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Baker

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August 30, 1995

Commander
Atlantic Division
1510 Gilbert Street, Building N-26
Norfolk, Virginia 23511-2699

Attn: Mr. James Harris
Code 18225

Re: Contract N62470-89-D-4814
Navy CLEAN, District III
Contract Task Order (CTO) 0269
Building LP-20 Site, Naval Aviation Depot (NADEP), Norfolk
Work Plan Addendum - Yorktown Aquifer Investigation

Dear Mr. Harris:

Baker Environmental, Inc. (Baker) is pleased to submit three copies of the Work Plan Addendum for the Yorktown Aquifer Investigation for the above referenced site. The scope of work described in this Work Plan is based on the scope of work modification negotiated on August 24, 1995. Two copies of this Work Plan have been submitted to Ms. Dianne Bailey of Norfolk Naval Base and Mr. John Bunn of the Naval Aviation Depot (NADEP) Environmental Programs Department.

The field activities are scheduled to begin on September 18, 1995 with well installation activities scheduled for completion by September 26, 1995. Groundwater sampling activities will be performed between October 2, 1995 and October 6, 1995.

Baker appreciates the opportunity to provide technical services to the U.S. Navy for this important project. If you have any questions, please contact me at (412)269-2026.

Sincerely,

BAKER ENVIRONMENTAL, INC.

David J Mamrose

David J. Mamrose, P.E.
Project Manager

DJM/lq

cc: Ms. Lee Anne Rapp, Code 18312 (letter only)
Ms. Dianne Bailey, Code N-42B
Mr. John Bunn, NADEP Code 904

WORK PLAN ADDENDUM
YORKTOWN AQUIFER INVESTIGATION

BUILDING LP-20 SITE
NAVAL BASE, NORFOLK, VIRGINIA

CONTRACT TASK ORDER 0269

August 30, 1995

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

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1.0 INTRODUCTION

This Work Plan Addendum (WPA) has been developed by Baker Environmental, Inc. (Baker) to further evaluate the extent of contamination in the Yorktown Aquifer associated with the past storage and disposal practices of solvents in the vicinity of Building LP-20 at the Naval Base in Norfolk, Virginia. The services to be performed are part of the Remedial Investigation/Feasibility Study (RI/FS) which is currently underway for Building LP-20 under the Navy CLEAN Contract No. N62470-89-D-4814, Contract Task Order (CTO) 0269. This project is being managed through the Naval Facilities Engineering Command, Atlantic Division (LANTDIV).

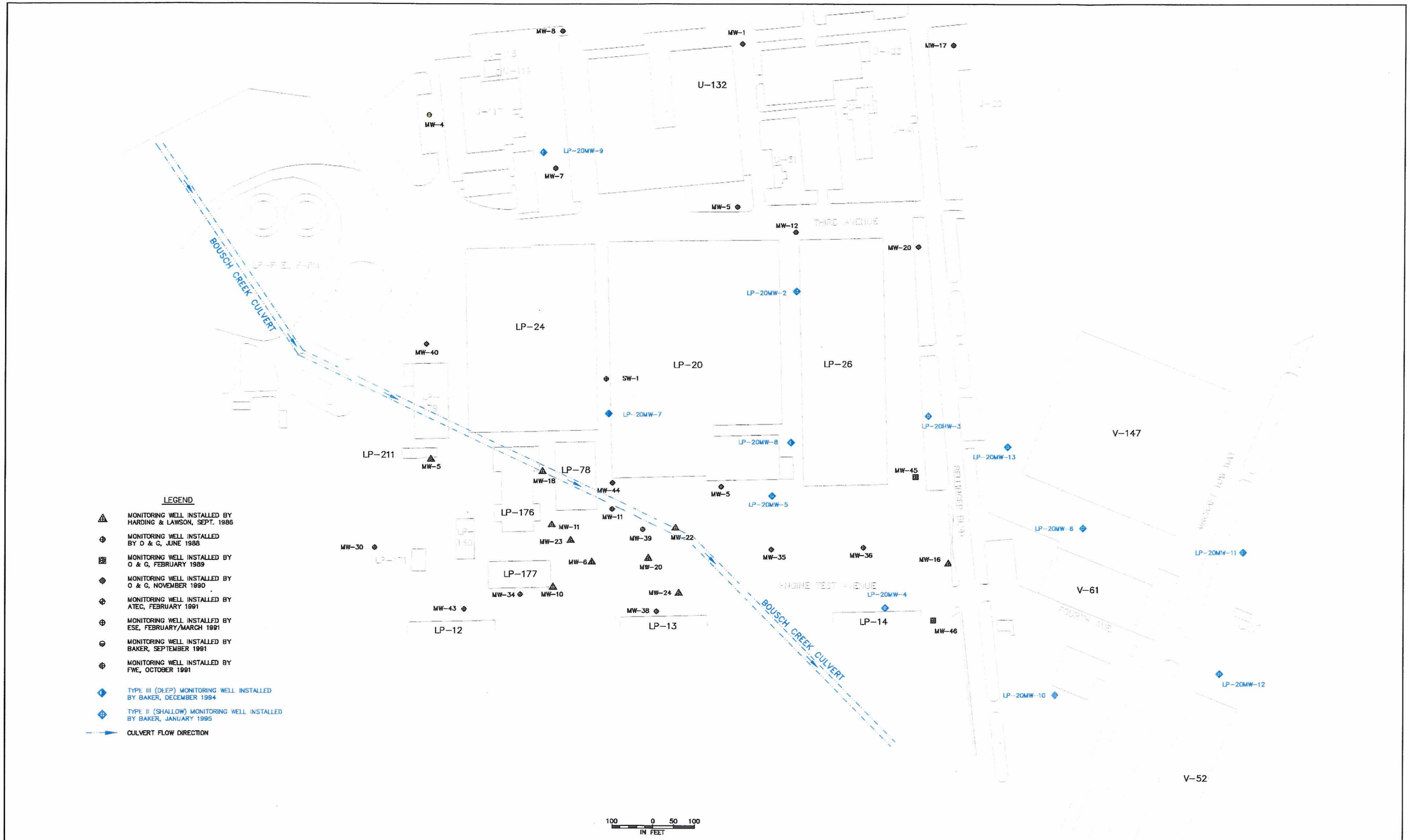
This WPA is intended to discuss general methods and procedures to assess the vertical and horizontal extent of contamination in the Yorktown Aquifer in the vicinity of Building LP-20. Specific sample collection procedures and laboratory analytical methods are presented in the Final Project Plans (Baker, 1994).

1.1 Background Information

Building LP-20 is located in the Naval Aviation Depot (NADEP) area of Naval Base Norfolk (NBN). The site is situated in a heavily developed area which includes industrial and military activities.

Building LP-20 and surrounding buildings provide support for aircraft operations including maintenance and repair activities. To provide this support, several areas in the vicinity of Building LP-20 utilize solvents, aviation fuel, and other forms of petroleum products. Metal plating operations were previously performed within Building LP-20 but have been discontinued. The plating operations have since been relocated to Building LP-24. The location of Buildings LP-20 and LP-24 are shown on Figure 1-1.

NADEP has been identified by the U.S. Navy for closure under the Base Realignment and Closure (BRAC) plan. Operations for the area are to be phased out and several NADEP facilities closed by 1996. Several operations such as the metal plating shop in Building LP-24 may remain active depending upon the anticipated needs of the area. Final closure plans for the NADEP area have not been completed.



LEGEND

- MONITORING WELL INSTALLED BY HARDING & LAWSON, SEPT. 1986
- MONITORING WELL INSTALLED BY O & G, JUNE 1988
- MONITORING WELL INSTALLED BY O & G, FEBRUARY 1989
- MONITORING WELL INSTALLED BY O & G, NOVEMBER 1990
- MONITORING WELL INSTALLED BY ATEC, FEBRUARY 1991
- MONITORING WELL INSTALLED BY ESE, FEBRUARY/MARCH 1991
- MONITORING WELL INSTALLED BY BAKER, SEPTEMBER 1991
- MONITORING WELL INSTALLED BY FWE, OCTOBER 1991
- TYPE III (DEEP) MONITORING WELL INSTALLED BY BAKER, DECEMBER 1994
- TYPE II (SHALLOW) MONITORING WELL INSTALLED BY BAKER, JANUARY 1995
- CULVERT FLOW DIRECTION

REVISIONS	DRAWN REL REVIEWED DJM S.O.# 62470-269-0000-04100 CADD# 269901WP	NORTH		BUILDING LP-20 NAVAL BASE, NORFOLK NORFOLK, VIRGINIA BAKER ENVIRONMENTAL, Inc. Coraopolis, Pennsylvania	Baker Baker Environmental, Inc.	SITE PLAN SCALE DATE AUGUST 1995	FIGURE NO. 1-1

Due to the amount of petroleum and chemical product stored and utilized in the area, several environmental investigations have been performed in the area to evaluate pipelines and underground storage tanks (USTs). As a result, numerous monitoring wells were installed in the Building LP-20 area. The locations of several of these existing monitoring wells are shown on Figure 1-1.

Baker initiated the RI field program in December 1994. At this time, three monitoring wells (LP-20MW-7, LP-20MW-8, and LP-20MW-9) were installed into the upper Yorktown Aquifer. Subsequent phases of the RI field program performed in December 1994 and January 1995 included an in-situ groundwater survey and the installation of nine monitoring wells to the base of the shallow Columbia Aquifer. The location of the monitoring wells installed during the RI field program are provided on Figure 1-1. Groundwater sampling of the three deep and nine shallow monitoring wells, and selected existing monitoring wells, was performed in February 1995.

The groundwater analytical results indicated that each of the three monitoring wells installed in the upper Yorktown Aquifer have volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) present. Four VOCs, detected in the Yorktown monitoring wells exceed the Federal Maximum Contaminant Levels (MCLs). These four VOCs were benzene, vinyl chloride, trichloroethene, and 1,2-dichloroethene. One SVOC, bis(2-ethylhexyl)phthalate, was also detected above MCLs. Several total and dissolved inorganics also exceeded groundwater criteria.

The source of the upper Yorktown Aquifer contamination is not known. Several possible explanations exist as to how these contaminants reached the lower aquifer. With several of the contaminants having a specific gravity greater than water, it is possible that the contaminants from the shallow aquifer have migrated downward from the shallow aquifer through the clay layer and into the Yorktown Aquifer. At boring locations LP-20MW-7 and LP-20MW-8, the clay layer ranges in thickness from 8 to 12 feet, respectively. Considering the age of the facility and the elevated contaminant concentrations detected in the vicinity of Buildings LP-20 and LP-26, the contaminants may have penetrated the clay layer over a period of several decades.

The vertical migration of contaminants may have been initiated by the intrusion of the Building LP-20 support piles through the clay layer during facility expansion. The contaminants may also have migrated to the site from an off-site area. Following a northwest groundwater flow in the Yorktown Aquifer, contaminants may have migrated from an area located southeast of the site.

1.2 Objectives

Horizontal and vertical extent of contaminants in the Yorktown Aquifer have not been established. In addition, because deep groundwater flows to the northwest in the vicinity of the site, potential source areas located east of Building LP-20 have not been defined.

Based on the results of the RI field activities performed between December 1994 and February 1995, it is apparent that VOC, SVOC, and inorganic contamination has migrated into the Yorktown Aquifer. Therefore, the objective of the proposed additional field activities are to:

- Confirm that the contamination of the Yorktown Aquifer in the vicinity of Building LP-20 is associated with past activities performed in the Building LP-20 area.

- Define the horizontal extent of contamination in the Yorktown Aquifer in the vicinity of the Building LP-20 site.

- Evaluate the vertical extent of groundwater contamination in the Yorktown Aquifer in the vicinity of Building LP-20.

2.0 TECHNICAL APPROACH - FIELD ACTIVITIES

This section briefly describes the methods which will be used to collect and analyze groundwater samples for the additional proposed field activities. Additional descriptions of sample collection, shipment, analyses, and evaluation are included in the Final Project Plans prepared for the RI/FS (Baker, 1994).

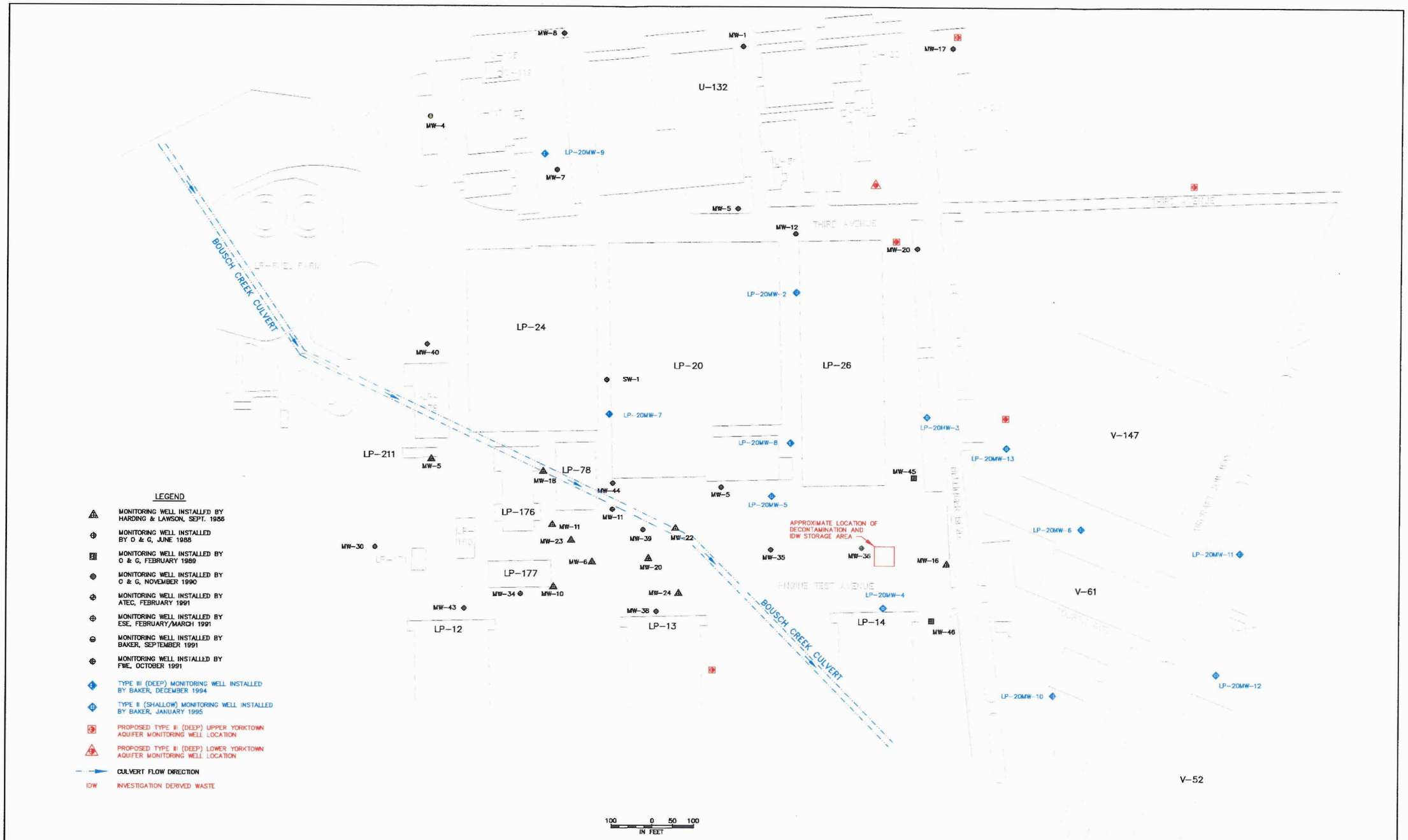
2.1 Monitoring Well Installation

A total of six additional monitoring wells are proposed for installation in the Yorktown Aquifer to evaluate the horizontal and vertical extent of contamination. The proposed location of these wells are shown on Figure 2-1. Actual monitoring well locations will be dependant upon accessibility of the boring locations and potential concerns for subsurface utilities.

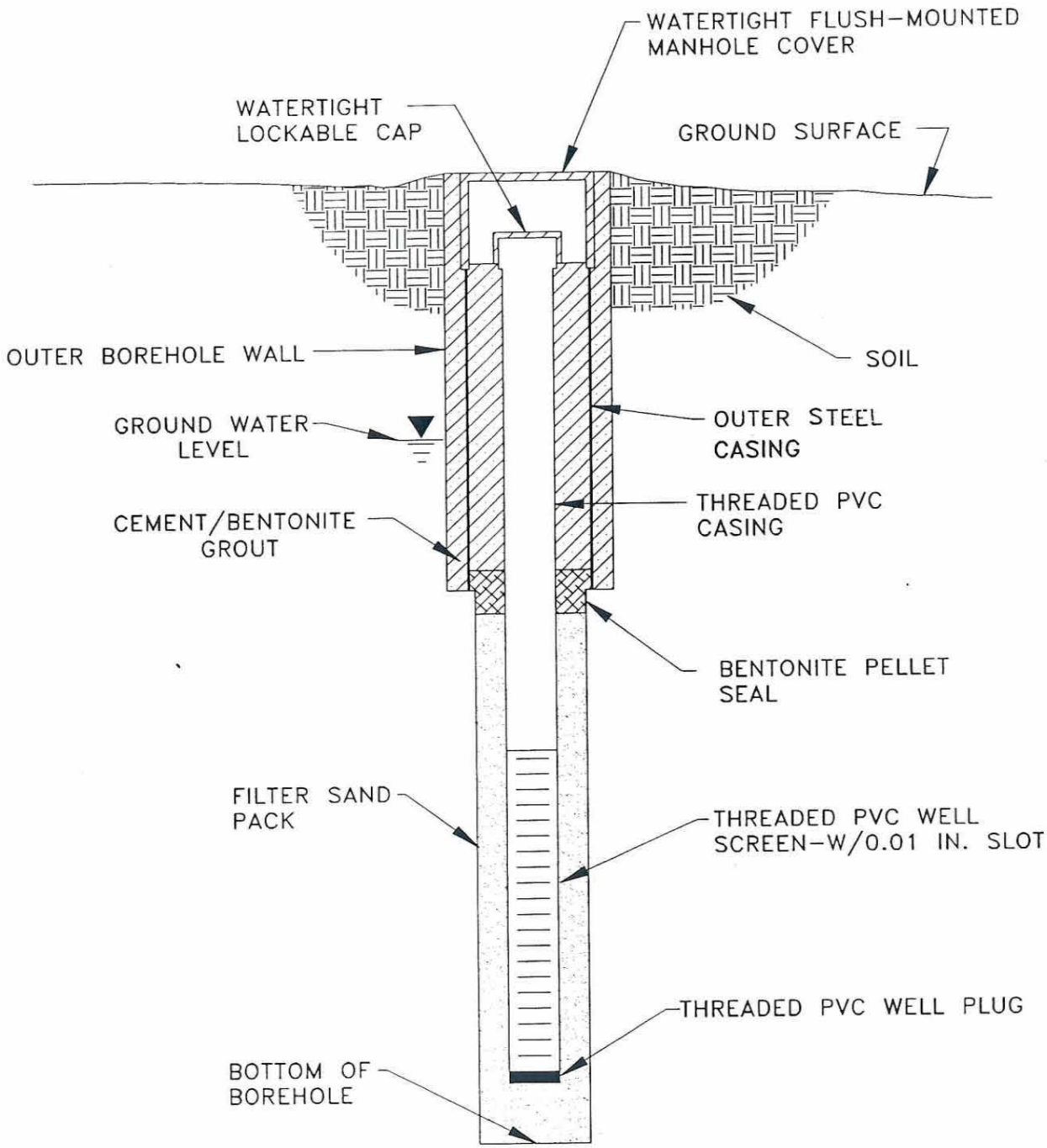
2.1.1 Upper Yorktown Monitoring Wells

Five of the monitoring wells shall be installed in the upper portion of the Yorktown Aquifer. It is anticipated that well depths will range from 65 to 70 feet below ground surface. It is assumed that the clay layer encountered beneath the Building LP-20 site will also be encountered at a depth of approximately 30 feet at each of the monitoring well locations. These wells shall be advanced approximately 15 to 20 feet into the Yorktown Aquifer, below the base of the confining clay layer. Due to concerns of "dragging" contamination into the Yorktown Aquifer from the shallow Columbia Aquifer, the monitoring wells will be constructed as Type III wells. This type of well construction utilizes a larger diameter outer casing which is advanced to the clay layer and used to seal off the boring from the Columbia Aquifer. A schematic of a Type III monitoring well is provided as Figure 2-2.

The soil borings will be advanced as part of the monitoring well installation using hollow-stem augers, rotary drilling techniques, and a truck-mounted drill rig. The borings will initially be advanced using a 4 1/4-inch inside diameter (I.D.) hollow-stem auger. During advancement of the boring, soils will be sampled for lithologic characterization using a two-foot long 2 3/8-inch I.D. stainless steel split-barrel sampler in accordance with ASTM Method D-1586. Split-spoon samples will be collected at five foot intervals to a depth of approximately 20 feet below ground surface. At



REVISIONS		NORTH		BUILDING LP-20 NAVAL BASE, NORFOLK NORFOLK, VIRGINIA		PROPOSED INVESTIGATION ACTIVITIES	FIGURE NO.
	DRAWN REL REVIEWED DJM S.O.# 62470-269-0000-04100 CADD# 269902WP			BAKER ENVIRONMENTAL, Inc. Coraopolis, Pennsylvania	Baker Baker Environmental, Inc.	SCALE / DATE AUGUST 1995	2-1



N.T.S.

Baker Environmental, Inc.

FIGURE 2-2
TYPICAL DEEP BELOW GRADE GROUNDWATER
MONITORING WELL CONSTRUCTION DIAGRAM
BUILDING LP-20 SITE

NAVAL BASE NORFOLK
NORFOLK, VIRGINIA

this depth the soil samples shall be collected continuously until the underlying clay layer is encountered.

After the clay layer is encountered, the soil boring shall be enlarged to eight inches using rotary drilling methods. A six-inch solid, Sch. 40 steel casing will be installed. Once the six-inch casing is installed to the proper depth, the casing will be grouted in place using a Portland cement/bentonite grout mixture. The grout will be added using a tremmie pipe.

The grout will be allowed to dry for approximately 24 hours. The grout inside the PVC casing will then be reamed out using a 5 7/8-inch tricone rotary bit. Upon reaching the bottom of the casing, fluids within the casing will be flushed out using fresh potable water and containerized for later disposal.

The soil boring will be further advanced using the 5 7/8-inch tricone bit. Soil samples will be obtained at five-foot intervals using ASTM methods until the final depth of the boring is reached. If possible, only potable water will be used in drilling fluids to further advance the soil boring. However, soil conditions may require that bentonite be added to stabilize the soil boring. If bentonite is required for stabilization of the borehole, the minimum amount required to perform the well installation will be used.

Upon termination of the soil boring, a 10-foot section of two-inch I.D., flush-threaded, Sch. 40 PVC well screen with 0.010-inch slots will be used in the bottom portion of the well connected to a flush-threaded Sch. 40 well casing placed to the ground surface. A gravel pack of No. 1 clean quartz sand will be placed to a minimum of two feet above the top of the well screen. A bentonite pellet seal will be installed to a minimum of two feet above the gravel pack. The bentonite pellets will be hydrated with potable water and allowed to set for at least 30 minutes prior to grouting. A grout mixture of portland cement and bentonite will be placed above the bentonite seal to the ground surface.

The Type III monitoring well sill be completed at the surface with a water-tight, flush-mounted, protective casing with locking cap. Finally, a 2-foot by 2-foot by 4-inch thick cement apron will be set within the asphalt, centered around the protective casing, so that surface water does not collect at the well.

2.1.2 Lower Yorktown Aquifer Monitoring Well

One monitoring well will be installed to a depth of approximately 110 feet below ground surface. This monitoring well is intended to determine if the lower portion of the Yorktown Aquifer has been adversely impacted by site contaminants. The well will be installed downgradient of the area of highest known contamination of the Columbia Aquifer and near the estimated source of the groundwater contamination. The possible location for this well is west of Building LP-26. Due to numerous subsurface utilities present in both areas, the actual location of this well will be determined in the field. Figure 2-1 illustrates the preferred location for the monitoring well.

The lower Yorktown Aquifer monitoring well will be installed in a similar manner as the upper Yorktown Aquifer monitoring wells described above. The well will be installed as a Type III monitoring well with the outer casing grouted into the underlying clay layer to seal of contaminants from the shallow aquifer.

2.2 Soil Sampling

As discussed earlier, soil samples will be collected at five-foot intervals. Sampling frequencies will increase as the soil boring is advanced near the suspected depth of the clay layer. The soil samples will be used for visual description of the stratigraphic horizon, discolorations, odors and other visual observations. These observations will be described and recorded in a field logbook maintained specifically for this investigation.

Each soil sample shall also be screened in the field using an HNu photoionization detector (PID) to evaluate the potential presence of volatile organic contamination within the soil boring. Unlike subsurface soil samples collected in the previous RI field program, soil samples collected during this investigation will not be retained for chemical analyses.

2.3 Well Development

The newly installed wells will be developed after allowing the grout to cure for at least 24 hours. Development will be performed by removing at least three to five borehole volumes of groundwater with temperature, pH, and specific conductivity readings stabilizing to within ten percent.

Development may also be considered complete after the well has been pumped or bailed dry multiple times.

2.4 Groundwater Sampling

Groundwater samples will be collected from each of the six newly installed and three existing deep monitoring wells. The monitoring wells will be sampled for the following analytical parameters:

- TCL (Target Compound List) VOCs
- TCL SVOCs
- TAL (Target Analyte List) metals (total and dissolved fractions)
- Cyanide

The number of original and control (field duplicate, trip blank, rinsate blank, and matrix spike/matrix spike duplicate [MS/MSD]) samples are described in the Final Project Plans. Level D quality control will be observed for laboratory analyses.

2.5 Sample, Identification, Handling, and Shipping

Each groundwater sample will be identified and numbered as described in a manner consistent with the Final Project Plans. A description of the sample numbering system is described on Page 3-21 of the Sampling and Analysis Plan (SAP) (Baker 1994).

All groundwater samples will be chemically preserved, if appropriate, and packaged with ice to four degrees centigrade prior to transport to the analytical laboratory. Sample preservation and handling will be conducted as described in the Final Project Plans which have been prepared for this RI/FS.

Proper chain-of-custody (COC) documentation will be maintained for all samples from the time of collection until shipped to the analytical laboratory. Samples will be transported by overnight courier to arrive before noon the following day. The only exception is that samples shipped on Saturday will not arrive at the laboratory until Monday morning.

2.6 Waste Handling and Disposal

Materials (cuttings and fluids) generated by the soil boring/well installation activities and decontamination procedures shall be stored in a roll-off box and multi-compartment tanker located in the parking area east of Building LP-26. Drums (55-gallon size) will be used to transport the investigation derived waste (IDW) materials generated at the soil boring locations to the material staging area. It is intended that the drums will be used several times during the field program to transport IDW materials to the staging area. Upon completion of the field program, it will be necessary to properly decontaminate and dispose of the drums.

Soil and groundwater samples shall be collected from the roll-off box and tanker to determine proper disposal method. One composite soil sample will be collected from the roll-off box and one grab type sample will be collected from each of the three compartments of the tanker. Each sample shall be analyzed for the following chemical parameters:

- TCL VOCs
- TCL SVOCs
- TCLP metals
- Polychlorinated Biphenyls (PCBs)
- Pesticides
- Ignitability
- Corrosivity
- Reactivity

In addition, the composite soil sample shall be analyzed for total petroleum hydrocardons (TPH).

As with the groundwater samples, the laboratory turnaround time for the IDW analyses will be two weeks. This will reduce the amount of time that the roll-off box and tanker will be required to remain on site.

3.0 TECHNICAL APPROACH - POST SAMPLING ACTIVITIES

After the groundwater samples have been collected and all the analytical results are received, further evaluation of site conditions will be performed by Baker.

3.1 Data Validation

As specified in the Final Project Plans, an independent subcontractor will perform data validation services. Samples collected during the field investigation for laboratory analyses will be analyzed using NEESA Level D quality control. Data review procedures specified by NEESA 20.2-047B will be followed to ensure that raw data are not altered and that an audit trail is developed for those data which require reduction.

Specified QA/QC procedures for validation are presented in the Final Quality Assurance Project Plan (QAPP) (Baker, 1994). It should be noted that 100 percent of the analytical data generated during the monitoring well sampling activities will be analyzed. The analytical results from the IDW samples will not require validation.

3.2 Sample Tracking/Evaluation

Services will be provided by a data management system contractor. The data management contractor sends validated data back to the data manager by way of electronic disk deliverable. The data manager will enter the appropriate validation qualifiers from the hard copy. The data manager then subdivides the data set into respective media and performs statistics such as frequency of detection, minimum detected value, maximum detected value, arithmetic and geometric means, and upper 95th percent confidence intervals to the mean. These data are then compiled into report quality deliverables for use in the systems report.

3.3 Reporting

The results of the additional groundwater sampling activities will be incorporated into the Draft Final RI Report. The Draft Final RI Report shall be modified to include the following information:

- Revisions to text, tables, and figures to include well installation, sampling, and analytical results.

- Modification of geologic cross-sections to depict geologic conditions identified by the additional wells.

- Boring logs/well completion diagrams of the newly installed monitoring wells

- IDW disposal documentation

The data shall be incorporated into the Draft Final RI Report for submittal to the Restoration Advisory Board (RAB).

3.4 Project Schedule

Because the analytical information from these deep monitoring wells are to be used to evaluate the extent of contamination in the Yorktown Aquifer, these results are important to both the RI and FS documents. To reduce potential delays in preparing these documents, the selected analytical laboratory will analyze the samples within a two week period.

It is estimated that the field program for this investigation will be completed within a three week period. Currently, well installation activities are scheduled to begin on September 18, 1995 and be completed by September 26, 1995. Groundwater sampling activities will be performed between October 2, and October 6, 1995.

The Draft Final RI and FS Reports shall be submitted to LANTDIV, the Activity, and the designated RAB members on December 1, 1995.

4.0 REFERENCES

Baker Environmental, Inc. Final Project Plans, Remedial Investigation/Feasibility Study, Building LP-20 Site, Naval Base, Norfolk, Virginia, December 1994.

Baker Environmental, Inc. Draft Remedial Investigation Report and Baseline Risk Assessment, Naval Base, Norfolk, Virginia, June 1995.