRO	Wilmington Regional Office
WSRO	Winston-Salem Regional Office

SUMMARY OF AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST

FOR

**BUILDING AS-4141
MARINE CORPS AIR STATION
NEW RIVER, NORTH CAROLINA**

MARCH 14, 2007

1.0 INTRODUCTION

1.1 AUTHORIZATION

CATLIN Engineers and Scientists (CATLIN) were authorized to perform field activities and prepare this Summary of Aggressive Fluid Vapor Recovery (AFVR) Pilot Test at the Building AS-4141 project site by NAVFAC Mid-Atlantic, in accordance with Contract No. N62470-05-D-6200, Delivery Order No. 0029.

1.2 PURPOSE OF PILOT TEST

The purpose of this investigation was to perform tasks to aid in the understanding and the feasibility of the use of Dual-Phase Extraction (DPE) technology for the remediation of free-phase product at the Building AS-4141 project site aboard Marine Corps Air Station (MCAS), New River, North Carolina. Additionally, the Pilot Test was performed in order to determine the parameters necessary for the design of a full scale DPE remediation system. These tasks were completed in general agreement with the recommendation of the Remedial Action Optimization and Revised Corrective Action Plan (RAO&RCAP) Addendum Report by CATLIN dated June 12, 2006. This Report should be considered as supplemental/addendum information to support the recommendations of the RAO&RCAP Addendum Report dated June 12, 2006.

1.3 SCOPE OF WORK

The scope of work for this project was performed in three phases in general accordance with the approved Workplan for AFVR Pilot Test for Building AS-4141 dated August 11, 2006.

Phase I of this project involved the installation of two Type II observation monitoring wells (USTAS4141-MW20 and USTAS4141-MW21). During well installation, soil samples were collected for the purposes of soil description. Soil samples were also screened with an Organic Vapor Analyzer (OVA) to monitor the headspace gases during well installation.

Phase II of the project involved the performance of the AFVR Pilot Test (Pilot Test). The initial task for the Pilot Test was to perform a groundwater gauging event from selected observation wells (Refer to Table 1 for wells utilized). This was to establish baseline data in order to help evaluate the Pilot Test. During the gauging event, depths to groundwater and free-phase product thickness, if present, were measured. Following the gauging event, a vacuum was applied for a short duration to well RW-2 to establish a vacuum pressure to be applied during the Pilot Test conducted on RW-1. This initial vacuum event also allowed for the verification that the planned equipment apparatus set-up would maintain the desired vacuum pressures. Upon completion of this initial vacuum event, the Pilot Test was performed on RW-1 as discussed within this Report. The data from the Pilot Test was subsequently compiled and evaluated. The results of the Pilot Test are documented in this Report.

Phase III of the project was added upon completion of the initial evaluation of the Pilot Test data. Based on the findings of the Pilot Test, four (4) additional AFVR events were conducted at durations of at least eight (8) hours to confirm that AFVR events would or would not be an applicable approach for the remediation of the free-phase product at this project site. The results of these additional AFVR events are also documented in this Report.

2.0 SITE DESCRIPTION

The Building AS-4141 project site is located along White Street aboard the MCAS, New River in Onslow County, North Carolina. The subject site is divided by White Street and consists of several parking lots and a helicopter hangar. Please refer to Figure 1 for a site vicinity map.

3.0 SUMMARY OF FIELD ACTIVITIES

3.1 PHASE I - OBSERVATION WELL INSTALLATION

3.1.1 Well Location and Depth

Two observation wells were installed to a depth of 13 feet below land surface (BLS) within 18.3 feet and 26.4 feet of the proposed Pilot Test well (RW-1). The observation wells were installed by a Diedrich D-50 hollowed stem auger rig to drill a borehole to a depth of approximately 5 feet into the groundwater table.

The observation wells were constructed as a 2-inch diameter, schedule 40 PVC monitoring well with 3 feet of casing and 10 feet of 0.010 inch slotted screen. Refer to the attached Appendix A for the boring log and North Carolina Well Construction Records for these new wells. The attached Figure 2 illustrates the approximate location of these two observation wells.

3.1.2 Soil Sample Collection

During observation well construction, soil samples were collected using split spoon samplers on a 5 foot interval. The samples were placed in a plastic bag that was left undisturbed for several minutes to allow the organic vapors to reach equilibrium. The gas within the headspace of the bag was tested with an Organic Vapor Analyzer (OVA). A geologist trained in using visual/manual techniques as described in American Society for Testing and Materials (ASTM) D-2488, classified soils in the field. The soils were classified in accordance with the Unified Soil Classification System (USCS). The soil descriptions and OVA results are provided in the boring logs prepared for each well included in Appendix A.

A minimum of 24 hours following well construction activities, each of the wells were developed by pumping until the groundwater was clear. The recovered groundwater was containerized and was properly disposed of.

3.2 PHASE II - PILOT TEST

The RAO&RCAP Addendum Report indicated that a continuous clay layer with high plasticity appeared to be present at approximately 3 feet below land surface and approximately 7-10 feet thick. This conclusion was based on additional monitoring wells installed as part of the RAO&RCAP Addendum Report preparation. It should be noted that the additional observation wells installed during this Pilot Test also indicated the presence of a clay layer at a depth ranging between 2.5 and 8.5 feet below land surface. The free-phase product appears to be located within this clay layer and therefore, increasing the difficulty of recovery and reducing the likelihood of plume migration. It is important to note that the clay layer is likely causing an exaggerated thickness of free-phase product within the measured wells. The DPE approach was recommended in the RAO&RCAP Addendum Report as the best approach for recovery of free-phase product from within this clay layer in comparison to alternative technologies.

The recommended DPE approach consists of the recovery, treatment and disposal of recovered groundwater and free-phase product through a series of well points. A DPE system applies a vacuum to the subsurface to remove various combinations of contaminated groundwater, free-phase product and hydrocarbon vapors. An AFVR Pilot Test was performed to confirm the spacing of the DPE extraction points. Specific activities associated with the Pilot Test are discussed below.

3.2.1 Initial Well Gauging

Prior to the start of the Pilot Test, fourteen wells at the project site were gauged for depth to groundwater and free-phase product thickness (if present). The wells were selected to correspond with the anticipated vacuum influence expected during the Pilot Test within Type II wells screened within the shallow aquifer. Refer to Table 1 for observation well construction data.

Initial depth to groundwater ranged from 4.69 feet to 8.28 feet below the top of casing. A measurable thickness of free-phase product was observed in seven (7) of the fourteen (14) wells gauged. Free-phase product thicknesses ranged from no measurable thickness to 1.09 feet. The well gauging data is summarized as the "initial" time period of Table 2.

3.2.2 AFVR Pilot Test

The Pilot Test field activities were conducted by CATLIN and Shaw Environmental, Inc. (Shaw) personnel. CATLIN personnel provided general direction on the scope of the project and data recording activities for use in this Report. Five days prior to commencement of gauging and pilot testing activities all active free-phase product recovery operations at the project site were discontinued by Shaw. Shaw personnel also provided the necessary equipment to perform the AFVR Pilot Test as described within.

Upon completion of the initial well gauging, the AFVR Pilot Test was conducted. As part of the Pilot Test, a vacuum was applied to well RW-2 to establish a vacuum pressure to be applied during the Pilot Test that was conducted on well RW-1. This initial vacuum event also allowed for the verification that the planned equipment apparatus set-up would maintain the desired vacuum pressures. The final equipment schematic used during the pilot test on well RW-1 is illustrated on the attached Figure 3. The vacuum pump on the AFVR truck consisted of a rotary vane vacuum pump (Masport Model Number HXL400W).

Upon completion of this initial vacuum event on well RW-2, the Pilot Test equipment was moved to well RW-1 for the Pilot Test. The initial vacuum event on well RW-2 indicated that vacuum pressures should be applied at 15, 20 and maximum vacuum pressures (inches of mercury (Hg)) during the Pilot Test to establish radius of influence from various pressures. The 15 inches of Hg vacuum pressure was selected based on the minimum vacuum required to remove water from well RW-2. The intent of applying various vacuum pressures was to determine radius of influence at various applied vacuum

pressures. Based on the relatively large radius of influence noted from the application of the 15 inches of Hg vacuum pressure, only one vacuum rate was deemed necessary during the Pilot Test.

A vacuum pressure of 15 inches of Hg was applied to RW-1 while depth to groundwater table, free-phase product thickness and vacuum pressures were observed and recorded on the surrounding observation wells. The observation data is summarized on the attached Tables 2 and 3 and graphically illustrated on Graphs #1 and #2 in Appendix C. The findings can be summarized as follows:

- The vacuum pressure of 15 inches of Hg was measured at the top of the recovery point. Refer to Figure 3 for gauge location.
- Emissions from the exhaust stack of the AFVR truck indicated organic vapors being emitted between 30 and 52 parts per million during the pilot test.
- The groundwater influence during the Pilot Test was observed by a change in groundwater elevation at a distance up to 115 feet from the recovery point of RW-1. Observed changes in groundwater elevations ranged from 0.25 feet in observation well USTAS4141-MW19 to 4.26 feet in observation well AS3905-TP2.
- The free-phase product thicknesses fluctuated during the Pilot Test in all observation wells except the closest observation well (AS3905-TP2) which indicated no measurable thickness of free-phase product upon application of the vacuum pressure on RW-1. The fluctuations are illustrated in the attached Table 2 and Graph #3 of Appendix C. The clay layer is likely the cause for the fluctuating free-phase product thicknesses. The clay layer tends to restrict the movement of the free-phase product and thus the application of a vacuum on the subsurface will cause intermittent release of the restricted or trapped free-phase product.
- A vacuum pressure was observed on observation wells at a distance up to 26.4 feet from the Pilot Test well RW-1. Vacuum pressures on observation wells ranged between 0 and 0.25 inches of water in these observation wells.
- Please note that little to no influence was indicated on observation well AS3905-TP4 at a distance of 6.5 feet from the Pilot Test well RW-1 and thus was not considered applicable during the evaluation of the Pilot Test data. The lack of influence is likely due to either a problem with the well construction or an unknown subsurface confining feature in the immediate area of AS3905-TP4.
- The Pilot Test applied vacuum was discontinued after 120 minutes.

3.2.3 Final Well Gauging

After the completion of the application of the vacuum portion of the Pilot Test, observation wells were gauged on thirty (30) minute intervals for approximately one (1) hour to observe water table rebound. Gauging data from the rebound monitoring phase is also included in Table 2 and graphically represented on graphs in Appendix C. Although the groundwater table did not completely rebound within the one hour of post Pilot Test, significant rebound was observed.

3.3 PHASE III - ADDITIONAL AFVR EVENTS

As previously indicated, Phase III of the project was added upon completion of the initial evaluation of the Pilot Test data. Phase III was added due to the relatively large radius of influence observed during the Pilot Test which was significantly more than expected. It was also noted during the Pilot Test that AFVR events historically performed at the AS-4141 project site were conducted for a time period based on achievement of an agreed upon stack emission concentration. This stack emission concentration was typically achieved within 4 hours and prior to filling the AFVR truck with liquid. Based on these findings, four (4) additional AFVR events were conducted at durations of at least eight (8) hours to confirm that AFVR events would or would not be an applicable approach for the remediation of the free-phase product at this project site. These additional AFVR events were conducted and recorded by Shaw personnel. Shaw personnel recorded depth to water, free-phase product thickness, recovered volumes, concentrations of AFVR truck stack emission vapors and applied vacuum pressures on a two hour interval during each event.

A copy of the field data from these additional AFVR events is included in Appendix B and summarized in Tables 4, 5 and 6. The findings can be summarized as follows:

- Each AFVR event was conducted for 8 hours.
- The applied vacuum ranged between 23 and 25 inches of Hg at the AFVR truck. Note that some fluctuations are common at the truck while the vacuum on the recovery well typically remains constant.
- Emissions from the exhaust stack of the AFVR truck indicated organic vapors being emitted at a concentration significantly higher than during the pilot test as summarized in Table 5. This higher concentration is likely due to the higher applied vacuum than during the Pilot Test.
- The additional AFVR events indicated a similar influence on the groundwater table as the Pilot Test at a distance of greater than 115 feet (distance to USTAS4141-MW19).

- Table 6 summarizes the volume of liquids recovered during these additional 8 hour AFVR events. Recovered volumes of liquid ranged from 1,301 to 2,853 gallons of water and 7 to 12 gallons of free-phase product per event. These relatively low volumes are another indication of the clay layer restricting the movement of the free-phase product toward the recovery point.
- Graph #4 of Appendix C illustrates the change in free-phase product thickness during the initial gauging for each 8 hour event per well (also summarized on Table 4). This initial gauging data represents the free-phase product thickness prior to application of a vacuum for each event. The graph indicates that AFVR events do not decrease the free-phase product plume thickness at a rate that warrants continual use of this approach. Therefore, the DPE approach is warranted as discussed within this Report. However, the higher vacuum pressures do appear to remove more vapors and thus should be considered during the DPE system design.

4.0 SUMMARY AND CONCLUSIONS

4.1 SUMMARY OF INFLUENCE

Decreased water table elevations, changes in free-phase product thickness and vacuum pressures in observation wells were used as primary indicators for influence from the application of a vacuum on RW-1. Decreased water table elevations were observed at a distance greater than 115 feet (USTAS4141-MW19) from RW-1. A vacuum pressure was observed on observation wells at a distance up to 26.4 feet (distance to USTAS4141-MW21) from the Pilot Test well RW-1.

It should be noted that while a large radius of influence can be assumed for the design of the DPE System, the removal of the free-phase product will be time consuming due to the presence of the clay layer. However, the DPE technology appears to be the most effective approach for removal of the free-phase product from this clay layer.

4.2 IMPLEMENTATION

Based on the summary of influence and our understanding of the current site features, DPE technology appears to be a viable technology selection for remediation of free-phase product in the clay layer at the Building AS-4141 portion of the project site. As a vacuum was applied, changes in groundwater elevation and free-phase product thickness indicate that a DPE well could have greater than 100 feet of influence from the recovery point if properly operated over a period longer than 8 hours. Additionally, the application of a vacuum on petroleum contaminated groundwater will potentially volatilize a portion of the free-phase product present at the Building AS-4141 project site.

In order to implement the recommended remedial approach, we recommend the installation of additional DPE wells (note that replacement of recovery well RW-1 should be considered to meet the design parameters of the DPE wells) as indicated on the attached Figure 4. In order to ensure an overlapping radius of influence and to account for potential lower permeability geological formations we recommend a recovery well spacing of no greater than 75 feet. It is important to note that many of the site features will also need to be considered when selecting the recovery well locations. The related equipment, associated piping and controllers should be designed for installation as a permanent unit at the location of the existing Remediation Equipment Area illustrated on Figure 4. The recovered water should be treated as necessary for discharge to the on-base sewer system. However, additional coordination with Camp Lejeune personnel and receipt of additional permits will be necessary to confirm the discharge to the sewer system to be an acceptable approach. The design parameters to utilize are presented in Section 4.3.

It should be noted that 8-hour AFVR events should continue at a minimum interval of once per month until implementation of the DPE system to continue to contain the migration of the free-phase product plume.

Design of the recommended remedial system should be implemented as soon as funding allows and upon approval of this approach from the North Carolina Department of Environment and Natural Resources (NCDENR).

4.3 DESIGN PARAMETERS FOR DUAL PHASE EXTRACTION SYSTEM

Based on an evaluation of the data collected during the Pilot Test, the following DPE design parameters are recommended for implementation:

Recovery Well Spacing:	75 feet
Recovery Well Screen Depth:	within the clay layer and 2 feet of the historical groundwater table elevation
Operating Vacuum Pressure Range:	20 to 30 inches of Hg

During performance of the additional AFVR events, groundwater was recovered at a rate ranging from 2.71 gpm to 5.94 gpm while free-phase product was recovered at a rate of 0.875 gph to 1.5 gph. The recovery volume is expected to be greatest at start-up with significant reductions within weeks/months of start-up. Therefore, the treatment system should be designed for a flow rate of 5 gpm for groundwater and 1 gph for product per recovery well. Based on the proposed four locations, the remedial system should be designed for a total flow rate of 20 gpm for groundwater and 0.07 gpm for free-phase product recovery. Note that the DPE system may require implementation using a staged approach until the groundwater table and flow rates have stabilized.

The design should account for all permits that will be required for implementation of this proposed DPE system including recovery well permit, air permit, discharge permit, construction permit, sedimentation and erosion control permit, stormwater permit, etc.

It is important to note that these recommendations are based on isolated data from one Pilot Test and may not be representative of conditions throughout the Building AS-4141 project site.

5.0 LIMITATIONS

The data obtained as part of this investigation only provides isolated data points and may not represent conditions at every location in the project area. Analyses and conclusions of this report, being based on interpolation between data points at the project area, may not be completely representative of all site conditions. Conclusions and recommendations of this investigation and report are based on the best available data in an effort to comply with current regulatory requirements.

6.0 REFERENCES

- AH Environmental Consultants, *Final Report, Wellhead Protection Plan – 2002 Update, Marine Corps Base, Camp Lejeune*. August 2002.
- CATLIN, *Remedial Action Optimization & Revised Corrective Action Plan, JP-5 Line Area, Marine Corps Air Station, New River, North Carolina*. December 2004.
- CATLIN, *Workplan, JP-5 Line Area Optimization Addendum, Marine Corps Air Station, New River, North Carolina*. September 29, 2005.
- CATLIN, *Building AS-4141 Remedial Action Optimization & Revised Corrective Action Plan Addendum Report, Marine Corps Air Station, New River, North Carolina*. June 12, 2006.
- CATLIN, *Workplan, Aggressive Fluid Vapor Recovery Pilot Test, Building AS-4141, Marine Corps Air Station, New River, North Carolina*. August 11, 2006.
- North Carolina Department of Environment and Natural Resources, Division of Waste Management, UST Section, 2001, *Guidelines for Assessment and Corrective Action*. Effective July 1, 2001.
- North Carolina Department of Environment and Natural Resources, Division of Water Quality, 2002, *Title 15A Subchapter 2L-Classifications and Water Quality Standards Applicable To The Groundwaters of North Carolina*. Effective December 2002.

TABLES

TABLE 1

**AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST -
OBSERVATION WELL CONSTRUCTION DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL I.D.	DATE CONSTRUCTED	TOP OF CASING (FT.)	DIAMETER (IN.)	TOTAL DEPTH (FT. Below TOC)	CASING INTERVAL (FT. Below TOC)	SCREEN INTERVAL (FT. Below TOC)
TYPE II MONITORING WELLS						
OBG-1	9/27/1989	UKN	2	15.0	0.0-5.0	5.0-15.0
OBG-2	9/28/1989	UKN	2	15.0	0.0-5.0	5.0-15.0
OBG-3	9/27/1989	UKN	6	25.0	0.0-10.0	10.0-25.0
OBG-03R**	10/26/2005	20.35	2	13.0	0.0-3.0	3.0-13.0
OBG-4	9/28/1989	21.09	2	15.0	0.0-5.0	5.0-15.0
OBG-5	9/28/1989	22.88	2	13.0	0.0-3.0	3.0-13.0
OBG-6	9/28/1989	21.63	2	15.0	0.0-5.0	5.0-15.0
W-2	5/1/1986	24.29	2	15.0	0.0-5.0	5.0-15.0
W-7	5/1/1986	26.50	2	15.0	0.0-5.0	5.0-15.0
W-8	5/1/1986	26.52	2	15.0	0.0-5.0	5.0-15.0
W-10	5/1/1986	25.88	2	15.0	0.0-5.0	5.0-15.0
W-13	5/1/1986	UKN	2	15.0	0.0-5.0	5.0-15.0
AS3905-TP1**	10/25/2005	20.08	1	13.0	0.0-3.0	3.0-13.0
AS3905-TP2**	10/26/2005	19.91	1	13.0	0.0-3.0	3.0-13.0
AS3905-TP3**	10/25/2005	20.05	1	13.0	0.0-3.0	3.0-13.0
AS3905-TP4**	10/25/2005	19.87	1	13.0	0.0-3.0	3.0-13.0
AS3905-TP5**	10/25/2005	19.97	1	13.0	0.0-3.0	3.0-13.0

TABLE 1

**AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST -
OBSERVATION WELL CONSTRUCTION DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL I.D.	DATE CONSTRUCTED	TOP OF CASING (FT.)	DIAMETER (IN.)	TOTAL DEPTH (FT. Below TOC)	CASING INTERVAL (FT. Below TOC)	SCREEN INTERVAL (FT. Below TOC)
TYPE II MONITORING WELLS						
USTAS4141-MW15	10/27/2005	18.21	2	13.0	0.0-3.0	3.0-13.0
USTAS4141-MW16**	2/27/2006	17.10*	2	15.0	0.0-5.0	5.0-15.0
USTAS4141-MW17**	3/1/2006	22.31*	2	15.0	0.0-5.0	5.0-15.0
USTAS4141-MW18**	2/27/2006	17.57*	2	15.0	0.0-5.0	5.0-15.0
USTAS4141-MW19**	3/1/2006	19.76*	2	15.0	0.0-5.0	5.0-15.0
USTAS4141-MW20**	8/30/2006	19.68*	2	13.0	0.0-3.0	3.0-13.0
USTAS4141-MW21**	8/30/2006	19.62*	2	13.0	0.0-3.0	3.0-13.0
TYPE III MONITORING WELLS						
USTAS4141-MW14	10/27/2005	19.23	2	25.0	0.0-20.0	20.0-25.0
RECOVERY WELLS						
RW-1**	UKN	UKN	6	23.0	UKN	UKN
RW-2**	UKN	UKN	6	23.0	UKN	UKN

1. Casing and screen intervals are assumed to be based on measurements from ground surface.
2. Total depth based on maximum depth of screen interval.
3. Top of casing provided by Shaw Environmental, Inc., except as noted
4. A portion of data for casing and screen intervals obtained from the O'Brien & Gere Engineers, Inc. Corrective Action Plan, dated June 1991.
5. UKN = Unknown.
6. TOC = Top Of Casing.
7. Shading indicates well not located or abandoned. Data from these wells is from previously submitted reports.
8. * Top of casing provided by CATLIN personnel which utilized bench mark provided by Shaw. Top of casing discrepancies have been encountered and implicate that this area be re-surveyed to develop more accurate elevation data.
9. ** Wells used for observation during pilot test.

TABLE 2

**AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST -
OBSERVATION WELL DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL ID	DISTANCE AWAY FROM PILOT TEST WELL (FT.)	TOC ELEVATION (FT.)	TIME	DEPTH TO GROUNDWATER (FT.)	FREE-PHASE PRODUCT THICKNESS (FT.)	ADJUSTED GROUNDWATER ELEVATION (FT.)	VACUUM PRESSURE (IN H2O)
RW-1	PT LOCATION	UKN	INITIAL	4.69	NMT	UKN	NM
			AFTER SHUT DOWN 30 MIN	6.02	NMT	UKN	NM
			AFTER SHUT DOWN 60 MIN	5.67	0.03	UKN	NM
AS3905-TP2	4.80	19.91	INITIAL	5.82	NMT	14.09	NM
			15 MIN	7.34	NMT	12.57	1.50
			30 MIN	8.42	NMT	11.49	1.00
			60 MIN	9.37	NMT	10.54	1.00
			90 MIN	9.80	NMT	10.11	1.00
			120 MIN	10.08	NMT	9.83	1.00
			AFTER SHUT DOWN 30 MIN	9.22	NMT	10.69	0.00
			AFTER SHUT DOWN 60 MIN	8.29	NMT	11.62	NM
AS3905-TP1	5.50	20.08	INITIAL	6.19	0.31	14.14	NM
			15 MIN	6.90	0.20	13.34	2.50
			30 MIN	7.87	0.21	12.38	2.10
			60 MIN	8.80	1.25	12.31	3.00
			90 MIN	9.22	0.15	10.98	3.50
			120 MIN	9.49	0.13	10.70	4.00
			AFTER SHUT DOWN 30 MIN	8.92	0.03	11.18	0.00
			AFTER SHUT DOWN 60 MIN	8.08	NMT	12.00	NM

TABLE 2

**AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST -
OBSERVATION WELL DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL ID	DISTANCE AWAY FROM PILOT TEST WELL (FT.)	TOC ELEVATION (FT.)	TIME	DEPTH TO GROUNDWATER (FT.)	FREE-PHASE PRODUCT THICKNESS (FT.)	ADJUSTED GROUNDWATER ELEVATION (FT.)	VACUUM PRESSURE (IN H ₂ O)
AS3905-TP4	6.50	19.87	INITIAL	6.30	0.80	14.23	NM
			15 MIN	6.17	0.67	14.25	0.00
			30 MIN	6.16	0.64	14.23	0.00
			60 MIN	6.17	0.64	14.22	0.00
			90 MIN	6.16	0.63	14.23	0.00
			120 MIN	6.15	0.60	14.21	0.25
			AFTER SHUT DOWN 30 MIN	6.08	0.50	14.20	0.00
			AFTER SHUT DOWN 60 MIN	6.05	0.54	14.26	NM
AS3905-TP3	7.00	20.05	INITIAL	6.68	0.90	14.11	NM
			15 MIN	7.62	1.22	13.43	0.00
			30 MIN	8.04	0.98	12.81	0.00
			60 MIN	9.00	1.12	11.97	0.00
			90 MIN	9.70	1.12	11.27	0.00
			120 MIN	10.20	1.21	10.84	0.10
			AFTER SHUT DOWN 30 MIN	9.36	0.69	11.26	0.00
			AFTER SHUT DOWN 60 MIN	8.83	0.73	11.82	NM

TABLE 2

**AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST -
OBSERVATION WELL DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL ID	DISTANCE AWAY FROM PILOT TEST WELL (FT.)	TOC ELEVATION (FT.)	TIME	DEPTH TO GROUNDWATER (FT.)	FREE-PHASE PRODUCT THICKNESS (FT.)	ADJUSTED GROUNDWATER ELEVATION (FT.)	VACUUM PRESSURE (IN H ₂ O)
USTAS4141-MW-20	18.30	19.68	INITIAL	6.24	0.79	14.09	NM
			15 MIN	6.38	1.02	14.14	0.00
			30 MIN	6.49	0.87	13.90	0.00
			60 MIN	6.77	0.91	13.66	0.00
			90 MIN	6.96	0.84	13.41	0.00
			120 MIN	7.15	0.82	13.20	0.20
			AFTER SHUT DOWN 30 MIN	7.46	0.85	12.92	0.00
			AFTER SHUT DOWN 60 MIN	7.38	0.82	12.97	NM
USTAS4141-MW-21	26.40	19.62	INITIAL	6.06	0.66	14.10	NM
			15 MIN	6.88	0.84	13.43	2.00
			30 MIN	7.25	0.82	13.04	0.75
			60 MIN	7.55	0.73	12.67	0.25
			90 MIN	7.91	0.79	12.36	0.25
			120 MIN	8.04	0.77	12.21	0.00
			AFTER SHUT DOWN 30 MIN	6.88	0.09	12.81	0.00
			AFTER SHUT DOWN 60 MIN	6.54	0.15	13.20	NM

TABLE 2

**AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST -
OBSERVATION WELL DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL ID	DISTANCE AWAY FROM PILOT TEST WELL (FT.)	TOC ELEVATION (FT.)	TIME	DEPTH TO GROUNDWATER (FT.)	FREE-PHASE PRODUCT THICKNESS (FT.)	ADJUSTED GROUNDWATER ELEVATION (FT.)	VACUUM PRESSURE (IN H ₂ O)
AS3905-TP5	31.80	19.97	INITIAL	6.80	1.09	14.06	NM
			15 MIN	7.67	1.45	13.49	0.00
			30 MIN	7.50	1.42	13.63	0.00
			60 MIN	8.30	1.40	12.82	0.00
			90 MIN	8.50	1.37	12.59	0.00
			120 MIN	8.68	1.38	12.42	0.00
			AFTER SHUT DOWN 30 MIN	7.92	0.94	12.82	0.00
			AFTER SHUT DOWN 60 MIN	7.67	0.96	13.09	NM
OBG-03R	34.40	20.35	INITIAL	6.62	0.71	14.31	NM
			15 MIN	7.28	0.74	13.68	0.00
			30 MIN	7.47	0.67	13.43	0.00
			60 MIN	7.78	0.71	13.15	0.00
			90 MIN	7.90	0.58	12.93	0.00
			120 MIN	8.10	0.65	12.78	0.00
			AFTER SHUT DOWN 30 MIN	7.48	0.40	13.20	0.00
			AFTER SHUT DOWN 60 MIN	7.25	0.36	13.40	NM

TABLE 2

**AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST -
OBSERVATION WELL DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL ID	DISTANCE AWAY FROM PILOT TEST WELL (FT.)	TOC ELEVATION (FT.)	TIME	DEPTH TO GROUNDWATER (FT.)	FREE-PHASE PRODUCT THICKNESS (FT.)	ADJUSTED GROUNDWATER ELEVATION (FT.)	VACUUM PRESSURE (IN H ₂ O)
USTAS4141-MW17	53.50	22.31	INITIAL	5.33	NMT	16.98	NM
			15 MIN	5.55	NMT	16.76	0.00
			30 MIN	5.70	NMT	16.61	0.00
			60 MIN	6.02	NMT	16.29	0.00
			90 MIN	6.26	NMT	16.05	0.00
			120 MIN	6.45	NMT	15.86	0.00
			AFTER SHUT DOWN 30 MIN	6.46	NMT	15.85	0.00
			AFTER SHUT DOWN 60 MIN	6.31	NMT	16.00	NM
USTAS4141-MW16	90.00	17.10	INITIAL	8.28	NMT	8.82	NM
			15 MIN	NM	NM	NM	NM
			30 MIN	NM	NM	NM	NM
			60 MIN	7.77	NMT	9.33	NM
			90 MIN	7.74	NMT	9.36	NM
			120 MIN	7.74	NMT	9.36	NM
			AFTER SHUT DOWN 30 MIN	7.70	NMT	9.40	NM
			AFTER SHUT DOWN 60 MIN	NM	NM	NM	NM
RW-2	107.00	UKN	INITIAL	6.65	NMT	UKN	NM
			AFTER SHUT DOWN 60 MIN	NM	NM	UKN	NM

TABLE 2

**AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST -
OBSERVATION WELL DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL ID	DISTANCE AWAY FROM PILOT TEST WELL (FT.)	TOC ELEVATION (FT.)	TIME	DEPTH TO GROUNDWATER (FT.)	FREE-PHASE PRODUCT THICKNESS (FT.)	ADJUSTED GROUNDWATER ELEVATION (FT.)	VACUUM PRESSURE (IN H ₂ O)
USTAS4141-MW19	115.00	19.76	INITIAL	5.75	NMT	14.01	NM
			15 MIN	NM	NM	NM	NM
			30 MIN	5.75	NMT	14.01	NM
			60 MIN	5.84	NMT	13.92	NM
			90 MIN	5.95	NMT	13.81	NM
			120 MIN	6.00	NMT	13.76	NM
			AFTER SHUT DOWN 30 MIN	5.92	NMT	13.84	NM
			AFTER SHUT DOWN 60 MIN	5.85	NMT	13.91	NM
USTAS4141-MW18	120.00	17.57	INITIAL	6.83	NMT	10.74	NM
			15 MIN	NM	NM	NM	NM
			30 MIN	NM	NM	NM	NM
			60 MIN	6.60	NMT	10.97	NM
			90 MIN	6.65	NMT	10.92	NM
			120 MIN	6.71	NMT	10.86	NM
			AFTER SHUT DOWN 30 MIN	6.68	NMT	10.89	NM
			AFTER SHUT DOWN 60 MIN	NM	NM	NM	NM

Set Stinger at depth of 8.65' below top of casing in RW-2 and 6.69' in RW-1.

NM = Not Measured

NMT = No measureable thickness

If free product is present in a well, groundwater elevation should be calculated by: [Top of Casing Elevation - Depth to Water] + [free product thickness x 0.82].

AFVR equipment provided by Shaw Environmental, Inc. personnel. All data collected by CATLIN personnel.

TABLE 3 AGGRESSIVE FLUID VAPOR RECOVERY PILOT TEST - STACK READINGS BUILDING AS-4141 MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA	
TIME	PID READING FROM STACK
INITIAL	NM
15 MIN	NM
30 MIN	30 PPM
60 MIN	52 PPM
90 MIN	45 PPM
120 MIN	38 PPM
AFTER SHUT DOWN 30 MIN	NM
AFTER SHUT DOWN 60 MIN	NM

PID = Photo Ionization Detector

NM = Not Measured

PPM = Parts Per Million

* All stack readings were collected from vacuum truck by CATLIN personnel.

TABLE 4

**SHAW ENVIRONMENTAL, INC.
AGGRESSIVE FLUID VAPOR RECOVERY EVENTS - OBSERVATION WELL DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL ID	DISTANCE AWAY FROM PILOT TEST WELL (FT.)	TOC ELEVATION (FT.)	DATE	TIME	DEPTH TO GROUNDWATER (FT.)	FREE-PHASE PRODUCT THICKNESS (FT.)	ADJUSTED GROUNDWATER ELEVATION (FT.)
RW-1	AFVR LOCATION	UKN	12/14/2006	INITIAL	5.48	0.18	UKN
				AFTER SHUT DOWN	7.52	NMT	UKN
			12/20/2006	INITIAL	5.46	0.03	UKN
				AFTER SHUT DOWN	7.34	0.02	UKN
			1/4/2007	INITIAL	4.97	0.08	UKN
				AFTER SHUT DOWN	9.60	NMT	UKN
			1/12/2007	INITIAL	4.77	0.06	UKN
				AFTER SHUT DOWN	9.81	NMT	UKN
AS3905-TP2	4.80	19.91	12/14/2006	INITIAL	6.45	0.01	13.47
				150 MIN	11.16	NMT	8.75
				270 MIN	11.72	NMT	8.19
				390 MIN	11.84	NMT	8.07
				510 MIN	12.00	NMT	7.91
			12/20/2006	INITIAL	6.64	NMT	-6.64
				135 MIN	5.42	NMT	14.49
				255 MIN	9.81	NMT	10.10
				375 MIN	9.90	NMT	10.01
				495 MIN	9.87	NMT	10.04
			1/4/2007	INITIAL	6.06	NMT	13.85
				150 MIN	8.48	NMT	11.43
				270 MIN	10.71	NMT	9.20
				390 MIN	10.68	NMT	9.23
				510 MIN	10.48	NMT	9.43
			1/12/2007	INITIAL	5.82	NMT	14.09
				120 MIN	9.18	NMT	10.73
				240 MIN	10.54	NMT	9.37
				360 MIN	10.77	NMT	9.14
				480 MIN	10.94	NMT	8.97

TABLE 4

**SHAW ENVIRONMENTAL, INC.
AGGRESSIVE FLUID VAPOR RECOVERY EVENTS - OBSERVATION WELL DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL ID	DISTANCE AWAY FROM PILOT TEST WELL (FT.)	TOC ELEVATION (FT.)	DATE	TIME	DEPTH TO GROUNDWATER (FT.)	FREE-PHASE PRODUCT THICKNESS (FT.)	ADJUSTED GROUNDWATER ELEVATION (FT.)
AS3905-TP1	5.50	20.08	12/14/2006	INITIAL	6.89	0.32	13.45
				150 MIN	11.31	0.39	9.09
				270 MIN	12.04	0.11	8.13
				390 MIN	12.20	0.27	8.10
				510 MIN	12.22	0.32	8.12
			12/20/2006	INITIAL	7.10	0.28	13.21
				135 MIN	10.11	0.95	10.75
				255 MIN	10.00	0.33	10.35
				375 MIN	10.24	0.51	10.26
				495 MIN	11.65	1.79	9.90
			1/4/2007	INITIAL	6.25	0.14	13.94
				150 MIN	8.76	0.43	11.67
				270 MIN	10.91	0.31	9.42
				390 MIN	11.31	0.44	9.13
				510 MIN	10.64	0.32	9.70
			1/12/2007	INITIAL	6.12	0.17	14.10
				120 MIN	9.47	0.60	11.10
				240 MIN	10.87	0.30	9.46
				360 MIN	11.26	0.50	9.23
				480 MIN	11.45	0.45	9.00
AS3905-TP3	7.00	20.05	12/14/2006	INITIAL	8.26	2.09	13.50
				150 MIN	12.48	2.67	9.76
				270 MIN	12.50	1.71	8.95
				390 MIN	12.51	1.40	8.69
				510 MIN	12.51	1.21	8.53
			12/20/2006	INITIAL	8.57	2.17	13.26
				135 MIN	10.14	2.38	11.86
				255 MIN	11.49	1.96	10.17
				375 MIN	11.53	2.43	10.51
				495 MIN	11.86	2.73	10.43
			1/4/2007	INITIAL	8.81	3.02	13.72
				150 MIN	9.73	2.52	12.39
				270 MIN	12.04	2.59	10.13
				390 MIN	12.41	2.59	9.76
				510 MIN	12.21	2.46	9.86
			1/12/2007	INITIAL	7.83	2.24	14.06
				120 MIN	10.65	2.59	11.52
				240 MIN	12.06	2.76	10.25
				360 MIN	12.56	2.92	9.88
				480 MIN	12.56	2.68	9.69

TABLE 4

**SHAW ENVIRONMENTAL, INC.
AGGRESSIVE FLUID VAPOR RECOVERY EVENTS - OBSERVATION WELL DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL ID	DISTANCE AWAY FROM PILOT TEST WELL (FT.)	TOC ELEVATION (FT.)	DATE	TIME	DEPTH TO GROUNDWATER (FT.)	FREE-PHASE PRODUCT THICKNESS (FT.)	ADJUSTED GROUNDWATER ELEVATION (FT.)
USTAS4141-MW-20	18.30	19.68	12/14/2006	INITIAL	7.19	1.25	13.52
				150 MIN	8.43	1.65	12.60
				270 MIN	9.61	1.94	11.66
				390 MIN	10.29	1.86	10.92
				510 MIN	11.77	3.06	10.42
			12/20/2006	INITIAL	7.71	1.55	13.24
				135 MIN	7.90	1.49	13.00
				255 MIN	9.04	2.15	12.40
				375 MIN	9.39	1.97	11.91
				495 MIN	9.60	1.97	11.70
			1/4/2007	INITIAL	6.85	1.35	13.94
				150 MIN	7.56	1.73	13.54
				270 MIN	8.96	1.87	12.25
				390 MIN	9.58	1.87	11.63
				510 MIN	9.88	1.88	11.34
			1/12/2007	INITIAL	6.70	1.34	14.08
				120 MIN	9.01	2.98	13.11
				240 MIN	9.03	1.95	12.25
				360 MIN	9.70	2.11	11.71
				480 MIN	10.04	2.60	11.77
USTAS4141-MW-21	26.40	19.62	12/14/2006	INITIAL	7.08	1.18	13.51
				150 MIN	9.59	1.38	11.16
				270 MIN	10.23	1.46	10.59
				390 MIN	10.34	1.50	10.51
				510 MIN	10.31	1.48	10.52
			12/20/2006	INITIAL	7.21	1.10	13.31
				135 MIN	9.06	1.96	12.17
				255 MIN	9.82	2.46	11.82
				375 MIN	9.18	1.57	11.73
				495 MIN	9.28	1.70	11.73
			1/4/2007	INITIAL	6.87	1.34	13.85
				150 MIN	9.04	2.11	12.31
				270 MIN	9.61	1.63	11.35
				390 MIN	9.82	1.70	11.19
				510 MIN	8.97	1.36	11.77
			1/12/2007	INITIAL	6.74	1.43	14.05
				120 MIN	9.21	2.04	12.08
				240 MIN	9.73	1.73	11.31
				360 MIN	9.83	1.75	11.23
				480 MIN	10.18	1.96	11.05

TABLE 4

**SHAW ENVIRONMENTAL, INC.
AGGRESSIVE FLUID VAPOR RECOVERY EVENTS - OBSERVATION WELL DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL ID	DISTANCE AWAY FROM PILOT TEST WELL (FT.)	TOC ELEVATION (FT.)	DATE	TIME	DEPTH TO GROUNDWATER (FT.)	FREE-PHASE PRODUCT THICKNESS (FT.)	ADJUSTED GROUNDWATER ELEVATION (FT.)
AS3905-TP5	31.80	19.97	12/14/2006	INITIAL	7.69	1.33	13.37
				150 MIN	9.31	1.96	12.27
				270 MIN	10.02	1.90	11.51
				390 MIN	10.50	1.79	10.94
				510 MIN	10.54	1.62	10.76
			12/20/2006	INITIAL	8.78	2.57	13.30
				135 MIN	9.03	1.97	12.56
				255 MIN	9.33	1.83	12.14
				375 MIN	9.37	1.74	12.03
				495 MIN	9.46	1.58	11.81
			1/4/2007	INITIAL	7.32	1.48	13.86
				150 MIN	8.53	2.11	13.17
				270 MIN	9.96	1.99	11.64
				390 MIN	10.03	1.82	11.43
				510 MIN	9.54	1.43	11.60
			1/12/2007	INITIAL	7.41	1.71	13.96
				120 MIN	9.12	2.09	12.56
				240 MIN	9.94	1.89	11.58
				360 MIN	10.13	1.87	11.37
				480 MIN	10.31	1.86	11.19
OBG-03R	34.40	20.35	12/14/2006	INITIAL	7.20	0.55	13.60
				150 MIN	8.92	0.47	11.82
				270 MIN	9.49	0.49	11.26
				390 MIN	9.61	0.51	11.16
				510 MIN	9.76	0.55	11.04
			12/20/2006	INITIAL	7.51	0.61	13.34
				135 MIN	8.21	0.63	12.66
				255 MIN	8.71	0.97	12.44
				375 MIN	8.72	0.55	12.08
				495 MIN	8.73	0.58	12.10
			1/4/2007	INITIAL	6.71	0.54	14.08
				150 MIN	7.74	0.57	13.08
				270 MIN	8.60	0.47	12.14
				390 MIN	8.84	0.48	11.90
				510 MIN	8.50	0.26	12.06
			1/12/2007	INITIAL	6.53	0.53	14.25
				120 MIN	7.98	0.53	12.80
				240 MIN	8.57	0.39	12.10
				360 MIN	8.67	0.36	11.98
				480 MIN	9.15	0.65	11.73

TABLE 4

**SHAW ENVIRONMENTAL, INC.
AGGRESSIVE FLUID VAPOR RECOVERY EVENTS - OBSERVATION WELL DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL ID	DISTANCE AWAY FROM PILOT TEST WELL (FT.)	TOC ELEVATION (FT.)	DATE	TIME	DEPTH TO GROUNDWATER (FT.)	FREE-PHASE PRODUCT THICKNESS (FT.)	ADJUSTED GROUNDWATER ELEVATION (FT.)
USTAS4141-MW17	53.30	22.31	12/14/2006	INITIAL	5.98	0.01	16.34
				150 MIN	7.34	NMT	14.97
				270 MIN	8.11	NMT	14.20
				390 MIN	8.34	NMT	13.97
				510 MIN	8.41	NMT	13.90
			12/20/2006	INITIAL	6.25	NMT	16.06
				135 MIN	6.73	NMT	15.58
				255 MIN	7.08	NMT	15.23
				375 MIN	7.39	NMT	14.92
				495 MIN	7.43	NMT	14.88
			1/4/2007	INITIAL	5.53	NMT	16.78
				150 MIN	6.22	NMT	16.09
				270 MIN	7.37	NMT	14.94
				390 MIN	7.69	NMT	14.62
				510 MIN	7.60	NMT	14.71
			1/12/2007	INITIAL	5.33	NMT	16.98
				120 MIN	6.54	0.01	15.78
				240 MIN	7.30	NMT	15.01
				360 MIN	7.57	NMT	14.74
				480 MIN	7.73	NMT	14.58
USTAS4141-MW16	90.00	17.10	12/14/2006	INITIAL	7.48	NMT	9.62
				150 MIN	7.48	NMT	9.62
				270 MIN	7.54	NMT	9.56
				390 MIN	7.60	NMT	9.50
				510 MIN	7.71	NMT	9.39
			12/20/2006	INITIAL	7.08	NMT	10.02
				135 MIN	7.11	NMT	9.99
				255 MIN	7.13	NMT	9.97
				375 MIN	7.23	NMT	9.87
				495 MIN	7.28	NMT	9.82
			1/4/2007	INITIAL	6.02	NMT	11.08
				150 MIN	6.06	NMT	11.04
				270 MIN	6.20	NMT	10.90
				390 MIN	6.32	NMT	10.78
				510 MIN	6.46	NMT	10.64
			1/12/2007	INITIAL	5.94	NMT	11.16
				120 MIN	6.02	NMT	11.08
				240 MIN	6.12	NMT	10.98
				360 MIN	6.23	NMT	10.87
				480 MIN	6.35	NMT	10.75

TABLE 4

**SHAW ENVIRONMENTAL, INC.
AGGRESSIVE FLUID VAPOR RECOVERY EVENTS - OBSERVATION WELL DATA**

**BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

WELL ID	DISTANCE AWAY FROM PILOT TEST WELL (FT.)	TOC ELEVATION (FT.)	DATE	TIME	DEPTH TO GROUNDWATER (FT.)	FREE-PHASE PRODUCT THICKNESS (FT.)	ADJUSTED GROUNDWATER ELEVATION (FT.)
USTAS4141-MW19	115.00	19.76	12/14/2006	INITIAL	6.08	NMT	13.68
				150 MIN	6.54	NMT	13.22
				270 MIN	6.80	NMT	12.96
				390 MIN	6.87	NMT	12.89
				510 MIN	6.93	NMT	12.83
			12/20/2006	INITIAL	6.35	NMT	13.41
				135 MIN	6.50	NMT	13.26
				255 MIN	6.61	NMT	13.15
				375 MIN	6.69	NMT	13.07
				495 MIN	6.71	NMT	13.05
			1/4/2007	INITIAL	5.23	NMT	14.53
				150 MIN	5.68	NMT	14.08
				270 MIN	6.10	NMT	13.66
				390 MIN	6.21	NMT	13.55
				510 MIN	6.24	NMT	13.52
			1/12/2007	INITIAL	5.42	NMT	14.34
				120 MIN	5.72	NMT	14.04
				240 MIN	6.00	NMT	13.76
				360 MIN	6.04	0.01	13.73
				480 MIN	6.45	0.31	13.56
USTAS4141-MW18	120.00	17.57	12/14/2006	INITIAL	6.93	NMT	10.64
				150 MIN	7.11	NMT	10.46
				270 MIN	7.26	NMT	10.31
				390 MIN	8.22	NMT	9.35
				510 MIN	8.49	NMT	9.08
			12/20/2006	INITIAL	7.56	NMT	10.01
				135 MIN	7.62	NMT	9.95
				255 MIN	7.90	NMT	9.67
				375 MIN	8.00	NMT	9.57
				495 MIN	8.05	NMT	9.52
			1/4/2007	INITIAL	6.55	NMT	11.02
				150 MIN	7.08	NMT	10.49
				270 MIN	7.14	NMT	10.43
				390 MIN	7.62	NMT	9.95
				510 MIN	7.63	NMT	9.94
			1/12/2007	INITIAL	6.60	NMT	10.97
				120 MIN	6.71	NMT	10.86
				240 MIN	7.37	NMT	10.20
				360 MIN	7.45	NMT	10.12
				480 MIN	7.53	NMT	10.04

NM = Not Measured

NMT = No measureable thickness

If free product is present in a well, groundwater elevation should be calculated by: [Top of Casing Elevation - Depth to Water] + [free product thickness x 0.82].

All data collected by Shaw Environmental, Inc. personnel.

Stinger set at depth of 2 feet below the initial groundwater elevation for each event in RW-1.

TABLE 5 SHAW ENVIRONMENTAL, INC. AGGRESSIVE FLUID VAPOR RECOVERY EVENTS - STACK READINGS BUILDING AS-4141 MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA		
DATE	TIME	FID READING FROM STACK (PPM)
12/14/2006	INITIAL	1,826
	120 MIN	5,549
	240 MIN	2,080
	360 MIN	4,462
	480 MIN	5,126
12/20/2006	INITIAL	7,790
	120 MIN	2,594
	240 MIN	11,268
	360 MIN	3,213
	480 MIN	2,798
1/4/2007	INITIAL	4,473
	120 MIN	10,405
	240 MIN	7,512
	360 MIN	7,389
	480 MIN	4,932
1/12/2007	INITIAL	267
	120 MIN	498
	240 MIN	501
	360 MIN	549
	480 MIN	618

FID = Flame Ionization Detector

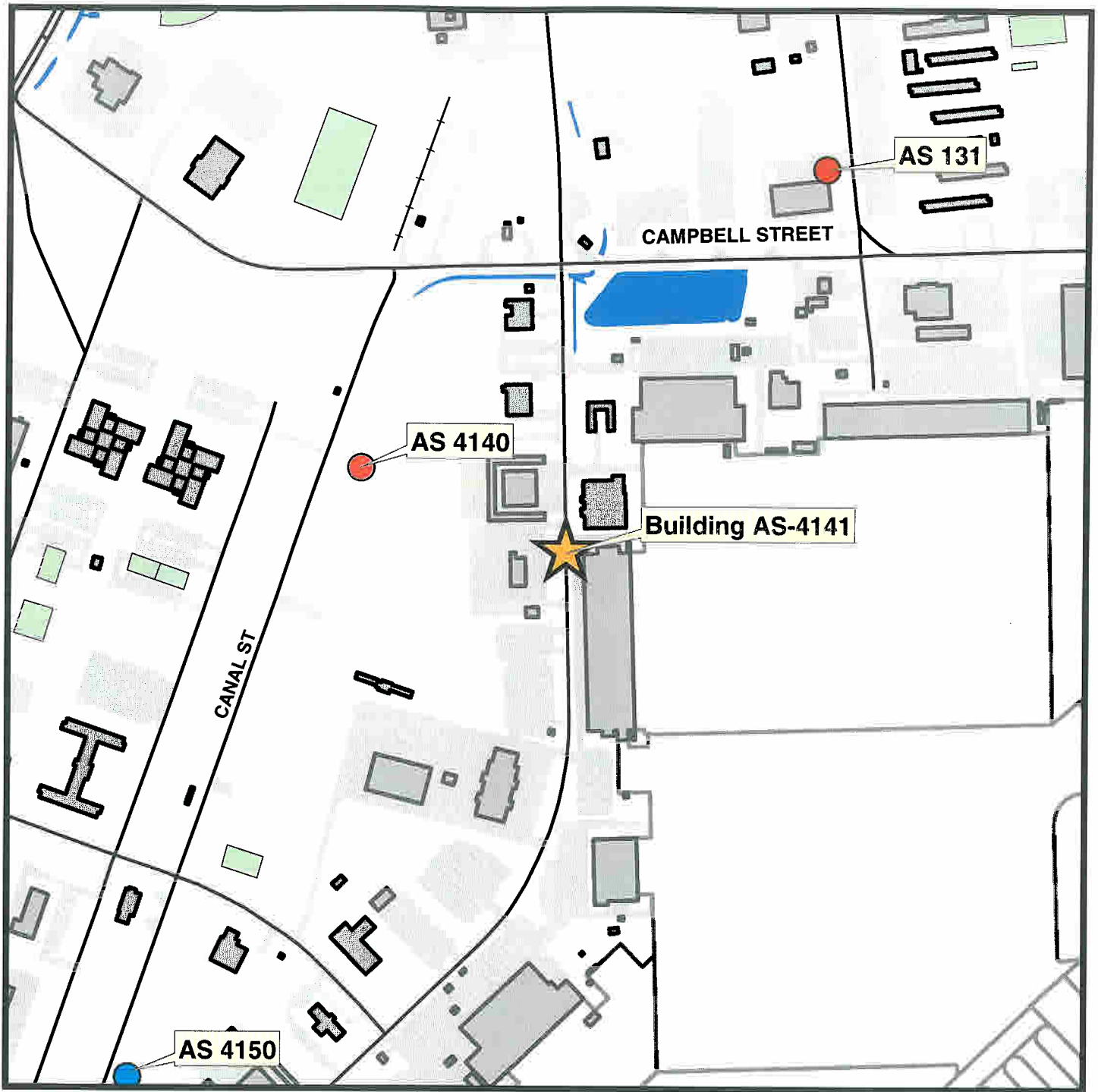
PPM = Parts Per Million

* All stack readings were collected from vacuum truck by Shaw Environmental, Inc. personnel.

TABLE 6**RECOVERED VOLUMES FROM ALL
AGGRESSIVE FLUID VAPOR RECOVERY EVENTS****BUILDING AS-4141
MARINE CORPS AIR STATION NEW RIVER, NORTH CAROLINA**

EVENT	GALLONS OF WATER	GALLONS OF PRODUCT
12/14/06 AFVR Event	2,025	7
12/20/06 AFVR Event	2,853	12
1/4/07 AFVR Event	2,295	7
1/12/07 AFVR Event	1,301	7

FIGURES



LEGEND

Water Supply Wells

- ACTIVE
- CLOSED
- INACTIVE
- PENDING

- Roads
- Railroads
- Recreational Horse Trail
- Buildings and Structures
- Parking Lots
- Playgrounds
- Driveways
- Athletic Fields
- Athletic Courts
- Surface Water
- Creeks
- Surface Water

500 0 500 Feet

SCALE



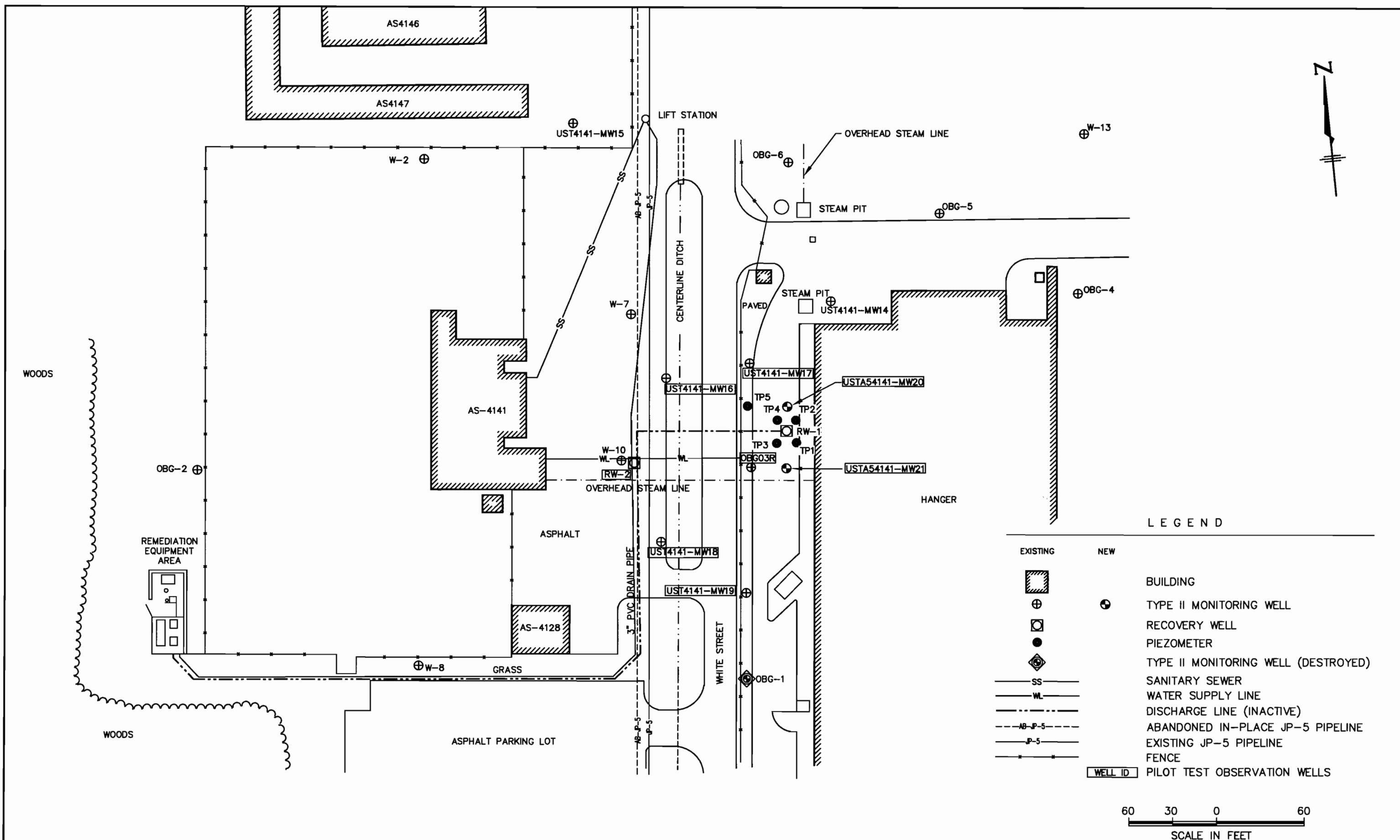
DRAWN BY:	CHECK BY:	APPROVED BY:
THW	JKB	MEM
CATLIN PROJECT No.: 206-074		

GENERAL SITE LOCATION

BUILDING AS-4141
AFVR PILOT TEST
MCAS, NEW RIVER NC

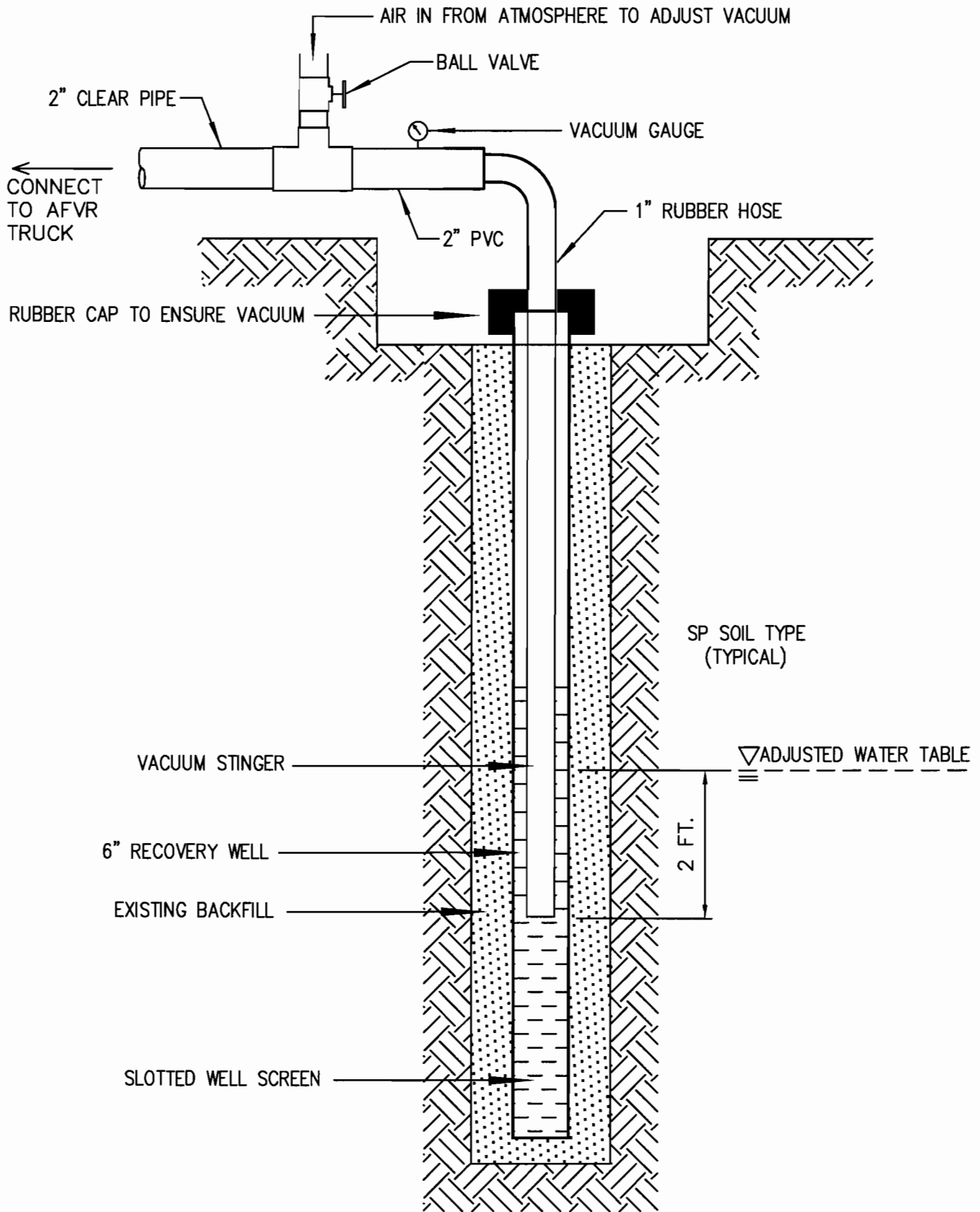
FIGURE

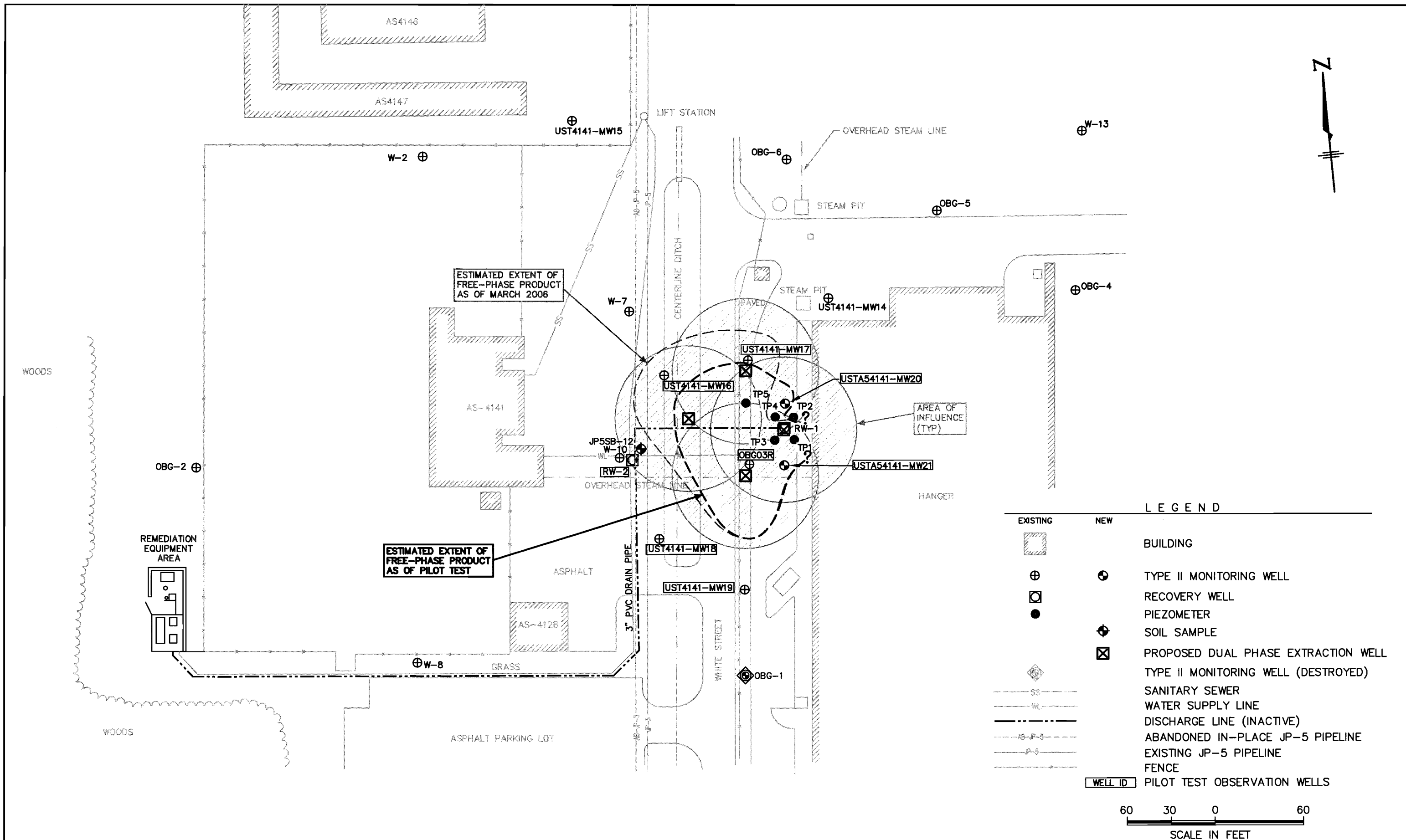
1



NOTE:
 1. SITE MAP ADAPTED FROM SHAW ENVIRONMENTAL, INC. ANNUAL MONITORING REPORT, DATED JANUARY 2004, LEJEUNE GIS DATABASE AND FIELD MEASUREMENTS BY CATLIN IN DECEMBER 2005.
 2. JP-5 PIPELINE LOCATION OBTAINED FROM AS-BUILT DRAWING NO. M2, TITLED REPLACE JP-5 FUEL LINE, DATED NOVEMBER 16, 2000. LOCATION SHOULD BE CONSIDERED APPROXIMATE.

 CATLIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT: BUILDING AS - 4141 AFVR PILOT TEST MARINE CORPS AIR STATION NEW RIVER, N.C.	TITLE: SITE PLAN WITH OBSERVATION WELL LOCATIONS	FIGURE: 2
	JOB NO. 206-074 DATE: FEB 2007	SCALE: 1"=60'	DRAWN BY: LCJ CHECKED BY: JKB





- NOTE:
1. SITE MAP ADAPTED FROM SHAW ENVIRONMENTAL, INC. ANNUAL MONITORING REPORT, DATED JANUARY 2004, LEJEUNE GIS DATABASE AND FIELD MEASUREMENTS BY CATLIN IN DECEMBER 2005.
 2. JP-5 PIPELINE LOCATION OBTAINED FROM AS-BUILT DRAWING NO. M2, TITLED REPLACE JP-5 FUEL LINE, DATED NOVEMBER 16, 2000. LOCATION SHOULD BE CONSIDERED APPROXIMATE.

CATLIN ENGINEERS and SCIENTISTS WILMINGTON, NORTH CAROLINA	PROJECT BUILDING AS - 4141 AFVR PILOT TEST MARINE CORPS AIR STATION NEW RIVER, N.C.	TITLE PROPOSED LOCATIONS FOR DUAL PHASE EXTRACTION RECOVERY WELLS		FIGURE 4
	JOB NO. 206-074 DATE FEB 2007	SCALE: 1"=60'	DRAWN BY: LCJ	CHECKED BY: JKB

APPENDICES

APPENDIX A

BORING LOGS AND WELL CONSTRUCTION RECORDS FOR OBSERVATION WELLS INSTALLED AS PART OF AFVR PILOT TEST

WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Bobbie Fowler CERTIFICATION # _____
WELL CONTRACTOR COMPANY NAME CATLIN Engineers & Scientists PHONE # (910) 452-5861
STATE WELL CONSTRUCTION PERMIT # 2869 ASSOCIATED WO PERMIT # N/A
(if applicable) (if applicable)

UST4141- MW20

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐
Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____

2. WELL LOCATION:

Nearest Town: MCAS New River County: Onslow

New River Air Station, NC
(Road Name and Numbers, Community, Subdivision, Lot No., Zip Code)

3. OWNER: Commanding General MCB

Address: Attn: I&E/ EMD/ EQB/ PSC Box 20004
(Street or Route No.)

Camp Lejeune NC 28542-0004
City or Town State Zip Code

451-9017
Area code - Phone number

Topographic/Land Setting
☐ Ridge ☐ Slope ☐ Valley ☒ Flat
(check appropriate box)

Latitude/Longitude of well location

(degrees*/minutes*/seconds")

Latitude/longitude source: ☐ GPS ☒ Topo. map
(check box)

DEPTH
From To

DRILLING LOG
Formation Description

4. DATE DRILLED: 8/30/2006

5. TOTAL DEPTH: 13

6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒

7. STATIC WATER LEVEL Below Top of Casing 8.29 FT.
(Use "+" if Above Top of Casing)

8. TOP OF CASING IS 0 FT. Above Land Surface*

* Top of casing terminated at/or below land surface requires
a variance in accordance with 15A NCAC 2C.0118

SEE
ATTACHED

9. YIELD (gpm): N/A METHOD OF TEST N/A

10. WATER ZONES (depth): Surficial Aquifer

12. DISINFECTION: Type N/A Amount N/A

13. CASING: Depth Diameter Wall Thickness or Weight/Ft. Material
From 0 To 3 ft. 2 in. Sch. 40 PVC
From _____ To _____ ft. _____ in. _____
From _____ To _____ ft. _____ in. _____

14. GROUT: Depth Material Method
From 0 To 1 ft. Concrete Surface Pour
From 1 To 2 ft. Bent. Pellets Surface Pour

15. SCREEN: Depth Diameter Slot Size Material
From 3 To 13 ft. 2 in. Slot .010 in. PVC
From _____ To _____ ft. _____ in. _____ in. _____

16. SAND/GRAVEL PACK: Depth Size Material
From 2 To 13 ft. #2 Medium Torpedo Sand
From _____ To _____ ft. _____

SEE
ATTACHED

17. REMARKS: _____

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF PERSON CONSTRUCTING THE WELL

DATE

Submit original to Division of Water Quality, Attn: Information Management, 1617 Mail Service Center - Raleigh, NC 27699-1617 Phone No. (919) 733-7015, within 30 days.

Modified from:
GW-1 REV.09/2004

WELL LOG

CATLIN

ENGINEERS and SCIENTISTS
204-103
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 204-103	STATE: NC	COUNTY: Onslow	LOCATION: MCAS New River
PROJECT NAME: JP-5 Line Area		LOGGED BY: Justin Heter	WELL ID: UST4141-MW20
DRILLER: Bobbie Fowler		CREW: John Wood	
NORTHING:	EASTING:	CREW:	
SYSTEM: N/A		BORING LOCATION: 15' north of large manhole	
T.O.C. ELEV.:			
DRILL MACHINE: Diedrich D-50	METHOD: HSA	0 HOUR DTW: 8.3	TOTAL DEPTH: 13.0
START DATE: 8/30/06	FINISH DATE: 8/30/06	24 HOUR DTW: NM	WELL DEPTH: 13.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	WELL DETAIL
	6in	6in	6in	6in							
0.0									0.0	LAND SURFACE	0.0
									0.5	Asphalt and concrete.	
					36		SP			Dark brown to brown, fine to med. SAND. Dry.	2" Sch. 40 PVC
									2.5		2.0
3.5							CL			SANDY CLAY with med. plasticity. HCO. Inorganic. Wet.	3.0
	1	1	1	2	273						
8.5							ML		8.0	Brownish gray, SILTY CLAY with some v.f. sand. Sat. No Odor. Low plasticity.	2" Slot .010 Sch. 40 PVC
	1	0	1	0	5.4						
							CL		10.5	Gray SANDY CLAY. Sat.	
									13.0	Boring Terminated at Depth 13.0 ft	13.0

 Portland Cement
  Bentonite Pellets
  #2 Medium Sand

CATLIN BORING LOG 204-103 JP-5 LINE AREA G.P.I. TEST GDT 9/11/06

WELL CONSTRUCTION RECORD

North Carolina - Department of Environment and Natural Resources - Division of Water Quality

WELL CONTRACTOR (INDIVIDUAL) NAME (print) Bobbie Fowler CERTIFICATION # _____
WELL CONTRACTOR COMPANY NAME CATLIN Engineers & Scientists PHONE # (910) 452-5861
STATE WELL CONSTRUCTION PERMIT # 2869 ASSOCIATED WO PERMIT # N/A
(if applicable) (if applicable)

UST4141- MW21

1. WELL USE (Check Applicable Box): Residential ☐ Municipal/Public ☐ Industrial ☐ Agricultural ☐
Monitoring ☒ Recovery ☐ Heat Pump Water Injection ☐ Other ☐ If Other, List Use _____
2. WELL LOCATION:
Nearest Town: MCAS New River County: Onslow
New River Air Station, NC
(Road Name and Numbers, Community, Subdivision, Lot No., Zip Code)
Topographic/Land Setting
☐ Ridge ☐ Slope ☐ Valley ☒ Flat
(check appropriate box)
Latitude/Longitude of well location
/ (degrees*/minutes'/seconds")
Latitude/longitude source: ☐ GPS ☒ Topo. map
(check box)
DEPTH DRILLING LOG
From To Formation Description
3. OWNER: Commanding General MCB
Address: Attn: I&E/ EMD/ EQB/ PSC Box 20004
(Street or Route No.)
Camp Lejeune NC 28542-0004
City or Town State Zip Code
451-9017
Area code - Phone number
4. DATE DRILLED: 8/30/2006
5. TOTAL DEPTH: 13
6. DOES WELL REPLACE EXISTING WELL? YES ☐ NO ☒
7. STATIC WATER LEVEL Below Top of Casing 6.38 FT.
(Use "+" if Above Top of Casing)
8. TOP OF CASING IS 0 FT. Above Land Surface*
* Top of casing terminated at/or below land surface requires a variance in accordance with 15A NCAC 2C.0118
9. YIELD (gpm): N/A METHOD OF TEST N/A
10. WATER ZONES (depth): Surficial Aquifer
12. DISINFECTION: Type N/A Amount N/A
13. CASING: Depth Diameter Wall Thickness or Weight/Ft. Material
From 0 To 3 ft. 2 in. Sch. 40 PVC
From _____ To _____ ft. _____ in. _____
From _____ To _____ ft. _____ in. _____
14. GROUT: Depth Material Method
From 0 To 1 ft. Concrete Surface Pour
From 1 To 2 ft. Bent. Pellets Surface Pour
15. SCREEN: Depth Diameter Slot Size Material
From 3 To 13 ft. 2 in. Slot .010 in. PVC
From _____ To _____ ft. _____ in. _____ in. _____
16. SAND/GRAVEL PACK: Depth Size Material
From 2 To 13 ft. #2 Medium Torpedo Sand
From _____ To _____ ft. _____
17. REMARKS: _____

SEE
ATTACHED

LOCATION SKETCH

Show direction and distance in miles from at least two State Roads or County Roads. Include road numbers and common road names.

SEE
ATTACHED

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15A NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Bobbie Fowler
SIGNATURE OF PERSON CONSTRUCTING THE WELL

9-18-06
DATE

Submit original to Division of Water Quality, Attn: Information Management, 1617 Mail Service Center - Raleigh, NC 27699-1617 Phone No. (919) 733-7015, within 30 days.

Modified from:
GW-1 REV.09/2004

WELL LOG

CATLIN

ENGINEERS and SCIENTISTS
204-103
Wilmington, NC

SHEET 1 OF 1

PROJECT NO.: 204-103	STATE: NC	COUNTY: Onslow	LOCATION: MCAS New River
PROJECT NAME: JP-5 Line Area		LOGGED BY: Justin Heter	WELL ID: UST4141-MW21
NORTHING:		DRILLER: Bobbie Fowler	
EASTING:		CREW: John Wood	
SYSTEM: N/A		BORING LOCATION: 25' south of large manhole	T.O.C. ELEV.:
DRILL MACHINE: Diedrich D-50	METHOD: HSA	0 HOUR DTW: 6.4	TOTAL DEPTH: 13.0
START DATE: 8/30/06	FINISH DATE: 8/30/06	24 HOUR DTW: NM	WELL DEPTH: 13.0

DEPTH	BLOW COUNT				OVA (ppm)	LAB.	USCS	LOG	DEPTH	SOIL AND ROCK DESCRIPTION	WELL DETAIL
	6in	6in	6in	6in							
									0.0	LAND SURFACE	0.0
									0.5	Asphalt/concrete	0.0
1.5							SP		2.0	Brown, f. to med. SAND.	1.0
					137		SC		3.5	Dark brown, v.f SAND with silty clay. Wet.	2.0
3.5	1	0	1	2	165		CL			Brown to gray, SILTY CLAY with med. plasticity. Wet. HCO.	
8.5	1	0	1	2	275		SC		7.5		
									13.0	Gray, v.f. to med. CLAYEY SAND. Sat.	
										Boring Terminated at Depth 13.0 ft	13.0

CATLIN BORING LOG 204-103 JP-5 LINE AREA G.P.I. TEST GDT 8/11/06

 Portland Cement
  Bentonite Pellets
  #2 Medium Sand

APPENDIX B

AFVR DATA FROM SHAW ENVIRONMENTAL, INC.

MCB CAMP LEJEUNE, NC
JOB# 119909

MCAS NEW RIVER BLDG AS-3905

Date: 12-14-06
Time: 0930

Lloyd Evans
Sampler: Jeff Moore
Conditions: 60° Cloudy

AFVR RW-1

RW-1	Time	DTP	DTW	Total
	0930	5.30	5.48	0.18
	1800	0	7.52	0

TP-1	Time	DTP	DTW	Total
	0930	6.57	6.89	0.32
	1200	10.92	11.31	0.39
	1400	11.93	12.04	0.11
	1600	11.93	12.20	0.27
	1800	11.90	12.22	0.32

TP-2	Time	DTP	DTW	Total
	0930	6.44	6.45	0.01
	1200	0	11.16	0
	1400	0	11.72	0
	1600	0	11.84	0
	1800	0	12.00	0

TP-3	Time	DTP	DTW	Total
	0930	6.17	8.26	2.09
	1200	9.81	12.48	2.67
	1400	10.79	12.50	1.71
	1600	11.11	12.51	1.40
	1800	11.30	12.51	1.21

TP-5	Time	DTP	DTW	Total
	0930	6.36	7.69	1.33
	1200	7.35	9.31	1.96
	1400	8.12	10.02	1.90
	1600	8.71	10.50	1.79
	1800	8.92	10.54	1.62

OBG-03R	Time	DTP	DTW	Total
	0930	6.65	7.20	0.55
	1200	8.45	8.92	0.47
	1400	9.00	9.49	0.49
	1600	9.10	9.61	0.51
	1800	9.21	9.76	0.55

USTAS4141-16	Time	DTP	DTW	Total
	0930	0	7.48	0
	1200	0	7.48	0
	1400	0	7.54	0
	1600	0	7.60	0
	1800	0	7.71	0

Date: 12-14-06
Time: 0930

Sampler: Jeff Moore
Conditions: 60° Cloudy

USTAS4141-17	Time	DTP	DTW	Total
	0930	5.97	5.98	0.01
	1200	0	7.34	0
	1400	0	8.11	0
	1600	0	8.34	0
	1800	0	8.41	0

USTAS4141-18	Time	DTP	DTW	Total
	0930	0	6.93	0
	1200	0	7.11	0
	1400	0	7.26	0
	1600	0	8.22	0
	1800	0	8.49	0

USTAS4141-19	Time	DTP	DTW	Total
	0930	0	6.08	0
	1200	0	6.54	0
	1400	0	6.80	0
	1600	0	6.87	0
	1800	0	6.93	0

USTAS4141-20	Time	DTP	DTW	Total
	0930	5.94	7.19	1.25
	1200	6.78	8.43	1.65
	1400	7.67	9.61	1.94
	1600	8.43	10.29	1.86
	1800	8.71	11.77	3.06

USTAS4141-21	Time	DTP	DTW	Total
	0930	5.90	7.08	1.18
	1200	8.21	9.59	1.38
	1400	8.77	10.23	1.46
	1600	8.84	10.34	1.50
	1800	8.83	10.31	1.48

Stack Readings FID	Time	PPM		
	1000	1826		
	1200	5549		
	1400	2080		
	1600	4462		
	1800	5126		

Vacuum Truck	Time	Pressure	RPM	
	1000	25"	650	
	1200	25"	650	
	1400	24"	650	
	1600	24"	650	
	1800	24"	650	

Comments: Ran Vacuum truck for 8 hours. Accumulated 2025 Gallon of water and recovered 7 Gallons of product.
Started Vacuum truck @ 1000

Date: 12-20-06
Time: 0900

Sampler: LF
Conditions: 51° Sunny

AFVR RW-1

RW-1	Time	DTP	DTW	Total
	0900	5.43	5.46	0.03
	1745	7.32	7.34	0.02

TP-1	Time	DTP	DTW	Total
	0845	6.82	7.10	.28
	1100	9.16	10.11	.95
	1300	9.67	10.00	.33
	1500	9.73	10.24	.51
	1700	9.86	11.65	1.79

TP-2	Time	DTP	DTW	Total
	0845	0	6.64	0
	1100	0	5.42	0
	1300	0	9.81	0
	1500	0	9.90	0
	1700	0	9.87	0

TP-3	Time	DTP	DTW	Total
	0845	6.40	8.57	2.17
	1100	7.76	10.14	2.38
	1300	9.53	11.49	1.96
	1500	9.10	11.53	2.43
	1700	9.13	11.86	2.73

TP-5	Time	DTP	DTW	Total
	0845	6.21	8.78	2.57
	1100	7.06	9.03	1.97
	1300	7.50	9.33	1.83
	1500	7.63	9.37	1.74
	1700	7.88	9.46	1.58

OBG-03R	Time	DTP	DTW	Total
	0845	6.90	7.51	.61
	1100	7.58	8.21	.63
	1300	7.74	8.71	.97
	1500	8.17	8.72	.55
	1700	8.15	8.73	.58

USTAS4141-16	Time	DTP	DTW	Total
	0845	0	7.08	0
	1100	0	7.11	0
	1300	0	7.13	0
	1500	0	7.23	0
	1700	0	7.28	0

MCB CAMP LEJEUNE, NC
JOB# 119909

MCAS NEW RIVER BLDG AS-3905

Date: 12-20-06
Time: 0900

Sampler: LE
Conditions: 51° Sunny

USTAS4141-17	Time	DTP	DTW	Total
	0845	0	6.25	0
	1100	0	6.73	0
	1300	0	7.08	0
	1500	0	7.39	0
	1700	0	7.43	0

USTAS4141-18	Time	DTP	DTW	Total
	0845	0	7.56	0
	1100	0	7.62	0
	1300	0	7.90	0
	1500	0	8.00	0
	1700	0	8.05	0

USTAS4141-19	Time	DTP	DTW	Total
	0845	0	6.35	0
	1100	0	6.50	0
	1300	0	6.61	0
	1500	0	6.69	0
	1700	0	6.71	0

USTAS4141-20	Time	DTP	DTW	Total
	0845	6.16	7.71	1.55
	1100	6.41	7.90	1.49
	1300	6.89	9.04	2.15
	1500	7.42	9.39	1.97
	1700	7.63	9.60	1.92

USTAS4141-21	Time	DTP	DTW	Total
	0845	6.11	7.21	1.10
	1100	7.10	9.06	1.96
	1300	7.36	9.82	2.46
	1500	7.61	9.18	1.57
	1700	7.58	9.28	1.70

Stack Readings FID	Time	PPM		
	0900	7.790		
	1100	2594		
	1300	11268		
	1500	3213		
	1700	2798		

Vacuum Truck	Time	Pressure	RPM	
	0900	25	650	
	1100	25	650	
	1300	25	650	
	1500	24	650	
	1700	24	650	

Comments: Ran Vacuum truck for 8 hours. Accumulated 2853
of water and recovered 12 Gallons of product.

Date: 1-4-07
Time: 0830

Sampler: LE
Conditions: Cloudy

AFVR RW-1

RW-1	Time	DTP	DTW	Total
	0830	4.89	4.97	0.08
	1700	0	9.60	0

TP-1	Time	DTP	DTW	Total
	0830	6.11	6.25	0.14
	1100	8.33	8.26	0.43
	1300	10.60	10.91	0.31
	1500	10.87	11.31	0.44
	1700	10.32	10.64	0.32

TP-2	Time	DTP	DTW	Total
	0830	0	6.06	0
	1100	0	8.48	0
	1300	0	10.71	0
	1500	0	10.68	0
	1700	0	10.48	0

TP-3	Time	DTP	DTW	Total
	0830	5.79	8.81	3.02
	1100	7.21	9.73	2.52
	1300	9.45	12.04	2.59
	1500	9.82	12.41	2.59
	1700	9.25	12.21	2.96

TP-5	Time	DTP	DTW	Total
	0830	5.84	7.32	1.48
	1100	6.42	8.53	2.11
	1300	7.97	9.96	1.99
	1500	8.21	10.03	1.82
	1700	8.11	9.54	1.43

OBG-03R	Time	DTP	DTW	Total
	0830	6.17	6.71	0.54
	1100	7.17	7.74	0.57
	1300	8.13	8.60	0.47
	1500	8.36	8.84	0.48
	1700	8.24	8.50	0.26

USTAS4141-16	Time	DTP	DTW	Total
	0830	0	6.02	0
	1100	0	6.06	0
	1300	0	6.20	0
	1500	0	6.32	0
	1700	0	6.46	0

Date: 1-4-07
Time: 0830

Sampler: LE
Conditions: Cloudy

USTAS4141-17	Time	DTP	DTW	Total
	0830	0	5.53	0
	1100	0	6.22	0
	1300	0	7.37	0
	1500	0	7.69	0
	1700	0	7.60	0

USTAS4141-18	Time	DTP	DTW	Total
	0830	0	6.55	0
	1100	0	7.08	0
	1300	0	7.14	0
	1500	0	7.62	0
	1700	0	7.63	0

USTAS4141-19	Time	DTP	DTW	Total
	0830	0	5.23	0
	1100	0	5.68	0
	1300	0	6.10	0
	1500	0	6.21	0
	1700	0	6.24	0

USTAS4141-20	Time	DTP	DTW	Total
	0830	5.50	6.85	1.35
	1100	5.83	7.56	1.73
	1300	7.09	8.96	1.87
	1500	7.71	9.58	1.87
	1700	8.00	9.88	1.88

USTAS4141-21	Time	DTP	DTW	Total
	0830	5.53	6.87	1.34
	1100	6.73	9.04	2.11
	1300	7.78	9.61	1.63
	1500	8.12	9.82	1.70
	1700	7.61	8.97	1.36

Stack Readings FID	Time	PPM		
	0900	4473		
	1100	10405		
	1300	7512		
	1500	7389		
	1700	4932		

Vacuum Truck	Time	Pressure	RPM	
	0900	25	700	
	1100	24	700	
	1300	24	700	
	1500	23	700	
	1700	23	700	

Comments: Ran Vacuum truck for 8 hours. Accumulated 2295 Gallons of water and recovered 7 Gallons of product.

Date: 1-12-07
Time: 0845

Sampler: 18
Conditions: 58°

AFVR RW-1

RW-1	Time	DTP	DTW	Total
	0900	4.71	4.77	.06
	1700	0	9.81	0

TP-1	Time	DTP	DTW	Total
	0900	5.95	6.12	.17
	1100	8.87	9.47	.60
	1300	10.57	10.87	.30
	1500	10.76	11.26	.50
	1700	11.00	11.45	.45

TP-2	Time	DTP	DTW	Total
	0900	0	5.82	0
	1100	0	9.18	0
	1300	0	10.54	0
	1500	0	10.77	0
	1700	0	10.94	0

TP-3	Time	DTP	DTW	Total
	0900	5.59	7.83	2.24
	1100	8.06	10.65	2.59
	1300	9.30	12.06	2.76
	1500	9.64	12.56	2.92
	1700	9.88	12.56	2.68

TP-5	Time	DTP	DTW	Total
	0900	5.70	7.41	1.71
	1100	7.03	9.12	2.09
	1300	8.05	9.94	1.89
	1500	8.26	10.13	1.87
	1700	8.45	10.31	1.86

OBG-03R	Time	DTP	DTW	Total
	0900	6.00	6.53	.53
	1100	7.45	7.98	.53
	1300	8.18	8.57	.39
	1500	8.31	8.67	.36
	1700	8.50	9.15	.65

USTAS4141-16	Time	DTP	DTW	Total
	0900	0	5.94	0
	1100	0	6.02	0
	1300	0	6.12	0
	1500	0	6.23	0
	1700	0	6.35	0

Date: 1-12-07
Time: 0845

Sampler: LE
Conditions: 58

USTAS4141-17	Time	DTP	DTW	Total
	0900	0	5.33	0
	1100	6.53	6.54	.01
	1300	0	7.30	0
	1500	0	7.57	0
	1700	0	7.73	0

USTAS4141-18	Time	DTP	DTW	Total
	0900	0	6.60	0
	1100	0	6.71	0
	1300	0	7.37	0
	1500	0	7.45	0
	1700	0	7.53	0

USTAS4141-19	Time	DTP	DTW	Total
	0900	0	5.42	0
	1100	0	5.72	0
	1300	0	6.00	0
	1500	6.03	6.04	.01
	1700	6.14	6.45	.31

USTAS4141-20	Time	DTP	DTW	Total
	0900	5.36	6.70	1.34
	1100	6.03	9.01	2.98
	1300	7.08	9.03	1.95
	1500	7.59	9.70	2.11
	1700	7.49	10.04	2.60

USTAS4141-21	Time	DTP	DTW	Total
	0900	5.31	6.74	1.43
	1100	7.17	9.21	2.04
	1300	8.00	9.73	1.73
	1500	8.08	9.83	1.75
	1700	8.22	10.18	1.96

Stack Readings FID	Time	PPM		
	0900	267		
	1100	498		
	1300	501		
	1500	549		
	1700	618		

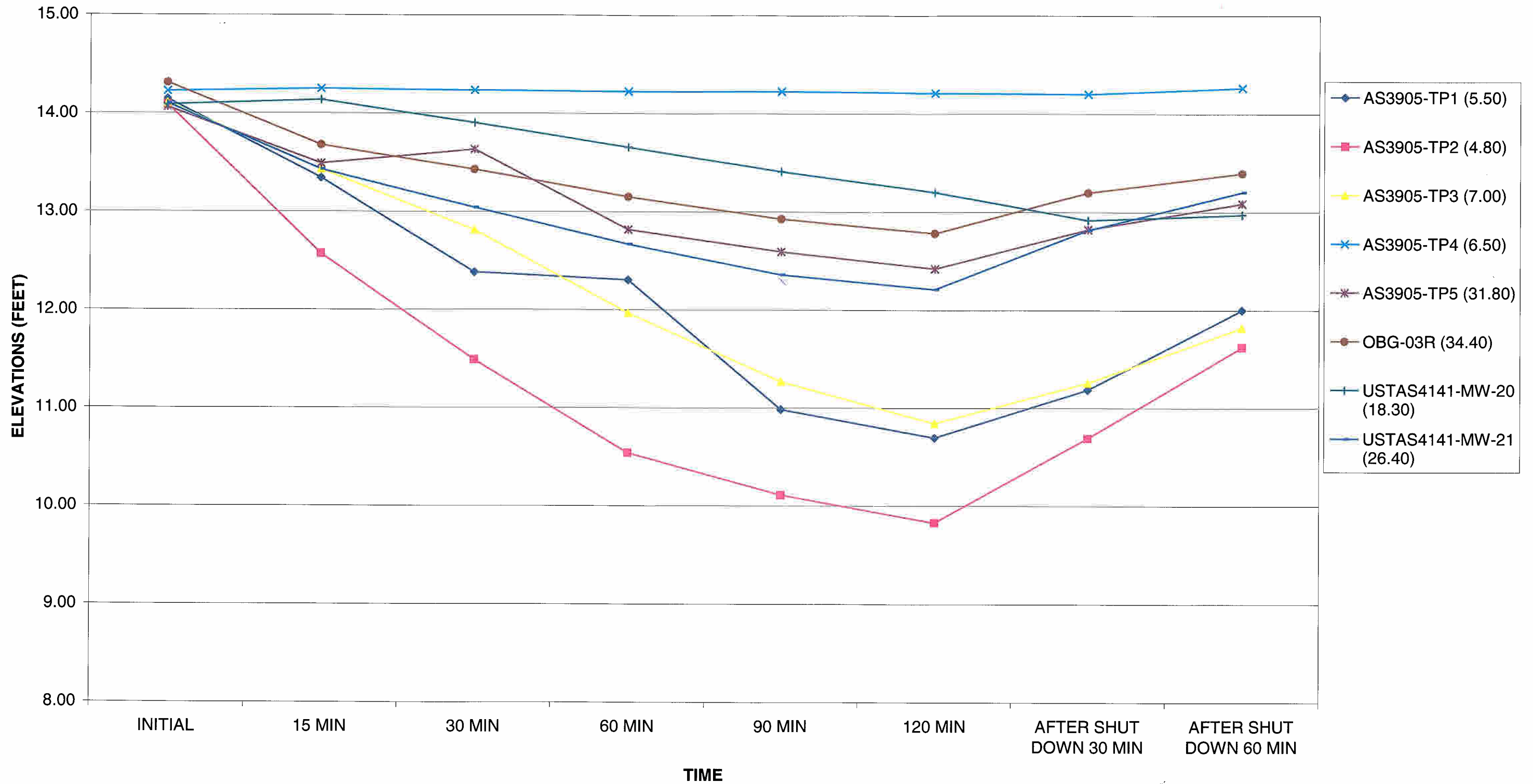
Vacuum Truck	Time	Pressure	RPM	
	0900	25	700	
	1100	24	700	
	1300	23	700	
	1500	23	700	
	1700	23	700	

Comments: Total Mixture Collected in Vac truck was
130 gals of water & 7 of product.

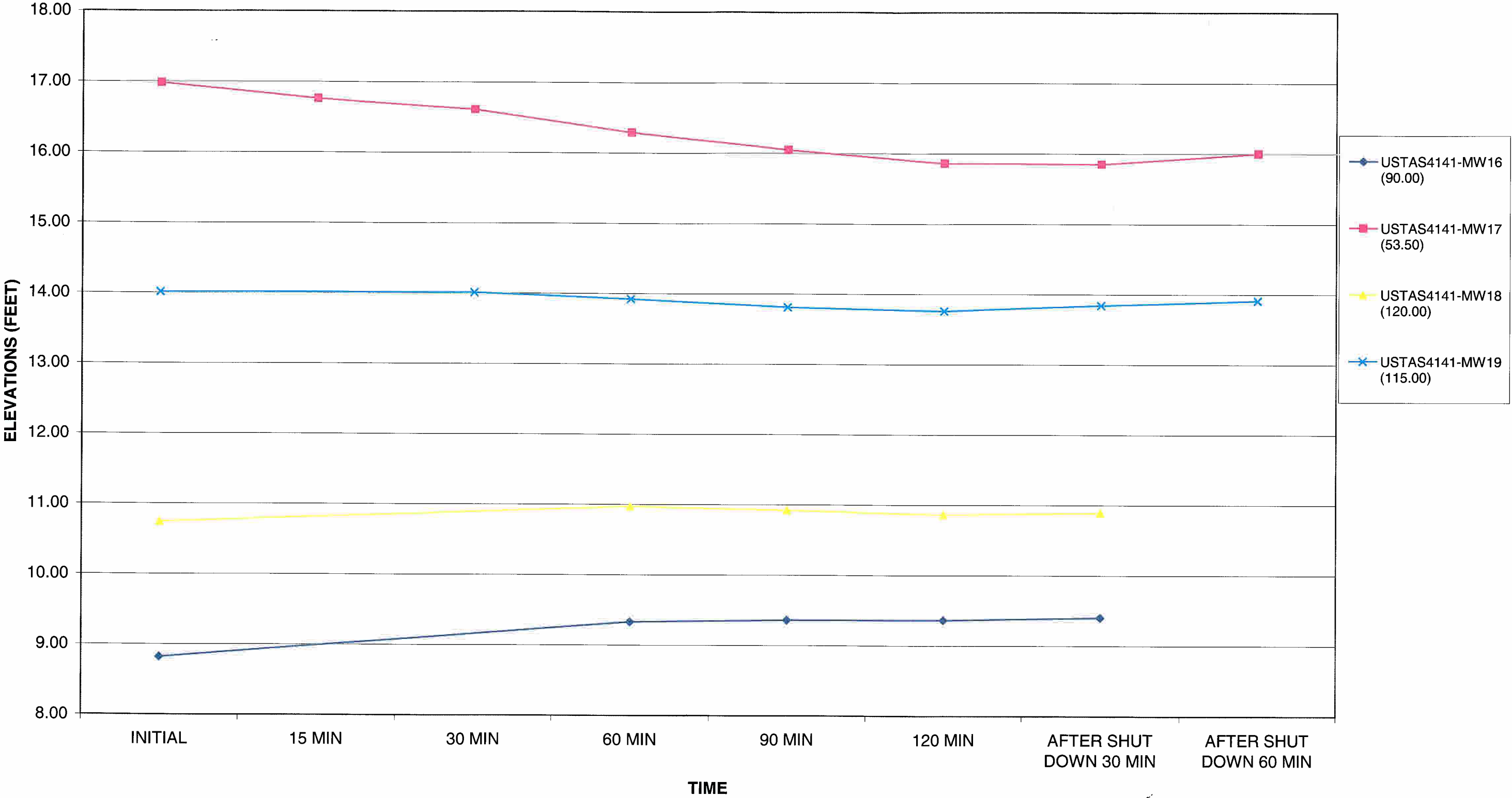
APPENDIX C

GRAPHS

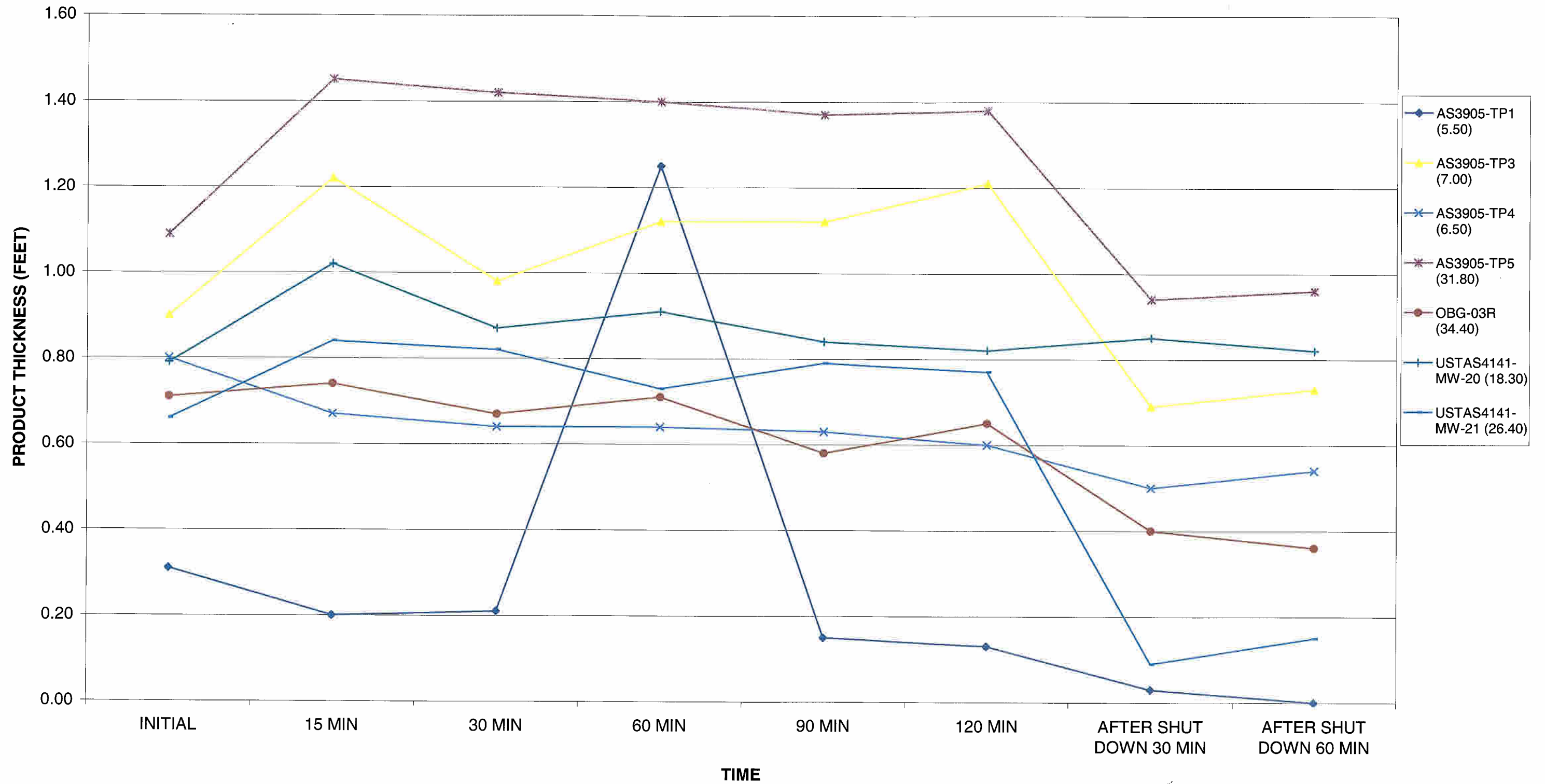
GRAPH #1
GROUNDWATER ELEVATIONS DURING AFVR PILOT TEST WITHIN 50 FEET OF RW-1



GRAPH #2
GROUNDWATER ELEVATIONS DURING AFVR PILOT TEST GREATER THAN 50 FEET FROM RW-1



GRAPH #3
FREE-PHASE PRODUCT THICKNESS DURING AFVR PILOT TEST



GRAPH #4
FREE-PHASE PRODUCT THICKNESS COMPARISON OF INITIAL GAUGING FOR EACH EVENT

