AQUIFER TEST WORK PLAN FOR SITE 82 WITH TRANSMITTAL NCB CAMP LEJEUNE NC

1/1/1996

OHM REMEDIATION

OHM Remediation
Services Corp.

AQUIFER TEST WORK PLAN
SITE 82
MCB CAMP LEJEUNE, NORTH CAROLINA

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
Delivery Order 0015

Prepared by

OHM Remediation Services Corp.
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Project Manager

January 1996

OHM Project No. 16032

OHM Remediation
Services Corp.
A Subsidiary of OHM Corporation

January 6, 1996

Cheryl Hansen/ROICC
Naval Facilities Engineering Command
1005 Michael Road
Camp Lejeune, NC 28540

Re: Contract N62470-93-D-3032; Delivery Order 0015
MCB Camp Lejeune, NC
OHM Project No. 16032
Aquifer Test Work Plan

Dear Ms. Hansen:

Enclosed herewith please find three copies each of the subject document which has been revised to reflect comments received from LANTDIV.

Very truly yours,
OHM Remediation Services Corp.

James A. Dunn, Jr., P.E.
Senior Project Manager

/mja

Enclosures

pc: Lance Laughmiller - Code 18233 (1)
Neal Paul - IRD/EMD w/enclosure (2)
Matt Bartman - Baker Environmental w/enclosure (1)
Randy Smith - OHM w/enclosure (5)
Patrick Watters - NCDEHNR w/enclosure (1)
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1.0 INTRODUCTION

The following aquifer testing program is presented in outline or macro format to allow for field modification as necessary to meet varying conditions. The general parameters presented herein are a result of meetings and discussions with Baker Environmental, LANTDIV, and OHM technical personnel. We anticipate conducting this test program immediately following the Christmas holidays, i.e., commencing the first week of January 1996. The new piezometer installation will occur prior to Christmas 1995.

2.0 MONITORING WELL SAMPLING

In order to properly evaluate the effectiveness of the treatment system, it is recommended that a complete round of monitoring well sampling be conducted prior to the aquifer test. This timing will allow for "baseline" sampling, i.e., prior to any activities which could influence static conditions in the aquifer.

2.1 INITIAL SAMPLING

In consultation with Baker Environmental, we have jointly developed the following lists of monitoring wells which are proposed to be sampled. Subsequent sampling events to be conducted to measure the effectiveness of the treatment system will involved fewer wells as indicated below.

Shallow Wells	**Deep Wells**
6 GW 1S	6 GW 1D
6 GW 33	6 GW 1DA
6 GW 34	6 GW 1DB
82 MW 3	6 GW 27D
6 GW 28S	6 GW 27DA
	6 GW 28D
SRW - 1	DRW - 1
6 GW 32	6 GW 40DW
	6 GW 40DWA
82 MW 2	
82 MW 1	6 GW 38D
82 MW 30	6 GW 15D
6 MW 3S	6 GW 30D
6 GW 3	6 GW 37D
6 GW 26	6 MW 3D
6 GW 30S	6 GW 2D
6 GW 2S	

Analytical testing to be performed on the groundwater samples will include EPA Method 8021 or 601/602 for volatile organic compounds (VOCs) and EPA Methods 6010/7060/7421/7470 or 200.7/2062/239.2/245.1 for target analyte metals (total). Results will be compared against the remediation goals set in the Record of Decision and indicated in the following table.

Remediation Goals for OU No. 2 – Groundwater Remediation

Media	Contaminant of Concern	Remediation Goal	Unit	Basis
Ground-water	1,2-Dichloroethane	0.38	ug/L	NCWQS
	Trans-1,2Dichloroethene	70	ug/L	NCWQS
	Ethylbenzene	29	ug/L	NCWQS
	Tetrachloroethene	0.7	ug/L	NCWQS
	Trichloroethene	2.8	ug/L	NCWQS
	Vinyl Chloride	0.015	ug/L	NCWQS
	Arsenic	50	ug/L	NCWQS
	Barium	1,000	ug/L	NCWQS
	Beryllium	4	ug/L	MCL
	Chromium	50	ug/L	NCWQS
	Lead	15	ug/L	MCL
	Manganese	50	ug/L	NCWQS
	Mercury	1.1	ug/L	NCWQS
	Vanadium	80	ug/L	Health Advisory

NCWQS = North Carolina Water Quality Standard
MCL = Maximum Contaminant Level

2.2 GROUNDWATER SAMPLE COLLECTION

The monitoring wells will be sampled via low-flow methods. Low-flow is defined as a flow rate similar to the ambient flow rate in the screened formation.

A peristaltic pump will be used to purge the wells and collect the samples. VOC loss through suction degassing is expected to be insignificant due to the very slow flow rates to be used. The procedure for collecting groundwater samples has been provided by Baker. Further details are provided in the amendment to the Field Sampling Plan appended to this document.

1. The protective casing (for existing wells) will be unlocked, the well cap will be removed, and escaping gases will be measured at the well head using a PID or FID. This will determine the need for respiratory protection.

2. The well will be allowed to equilibrate to atmospheric pressure, in the event that a vent hole was not installed in the well.

3. The static water level will be measured. The total depth of the well will not be measured, as not to stir up any sediment. The total depth will be obtained from boring logs. The water volume in the well will then be calculated.

4. The sampling device intake (virgin, 1/4 inch ID Teflon tubing) will be slowly lowered until the bottom end is 2 to 3 feet below the top of water. Based on historical water levels, this depth will be a point within the screened interval. Next, the water level probe will be placed into the well, just below the surface of the water.

5. Purging will then begin. The discharge rate will be measured using a stopwatch and calibrated container. The flow rate will be adjusted to ambient flow conditions (i.e., no drawdown is observed in the well). Flow rates of less than 1 liter per minute (L/min) are expected.

6. The Water Quality Parameters (WQPs), including dissolved oxygen, turbidity, temperature, pH, and specific conductance will be measured frequently (e.g., every 2 minutes).

7. Purging will be complete when three successive WQP readings have stabilized within 10 percent, or there is no further discernable upward or downward trend. Low values, certain WQPs (such as turbidity and dissolved oxygen) may vary by more than 10 percent, but have reached a stable plateau.

8. Upon WQP stabilization, groundwater samples will be collected. Samples for VOC analysis will be collected first, followed by total metals. Sample bottles will be labeled prior to sample collection.

9. Replace the Teflon and silicon pump tubing between wells.

10. The sample jars will be stored in a cooler with ice until laboratory shipment. Samples must be shipped within 24 hours of collection.

2.3 QUALITY CONTROL/QUALITY ASSURANCE PROGRAM

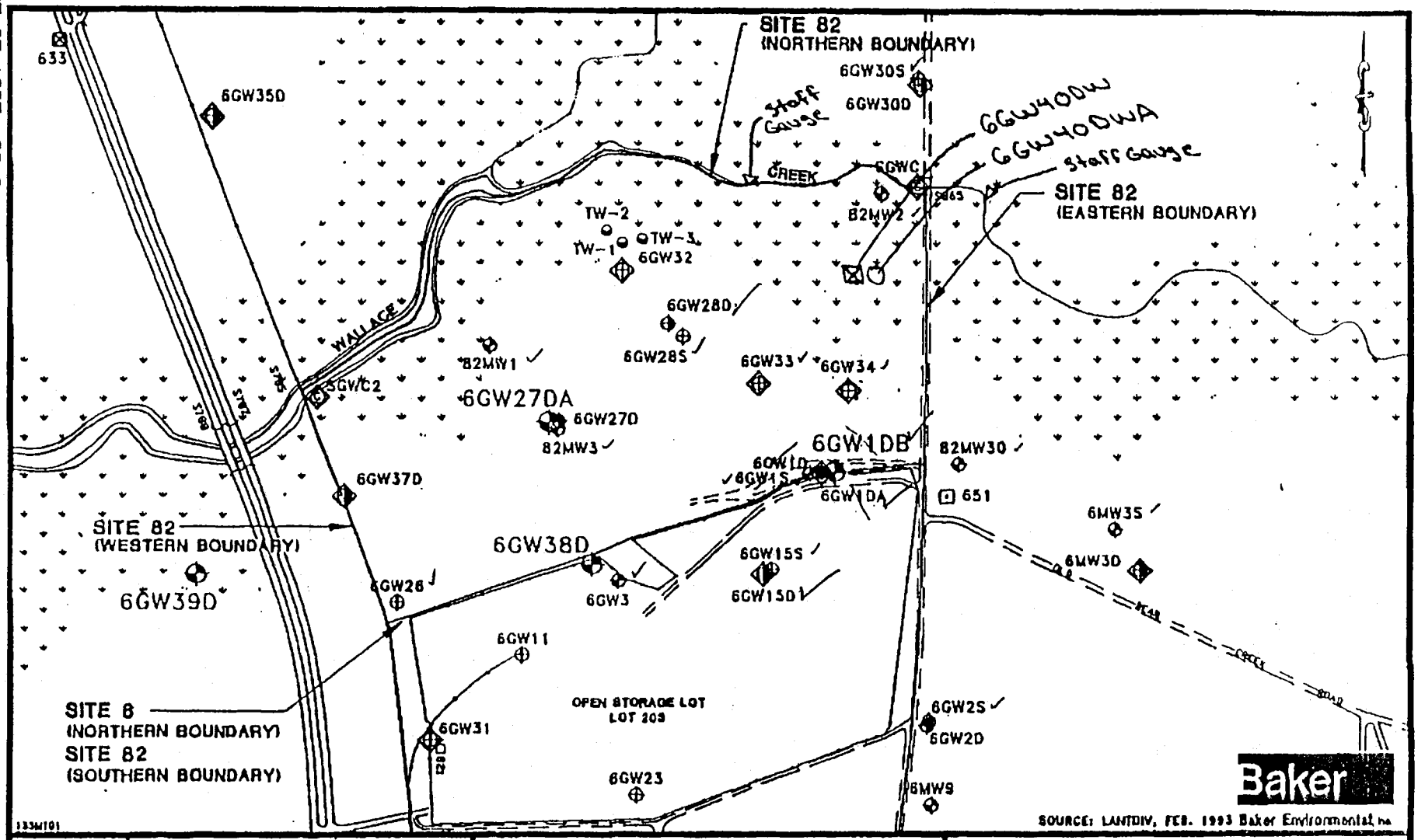
Three types of field quality assurance/quality control samples will be submitted to the laboratory: trip blanks, field blanks, and field duplicates. Since dedicated tubing is used for each well, no equipment rinsates will be required. The results from the field quality control samples will be used to determine the overall quality of the data.

2.4 QUARTERLY SAMPLING

Monitoring wells recommended to be sampled on a quarter basis to measure effectiveness of the treatment system include the following:

Shallow Wells
6 GW 15
6 GW 33
6 GW 34
82 GW 3
6 GW 28S

Deep Wells
6 GW 1D
6 GW 1DA
6 GW 1DB
6 GW 27D
6 GW 27DA
6 GW 40DW
6 GW 40 DWA



LEGEND

- EXISTING SHALLOW MONITORING WELL
- PHASE I SHALLOW MONITORING WELL INSTALLED BY BAKER ENVIRONMENTAL, Inc., SEPT.– OCT. 1992
- PHASE I DEEP MONITORING WELL INSTALLED BY BAKER ENVIRONMENTAL, Inc., SEPT.– NOV. 1992
- PHASE I STAFF GAUGE INSTALLED BY BAKER ENVIRONMENTAL, Inc., OCT. 1992
- PHASE II SHALLOW MONITORING WELL INSTALLED BY BAKER ENVIRONMENTAL, Inc., MARCH–APRIL 1993
- PHASE II DEEP MONITORING WELL INSTALLED BY BAKER ENVIRONMENTAL, Inc., MARCH–APRIL 1993
- PHASE II STAFF GAUGE INSTALLED BY BAKER ENVIRONMENTAL, Inc., DEC. 1992
- TEMPORARY WELL INSTALLED BY BAKER ENVIRONMENTAL, Inc., MARCH 1993

500 0 250 500 1000

1 inch = 500 ft.

FIGURE 1
DEEP MONITORING WELL LOCATIONS
PRE-DESIGN STUDY CTO-0133

MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

3.0 PIEZOMETER INSTALLATION

To properly measure the hydrogeologic properties of the aquifer, it has been deemed necessary to install piezometers which will be monitored during the aquifer test. The locations for these new 1-inch piezometers are indicated of drawings CD-10A and CD-10 and are described as follows.

3.1 SHALLOW AQUIFER

The aquifer test of the shallow aquifer will be conducted through well SRW-1. Three new 1-inch piezometers designated SP-1, SP-2, and SP-3 will be installed 20 feet north, 10 feet south, and 100 feet east of well SRW-1. Depth of the piezometers and locations of well screens will mirror SRW-1.

3.2 DEEP AQUIFER

The aquifer test of the deep aquifer will be conducted through well DRW-1. Two new 1-inch piezometers designated DP-1 and DP-2 will be installed 200 feet west of DRW-1 and midway between DRW-1 and 6 GW 15D. Depth of the piezometers and locations of the well screen will mirror DRW-1.

4.0 AQUIFER TEST

The aquifer test program for both the shallow and the deep aquifer testing will include three phases. The initial phase will be a stepped drawdown test. The second phase will be a 72-hour pumping test. The final phase will be a recovery test.

4.1 SHALLOW AQUIFER TEST

As indicated earlier, the pumping well for the shallow aquifer test will be SRW-1. Wells to be monitored during the test are SRW-1, SP-1, SP-2, SP-3, 6 GW 34, 6 GW 33, 6 GW 1S, and DRW-1. For ease of identification, each of these wells has been italicized on the attached drawings. A Hermit datalogger with 16 port capacity will be used to continuously monitor the water levels in each of the eight wells. Produced fluids will be piped to the new groundwater treatment plant for treatment and subsequent discharge into Wallace Creek.

4.2 DEEP AQUIFER TEST

As indicated earlier, the pumping well for the deep aquifer test will be DRW-1. Wells to be monitored during the test are DRW-1, DP-1, DP-2, 6 GW 15D, 6 GW 38D, 6 GW 1S, 6 GW 1D, 6 GW 1DA, 6 GW 1DB, SRW-1, and SP-2. For ease of identification, each of these wells has been italicized on the attached drawings. A Hermit datalogger with 16 port capacity will be used to continuously monitor the water levels in each of the 11 wells. Produced fluids will be piped to the new groundwater treatment plant for treatment and subsequent discharge into Wallace Creek.

4.3 DETAILED DESIGN

The purpose of aquifer test to be performed at Site 82, MCB Camp Lejeune is to collect data on the reaction of the aquifer(s) in various observation wells in response to pumping from shallow and deep recovery wells. This data will be analyzed by Baker Environmental.

Prior to the aquifer tests, groundwater samples will be collected from the monitoring and recovery wells at the site. These will be analyzed to identify the spatial distribution and concentration gradients of dissolved contaminants. The procedures for this baseline sampling are described in the Field Sampling Plan, which is attached to this document as Appendix A.

This detailed design outlines the specific equipment, procedures, and data interpretation to be performed during the testing of the shallow and deep aquifers. Wherever possible, the equipment, flow rates and durations are identified quantitatively. Because no previous pumping tests have been performed at the site, the test parameters are based on inferences from available information. Given the complex and heterogenous nature of aquifers, initial field results may indicate that some modification of these parameters is necessary during testing.

4.3.1 Equipment

A) Pumps, Flow Meters, Flow Rate Controls

1) General: The two pumping wells (DRW-1 and SRW-1) will be supplied with electric pumps, flow meters covering the full range of expected flow rates, and valves for adjusting the flow rates. The power source is the base electrical network. All of this equipment will be installed, wired, tested and operational prior to the aquifer tests.
2) Shallow aquifer: The pump is a Grundfos Model 5S, with operational flow rates ranging from 1.2 to 7 gallons per minute (gpm).
3) Deep aquifer: The pump is a Grundfos Model 80S, with operational flow rates ranging from 48 to 110 gpm.

B) Data Logger, Pressure Transducers, Cables, and Lap Top Computer

1) Data Logger: Because a maximum of 11 wells (including the pumping well) will be monitored at any one time, a Hermit Model SE2000 with 16 channels will be employed. During the tests, the data logger will be located in the well house of the pumping well.
2) The choice of pressure transducers is determined by the presence or absence of contaminants, the range of pressures expected, and the diameter of the wells.
   a) Because contaminants are expected to be present in at least some of the wells, the transducer will be supplied with teflon sheathes rather than polyurethane sheathes.
   b) Each transducer will be either a standard range or special range model. The special range will be required in the pumping wells. The standard range will be adequate for the majority of the monitoring wells.
   c) A standard pressure transducer has an outside diameter of an inch. The piezometers which are used for monitoring will require be specialized transducers with reduced outside diameters.
3) Cables: The pressure transducers come with cable assemblies ranging from 150 feet to 500 feet in length. Additional connectors approximately 350 feet long each are available for those wells which are further from the data logger.
4) Lap top computer: During testing, data will be downloaded at least once every 24 hours from the data logger. For this purpose, an IBM compatible Model 486 (or equivalent) will be utilized. The specific software program for downloading the data will be supplied with the data logger.

C) Wells: In order to properly interpret the test data from pumping and observation wells, several details of well construction will be utilized. These are:

1) Total depth
2) Screened interval
3) Well diameter and slot size
4) Annular space diameter
5) Method of completion
6) Elevation of top of filter pack, bentonite seal and grout
7) Surveyed elevation of top of casing
8) Elevation of upper and lower boundaries of the aquifer being monitored
9) (in pumping wells) The depth at which the pump is installed
10) The length of the pump.

D) Miscellaneous
   1) Rain gauge: Recharge during the test period can affect aquifer test results. To quantify this effect, a rain gauge will be mounted outside the well house of the pumping well during each test to measure precipitation.
   2) Barometric pressure gauge: Fluctuations in atmospheric pressure can also affect aquifer test results. To quantify this effect, a barometric pressure gauge will be mounted outside the well house of the pumping well during each test to measure changes in atmospheric pressure.
   3) Water level indicator: This instrument will be used to confirm the proper functioning of the pressure transducers and to measure water levels in the distant well selected for observation of regional trends (see II-A-5 below).
   4) Water treatment and disposal: The tests are being performed in portions of the aquifers where organic contaminants have been reported. A water treatment system is under construction and will be operational before the aquifer tests are performed. All effluent from the tests will be piped to this system for treatment, followed by discharge to Wallace Creek.

4.3.2 Field Procedures

A) General Procedures
   1) Baseline: For all aquifer tests, a baseline measurement of conditions will be collected just prior to beginning the test.
   2) Recovery: For all aquifer tests, the aquifer will be allowed to recover following the completion of the test. The recovery period will be a maximum of 24 hours for this test.
   3) Precipitation: The rain gauge will be observed and amount of precipitation (if any) recorded once every 24 hours. If heavy rainfall events take place during testing, this frequency will be increased to once every 6 hours.
   4) Atmospheric pressure: The barometric pressure gauge will be observed once every hour. Any changes in atmospheric pressure will be recorded.
   5) Regional trend: changes in the elevation of the aquifer's potentiometric surface may occur due to natural causes during the tests. Therefore, for each test a well will be selected which is distant enough from the pumping well that no pumping influence would reasonably be expected to occur. During the test this well will be periodically monitored with a water level indicator to quantify any regional trends.
   6) Potential interference from the active soil vapor extraction (SVE) system: The shallow aquifer test is taking place adjacent to and in the zone of influence of an active SVE system. The operation of this system could have unpredictable effects upon the results of the tests. Therefore, the SVE system will need to be shut down while the tests are being run and for a week before the tests begin (to allow for equilibration to static conditions).

B) Step drawdown tests
   1) Goal: The goal of the step drawdown tests is to determine that maximum sustainable pumping rate in each pumping well which will maintain the maximum sustainable drawdown during the continuous aquifer test. The maximum sustainable drawdown is

the depth to the pump inlet minus a safety factor to ensure that the pump remains sufficiently submerged for proper operation.

2) General procedures: For each pumping rate, the drawdown in the pumping well is monitored until it approaches equilibrium closely enough for steady state conditions to be inferred. The time required to achieve this condition is dependent on both aquifer and well parameters, and cannot be predicted with precision in advance. Based on available information, it is expected that 1 to 2 hours will be sufficient for each pumping rate in each well at this site.
3) Deep aquifer: As described above, a Grundfos Model 80S pump will be used for the tests in DRW-1. This pump has a operational range from 48 to 110 gpm. Given the flow rates expected from the deep aquifer, it is anticipated that the step drawdown intervals will be 50, 70, 90 and 110 gpm. Prior to the step drawdown test, the pressure data recording equipment will be installed. During the step drawdown test this equipment will be operated and monitored to ensure it is performing properly prior to the continuous test.
4) Shallow aquifer: As described above, a Grundfos Model 5S pump will be used for the tests in SRW-1. This pump has an operational range from 1.7 to 7 gpm. Given the flow rates expected from the shallow aquifer, it is anticipated that the step drawdown intervals will be 2, 3, 4 and 5 gpm. Prior to the step drawdown test, the pressure data recording equipment will be installed. During the step drawdown test this equipment will be operated and monitored to ensure it is performing properly prior to the continuous test.

C) Continuous aquifer tests
1) Goal: The goal of the continuous aquifer tests is to determine aquifer parameters so that the optimal location(s) and construction details can be specified for additional recovery wells to capture contaminated groundwater.
2) Deep aquifer: The test will be run continuously for a period of 72 hours at the maximum sustainable pumping rate as determined by the step drawdown test. The observation wells will be DRW-1, DP-1, DP-2, 6 GW 15D, 6 GW 38D, 6 GW 1S, 6 GW 1D, 6 GW 1DA, 6 GW 1DB, SRW-1 and SP-2. The regional trend observation well will be 6 GW39D. In addition to continuous recording by the data logger, manual readings will be taken from select wells with a water level indicator to confirm proper operation of the data collection equipment. The intervals for these readings will be as follows:
   a) First 10 minutes of the test: every 2 minutes
   b) Next 30 minutes of the test: every 5 minutes
   c) For the remainder of the test: every 10 minutes, or as deemed appropriate by the senior hydrogeologist on site.
3) Shallow aquifer: The test will be run continuously for a period of 72 hours at the maximum sustainable pumping rate as determined by the step drawdown test. The observation wells will be SRW-1, SP-1, SP-2, SP-3, 6 GW 34, 6 GW 33, 6 GW 1S, and DRW-1. The regional trend observation well will be 6 GW 28S. Manual water level readings will be taken on the same schedule as shown above for the deep aquifer test.

5.0 REPORT OF FINDINGS

During the aquifer testing period, a Senior Hydrogeologist will be onsite to provide overall direction and guidance to the hydrogeologists performing the test. This individual will be evaluating the data on a daily basis to be in a position to make recommendations on future well placement locations as soon as practicable. It is recommended and encouraged that Baker Environmental, as designer of record, and LANTDIV, as owner, have representatives available onsite during the aquifer test program to provide input and concurrence with the recommendations of our Senior Hydrogeologist.

5.1 DATA INTERPRETATION

Preliminary examination of the data for indications of aquifer properties will occur daily during the field testing. The data which is downloaded from the data logger into the laptop computer will be copied on disks which will be made available to LANTDIV and Baker Environmental. Upon completion of the field tests, Baker will perform a detailed analysis of the data.

5.2 RECOMMENDATIONS

Baker Environmental will present the data interpretation and make recommendations regarding alternations to the groundwater recovery system design. OHM will review the interpretation and recommendations to the extent directed by LANTDIV.

APPENDIX A

ADDENDUM TO THE SAMPLING AND ANALYSIS PLAN

OHM Remediation
Services Corp.

Addendum to the Sampling and Analysis Plan for Soil and Groundwater Remediation Operable Unit No. 2 MCB Camp Lejeune, North Carolina

For Groundwater Collection at Site 82, Pre-Aquifer Test

January 1996

OHM Project No. 16032

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TABLES

1.0 INTRODUCTION

Baseline sampling will be performed before the aquifer test to determine levels of target compounds in the groundwater along with other specific analytical tests that will be required for monitoring water quality. In addition water levels will be required on all wells for aquifer test background. Approximately 15 shallow and 15 deep well will be sampled. Carl Pampel (Project Chemist) will be on-site for the first week of the sampling effort to assist in training of personnel and trouble shooting any technical difficulties that arise.

2.0 DATA QUALITY OBJECTIVES

Specific remediation goals for OU No. 2 groundwater have been determined. Analytical methodology has been selected that will meet or surpass all remediation goal detection level for the final cleanup except for vinyl chloride. The detection goals for vinyl chloride are below all EPA analytical methodology and the best available detection limits will be employed. Table 2.1 summarizes the remediation goals and the additional water quality analysis for the project. Data quality parameter goals are: 50% RPD for field collocated duplicates, 20-150% recovery for MS/MSDs with 50% RPD, 30-150% LCS recovery, and 90% data completeness.

Table 2.1 Remediation Goals and Water Quality Parameters

Contaminant of Concern	Method Number	Remediation Goal ug/l	Laboratory Required Reporting Limit ug/l
1,2-Dichloroethane	8021	0.38	0.2
Trans-1,2-Dichloroethene	8021	70	2
Ethylbenzene	8021	29	2
Tetrachloroethene	8021	0.7	0.4
Trichloroethene	8021	2.8	1.5
Vinyl Chloride	8021	0.015	<1.0
Arsenic	7060	50	15
Barium	6010	1000	50
Beryllium	6010	4	2
Chromium	6010	50	15
Lead	7421	15	5
Manganese	6010	50	15
Mercury	7470	1.1	0.2
Vanadium	6010	80	20
Dissolved Oxygen (field test)	SM-4500-0 G (or equivalent)	NA	NA
pH (field test)	9040	NA	NA
BOD (5 day)	405.1	NA	NA
COD	410.4	NA	NA
Turbidity	180.1	NA	NA
Alkalinity	305.1	NA	NA
Hardness	130.2	NA	NA

3.0 WELL LEVEL DETERMINATION AND GROUNDWATER SAMPLE COLLECTION

Also refer to section 2.2 of the Work Plan.

Upon arriving at Site 82, the location of all wells to be sampled will be determined. As each is located, its pressure cap will be removed to allow equilibration. As soon as all wells are located, each will be gauged to determine the depth to water from top of casing (to the nearest 1/100 of a foot) using a water level indicator. This depth plus the date and time of gauging will be recorded.

The data will be used to determine the volume of water in the well casing. With the exception of the first well gauged, the pressure cap will be reinserted as soon as gauging is complete. At the conclusion of the survey the first well measured will be gauged and recorded again. This will allow any regional trends to be observed and appropriate corrections made. The first well will then be recapped.

The wells will be purged and sampled using low flow methods. A peristaltic pump with Teflon tubing will be used to purge and collect the required samples. After wells are gauged they will be purged using the peristaltic pumps at a flow that will not cause draw down of the well water level. It is expected that the flow rates will be less than 1 liter per minute. The pH and DO readings will be monitored and the well purged until stable readings are obtained. At least one well volume will be purged. After the well has been purged and the purge water collected the metals sample bottle will filled through the pump. COD, BOD, pH, Turbidity, alkalinity, hardness, and dissolved oxygen (DO) will be sampled through the pump into the appropriate container. DO and pH measurements will be conducted in the field following the instrumentation methods. The tubing before the pump will be capped with a finger to trap the water in the tubing. The tubing will be slowly pulled from the well and the water drained into the two VOA containers. All sample containers will already contain the correct preservatives. New Teflon and pump tubing will be used at each well.

All wells will require the metals and volatile analysis. Wells 6GW33, SRW-1, 82MW30, 6GW27D, DRW-1 and 6GW15D will require DO, pH, BOD, COD, turbidity, alkalinity and hardness in addition to the metals and volatiles. A listing of the shallow and deep wells can be found in section 2.1 of the Work Plan.

Table 3.1 summarizes the estimated required sample bottles and preservatives along with holding times for each method. Some analysis can be combined into the same containers.

Table 3.1 Analytical Summary

Analysis	Method Number	Preservatives	Containers	Holding Times
VOCs	8021	HCL<2/Cool 4 C	2ea 40ml VOA vials	14 days
Metals Hardness	6010/7000	Nitric<2	1ea 500ml plastic	6 months (Hg 28 days)
Alkalinity	310.1	Cool 4 C	1ea 500ml plastic	14 days
COD	410.4	Sulfuric<2/Cool 4 C	1ea 250ml plastic	28 days
pH	9040	Cool 4 C	1ea 250ml plastic	Immed.
Turbidity	180.1	Cool 4 C	1ea 500ml plastic	48 hours
BOD	405.1	Cool 4 C	1ea 1 liter plastic	48 hours

4.0 QA/QC SAMPLES

NFESC level C data reporting will be required for this project. One field blank will be required for each water source that is used in equipment deacon if needed. Rinsate blanks will not be required since the sampling equipment is not cleaned between sample points and new materials are used. Field collocated duplicates will be required at 10% to meet level C reporting. Trip blanks will accompany each cooler that contains volatile analysis. This blank will be sent from the laboratory and returned with the samples back to the laboratory and analyzed for volatiles only.

5.0 SAMPLE IDENTIFICATION

All wells are already numbered. This number with the date sampled will become the sample designation. Field duplicates will be dented with a D at the end of the sample number. For example: 6GW15-010496 for the sample and 6GW15-010496D for the duplicate.