04.07-01/30/98-01792

FINAL

PHASE I AND II TREATABILITY STUDY REPORT
OPERABLE UNIT NO. 14
(SITE 69)

MARINE CORPS BASE
CAMP LEJEUNE, NORTH CAROLINA

CONTRACT TASK ORDER 0332

JANUARY 30, 1998

Prepared For:

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

Under:

LANTDIV CLEAN Program
Contract N62470-89-D-4814

Prepared by:

BAKER ENVIRONMENTAL, INC.
Coraopolis, Pennsylvania
and
SBP Technologies, Inc.
White Plains, New York

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

Phase II Study Figures

LIST OF TABLES

Phase II Study Tables

LIST OF ACRONYMS AND ABBREVIATIONS

Baker	Baker Environmental, Inc.
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFM	cubic feet per minute
CLEAN	Comprehensive Long-Term Environmental Action Navy
COIs	Contaminants of Interest
CWM	Chemical Warfare Material
DOD	Department of Defense
DON	Department of the Navy
DCE	1,2-dichloroethene
ECBSOPQAM	Environmental Compliance Branch (USEPA) Standard Operating Procedures and Quality Assurance Manual
FFA	Federal Facilities Agreement
FMP	Field Monitoring Plan
FS	Feasibility Study
FSP	Field Sampling Plan
GAC	granular activated carbon
gpm	gallons per minute
HTH	high test hypochlorite
IEG	IEG Technologies, Corporation
KGB	(same as "Coaxial Groundwater Ventilation" in English)
LANTDIV	Naval Facilities Engineering Command, Atlantic Division
MCB	Marine Corps Base
NC DEHNR	North Carolina Department of Environment, Health and Natural Resources
NCP	National Oil and Hazardous Substances Contingency Plan
NPL	National Priority List
OU	Operable Unit
OUL	Ozark Underground Laboratories
PCBs	polychlorinated biphenyls
PCE	Tetrachloroethylene
PID	photo-ionization detector
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
RI/FS	remedial investigation/feasibility study
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act

SBP	SBP Technologies, Inc.
SOPs	standard operating procedures
1,1,2,2-TCA	1,1,2,2- tetrachloroethane
TCE	thrichloroethene
USEPA	United States Environmental Protection Agency
UVB	(German acronym for "Vacuum Vaporizer Well")
UXO	Unexploded Ordinances
VC	vinyl chloride
VOCs	volatile organic compounds
ZOI	zone of influence

1. EXECUTIVE SUMMARY

In September 1995, Baker Environmental, Inc. (Baker) requested a proposal from SBP Technologies, Inc. (SBP) to install an *in situ* groundwater treatment technology at Site 69, Marine Corps Base (MCB) Camp Lejeune, NC to treat chlorinated solvents contaminated groundwater. As part of the request for proposal, Baker submitted site specific geologic and chemistry data to SBP for review. After evaluating the data, SBP and its collaborator IEG Technologies, Charlotte, NC (IEG) recommended that a UVB, and a KGB system be installed to perform a treatability study at the site.

The Department of Navy (DON) through Baker funded this two phase treatability study to determine the technical and economic feasibility of using these (UVB and KGB) innovative in-well aeration technologies at Site 69, MCB Camp Lejeune. The objectives of the Phase I study (six months of actual operation) were to show that a groundwater circulation cell could be created at the site which would mobilize and transport contaminants to the wells for treatment, to experimentally (via dye test) determine the zone of influence (ZOI) of each circulation cell, and to show that contaminants were being removed by monitoring for target volatile organic compounds (VOCs) in the off-gases, and in groundwater.

Mathematical models were used to predict the ZOI of each system. The ZOI is typically defined as the distance between the upgradient, and the downgradient stagnation points of the circulation cell. The models predicted that the ZOI of the KGB would be 93 ft, and that of the UVB would be 368 ft. In February 1995, the two systems were installed, and were in operation by March 1995. The KGB was installed in the shallow Castle Hayne aquifer to 12 ft below ground surface (bgs) where the target contaminants were vinyl chloride (VC), 1,2-dichloroethene (DCE), trichloroethene (TCE), tetrachloroethene (PCE), and 1,1,2,2-tetrachloroethane (1,1,2,2-TCA). The UVB was installed in the upper Castle Hayne aquifer to 74 ft bgs where the target VOCs were VC, DCE, and TCE. Monitoring wells were installed within the estimated ZOI of each systems to monitor changes in groundwater VOCs, and other physical/chemical parameters. These wells were also used as injection and monitoring stations for the dye test.

The UVB dye test was successful, and validated that a circulation cell was established. It also indicated that at a minimum, a 188 ft ZOI was created by the UVB system. The KGB dye test did not provide any results. The test failed again when repeated with a different dye. Groundwater monitoring data indicated that a circulation cell may have been established at the KGB site, but the preliminary transducer test was inconclusive in determining this. Consequently, the ZOI of the KGB circulation cell could not be validated.

During six months of operation, the UVB well did not mobilize significant contaminants to the well for treatment. On average, concentration of target VOCs were reduced by 16% in groundwater monitoring wells within the ZOI of the UVB. Primarily, these reductions may be due to dilution and *in situ* biodegradation in the circulation cell. Additional monitoring data over the next three to six months would help evaluate this further. During the same time, the KGB well mobilized and removed at least 10.10 kg of target VOCs by stripping. On average, concentration of target VOCs were reduced by 15% in groundwater monitoring wells within the estimated ZOI of the KGB.

To complete a technical and economic evaluation of these systems for Site 69, the following recommendations were made at the end of the Phase I study:

(i) Relocate the UVB well to the area of high contamination in order to determine its treatment rate and efficiency as a remediation system.
(ii) Continue operation of the KGB system. Use a modified well development method to remove sediments and improve operation of the KGB well.

(iii) Conduct frequent (every two weeks) sampling and analysis of off-gases from both systems to determine the removal rates of target VOCs.
(iv) Sample groundwater from selected wells in the immediate vicinity of both systems.
(v) Operate both systems (Phase II study) for at least three months.

The Phase II study was initiated in June 1997, and both systems were in operation by the second week of August 1997. Plugging problem continued with the KGB system, and in October 1997, it was decide to shut down the KGB system.

The UVB system operated satisfactorily after initial problems with flow rates and pumps. It reduced the concentration of VOCs at the well by 99% in sixteen weeks of operation. In the time frame of sixteen weeks, the UVB system did not reduce contamination levels at well MW17-UW (56 ft from the UVB), but marginally reduced contamination levels in well MW15-IW (19 ft from the UVB).

2. INTRODUCTION

2.1 Project Description

This Treatability Study Report has been prepared by SBP and Baker for the United States Department of the Navy (DON) under the DON, Atlantic Division, Naval Facilities Engineering Command (LANTDIV) Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62470-89-D-4814, Contract Task Order 0332 for Site 69, the Rifle Range Chemical Dump, MCB, Camp Lejeune, NC. The treatability study is being conducted concurrent with the Remedial Investigation/Feasibility Study (RI/FS) for Site 69.

MCB Camp Lejeune was placed on the CERCLA National Priorities List (NPL) on October 4, 1989 (54 Federal Register 41015, October 4, 1989). The United States Environmental Protection Agency (USEPA) Region IV, the North Carolina Department of Environment, Health and Natural Resources (NC DEHNR) and the DON then entered into a Federal Facilities Agreement (FFA) for MCB, Camp Lejeune. The primary purpose of the FFA is to ensure that environmental impacts associated with past and present activities at the MCB, Camp Lejeune are thoroughly investigated and appropriate CERCLA response/Resource Conservation and Recovery Act (RCRA) corrective action alternatives are developed and implemented as necessary to protect public health and the environment.

The primary concern at Site 69 is the presence in groundwater of chlorinated VOCs. A Draft Feasibility Study (FS) was completed for Site 69 (Baker, October 1994) in which several groundwater treatment alternatives were evaluated. Of the groundwater treatment technologies evaluated, the innovative technology known as in-well aeration, or "*in situ* air stripping," appeared to offer the most advantages with respect to effectiveness, implementability, and cost.

This Treatability Study Report provides the objectives, technology description, approach, results and discussions, and conclusions and recommendations for both Phase I and Phase II treatability study activities at Site 69. Chapters 3, 4, 5, and 6 describe the approach, results and discussions, and recommendations for the Phase I study (first nine months of operation). Chapters 7 through 10 describe the approach, results and discussions, and recommendations for the Phase II study (last three months of operation). The UVB and KGB technologies are innovative in-well aeration treatment systems for *in situ* treatment of contaminated groundwater. These technologies were developed and patented by IEG mbH of Germany. SBP of White Plains, NY represents the sole source of the UVB and KGB technologies in the United States. SBP performed this treatability study under subcontract to Baker.

The primary objectives of this treatability study were to:

(i) show that a groundwater circulation cell could be created at both sites (UVB and KGB) which would mobilize and transport contaminants to the wells for treatment,
(ii) determine if the technologies are effective, implementable, and economical for remediation and/or containment of contaminants of the shallow and upper Castle Hayne aquifers at Site 69,
(iii) determine experimentally (via dye test) the ZOI of each circulation cell, and
(iv) show that contaminants were being removed by monitoring for target (VOCs) in the off-gases, and in groundwater.

2.2 Site Description

Site 69, the Rifle Range Chemical Dump, is located west of the New River in the area of MCB Camp Lejeune known as the Rifle Range (see Figure 2-1). The site is approximately 14 acres in size and is situated in a topographically high area (see Figure 2-2). During the period 1950 to 1976, the area was used to dispose chemical wastes including polychlorinated biphenyls (PCBs), solvents, pesticides, calcium hypochlorite, high-test hypochlorite (HTH), and drums of "gas", which possibly contained Chemical Warfare Material (CWM), such as "mustard gas." The area is overgrown to the point that the boundary of the former dump is not readily noticeable. Three bodies of surface water are located within a quarter mile of the site: the New River to the west, an unnamed tributary of the New River to the north, and Everett Creek to the south. In addition, a limited number of small pools of water are present in the low-lying areas of the site. The site area is rather secluded; however, training exercises are conducted throughout the surrounding area. Currently, a fence surrounds the site to restrict access.

The site is underlain by silty sands from the ground surface to a depth of approximately 12-15 feet. Beneath the silty sand is a fairly continuous sandy clay, and sand and clay unit, to a depth of approximately 26-36 feet. The clay horizons of this unit act as an aquitard. The upper unit of the Castle Hayne aquifer, which was encountered below the clay retarding layer, consists of silty sand with shell and limestone fragments.

In general, shallow groundwater (perched zone) appears to flow radially from the center portion of the site to the outer, low lying areas. Groundwater in the upper portion of the Castle Hayne aquifer appears to flow in a general eastern direction towards the New River. Groundwater levels at Site 69 range from 0.34 to 3.3 feet below ground surface (bgs) for the perched water zone. The potentiometric surface for wells screened at 38 to 45 ft bgs is 25-30 feet below top of casing. The estimated horizontal hydraulic conductivity for the site is 1.0×10^{-4} cm/sec and the estimated vertical hydraulic conductivity for the site is 1.0×10^{-5} cm/sec. The water table gradient has been determined to be 0.065 for the perched aquifer, and 0.016 for the groundwater aquifer. Groundwater contamination at Site 69 primarily consists of chlorinated VOCs such as *cis*-1,2-DCE, *trans*-1,2-DCE, TCE 1,1,2,2-TCA, PCE and VC. The highest levels of contamination are centered around monitoring wells 69-GW15. The vertical extent of contamination in the area of monitoring well cluster 69-GW15 was 60-75 feet bgs.

All of the above information is from the RI work conducted by Baker, which is cited in the Draft Final Remedial Investigation Report [1].

2.3 Treatment Technology Descriptions

The UVB/KGB technologies were designed and developed by IEG mbH of Germany as a methodology for *in situ* treatment of groundwater, and were first introduced in the U.S. in 1992. SBP has the exclusive rights to distribute these technologies in North America, and to the Department of Defense (DOD) for its sites worldwide.

2.3.1 The UVB Technology

The UVB groundwater and soil treatment technology consisted of a specially constructed well which was developed by IEG mbH of Germany. The patented technology is based on a double screened well which can simultaneously mobilize and treat contaminants from the unsaturated zone, capillary fringe, and the saturated zone [2-4]. At Site 69, the UVB technology was designed to provide *in situ* remediation of chlorinated hydrocarbon contaminants only in the saturated zone. The UVB system creates a circulation cell that transports the dissolved and residual mobile-phase hydrocarbons to a central well casing for treatment. The treatment methodology is primarily air stripping for VOCs, and secondarily, bioremediation for semi- to non-volatile hydrocarbons. Water leaving the well is enriched with dissolved oxygen (DO) due to in-well stripping which enhances *in situ* biodegradation.

The combination of these approaches makes this technology an effective alternative to other conventional remediation methods for groundwater. An obvious advantage of this *in situ* method is that it accomplishes treatment without groundwater extraction, hence no surface treatment is required.

Vertical groundwater circulation in the saturated zone is established by creating a pressure differential (using a mechanical pump and/or an air-lift pump) across the two screens in the well [5-7]. In a standard circulation mode, groundwater enters the well through the lower screen and leaves through the upper screen. In a reverse circulation mode groundwater enters the well through the upper screen and leaves through the lower screen. Between its travel within the casing from one screen to the other, the groundwater passes through one or many in-well treatment systems. These, for example, may include an air stripper/aerator and/or an *in situ* bioreactor, depending on the type of contaminants being treated. VOCs in the off-gases are usually processed in an above-ground granular activated carbon (GAC) unit. Off-gas bioreactors or thermal oxidizers are used when appropriate. Groundwater leaving the treatment well can be supplemented with nutrients, additional dissolved oxygen, and co-substrates to further facilitate *in situ* biodegradation of contaminants in the aquifer.

An upgradient capture zone, and a downgradient release zone are calculated for a given circulation cell. Part of the groundwater flow entering the well casing is from the newly captured upgradient groundwater, while the remaining portion of water entering the casing at the same time is recirculating in the cell around the remediation well. An equal portion of treated groundwater leaving the well casing exits the circulation cell through the downgradient release zone. As the system operates over time, the VOC concentrations in groundwater fluctuate initially due to soil flushing and mobilization, then decrease gradually until an asymptotic level is reached.

2.3.2 The KGB Technology

The Coaxial Groundwater Ventilation (KGB in German) is used i) to create a circulation cell within perched groundwater and shallow aquifers, ii) to remove VOCs, and iii) to enhance *in situ* microbiological degradation. The KGB well is equipped with a specially designed air distributor positioned at the bottom of the borehole, and a soil vapor extraction (SVE) screen in the lower vadose zone. On the surface, a blower pulls vacuum in the range of 20 to 40 mbars on the SVE screen, and a compressor injects air with a pressure sufficient to overcome the water column pressure. The air bubbles rise within the borehole filled with gravel pack, and cause the water to flow upward due to an air-lift effect. A continuous circulation of groundwater is established in the area surrounding the KGB well which delivers contaminated water for air stripping. VOCs dissolved in groundwater are transferred from the aqueous phase to the gaseous phase in an amount relative to their gas-liquid distribution coefficients. When these sparged bubbles burst on the water-air interface, the air is immediately drawn into the screen of the vacuum extraction well and transported to the surface. In addition, vapors from the vadose zone are also drawn by the blower removing the VOCs by vacuum extraction. On the surface, the off-gases are processed in above- ground GAC units. Off-gas bioreactors or thermal oxidizers are also used when appropriate.

3. TREATABILITY STUDY APPROACH

3.1 Goals and Objectives

The major objectives of this treatability study were to:

(i) determine if the UVB and the KGB technologies were effective and economical for remediation and/or containment of contaminants in the shallow and upper Castle Hayne aquifers at Site 69, MCB, Camp Lejeune, NC.

(ii) provide engineering parameters related to the design and implementation of full-scale (series or combination of systems) UVB and KGB remediation systems at Site 69, MCB, Camp Lejeune, NC.

More specifically, the treatability study was conducted to answer the following questions in support of the feasibility study:

(i) Can the UVB and the KGB technologies be implemented on a full-scale under the existing hydrogeologic conditions at Site 69?

(ii) Can dye trace experiments and pressure transducers be used to determine if a circulation cell has been established. Without a circulation cell, remediation is not possible.

(iii) How effective were the UVB and the KGB technologies? The overall effectiveness was partially determined based on an average reduction of target VOCs in groundwater. Four groundwater sampling events were conducted to determine the concentration of target VOCs in selected monitoring wells. In addition, off-gas samples were collected to estimate the mass of target VOCs removed by air stripping and vacuum extraction.

(iv) Are the UVB and the KGB remediation technologies cost effective? Based on the ZOI created, the number and types of UVB and KGB systems required to treat the impacted area can be estimated. The capital cost for these units along with the associated annual operating and maintenance cost over an estimated period of operation would determine the long-term remediation costs for Site 69.

The following parameters were evaluated to assess the technical and economical feasibility of the UVB and KGB technologies during this treatability study:

- Zone of influence of the UVB (from tracer study)
- Zone of influence of the KGB (from tracer study)
- Cumulative water processed by the UVB (from actual measurements)
- Cumulative water processed by the KGB (estimated)
- Cumulative air processed by the UVB (from weekly, bi-weekly and monthly monitoring)
- Cumulative air processed by the KGB (from weekly, bi-weekly and monthly monitoring)
- GAC breakthrough, and GAC consumption for the UVB
- GAC breakthrough, and GAC consumption for the KGB
- Contaminants removed by the UVB (from off-gas and groundwater analyses)
- Contaminants removed by the KGB (from off-gas and groundwater analyses)
- Electric power consumption (pump, blower, compressor)
- Frequency and extent of maintenance requirements

3.2 Modeling and Design Calculations

3.2.1 UVB System

The stripping efficiency of the UVB is based on the air to water ratio. The UVB-250 system usually draws in approximately 150 m^3/h of air (measured range 119 to 207 m^3/h). For this study, approximately 4 m^3/h of water (measured using a flowmeter) was pumped into the stripping reactor producing a water to air ratio of 1:38, resulting in an approximate stripping efficiency ranging from 90 to 99%.

Based on an aquifer flow rate (Qo) of 0.26 m^3/h through the cross section of the capture zone, and an internal combined flow rate (Q) of 4.0 m^3/h, the UVB-250 system recirculates 93.5 percent of the total influent more than once though the circulation cell.

Assuming complete mixing is occurring, 7 percent of the effluent moving downgradient passes once through the stripping zone, while the remaining 93 percent of the effluent passes through the stripping zone at least twice.

(i) Capture Zone and Circulation Cell of the UVB-250

The capture zone and circulation cell for the UVB-250 system installed at Site 69 are estimated using equations and graphical solutions developed by Dr. Bruno Herrling of the Groundwater Research Group, Hydromechanic Institute, University of Karlsruhe, Germany [8]. These calculations were done after the system was installed (using actual installed measurements), and are marginally different from those reported in the Final Treatability Study Workplan [9].

The estimations are based on the following assumptions and simplifications:

- The aquifer thickness is constant.
- Only confined aquifer conditions are considered in the estimations.
- The aquifer structure is assumed radially homogeneous to hydraulic conductivities. Horizontal layers, each with different conductivities, can be used. The hydraulic conductivities may be anisotropic, but each horizontal layer may have only one vertical and one horizontal conductivity.
- The local below-atmospheric pressure field near the well is neglected.
- Density effects are neglected.
- The computations assume steady-state conditions.

For estimating the capture zone, only convective transport is considered. Dr. Herrling's equations and graphical solutions for unconfined aquifers are acceptable since the hydraulic gradient is small, and the rise in the static water level at the UVB during operation is also expected to be small. Based on these assumptions, the following aquifer parameters, and UVB measurements, the upgradient and downgradient stagnation points, and the distances Bb and Bt were estimated [8]. For the standard flow UVB systems, distance Bb is defined as the bottom width of the capture zone, and distance Bt is defined as the top width of the capture zone as calculated for an upgradient distance from the UVB of 5H (H=height of saturated zone effected by the UVB).

(ii) Assumptions for the UVB-250 System:

Darcian velocity = 1.6×10^{-8} m/sec
Kh (Horizontal Hydraulic Conductivity) = 1.0×10^{-4} cm/sec
Kv (Vertical Hydraulic Conductivity) = 1.0×10^{-5} cm/sec

Horizontal Hydraulic Gradient = 0.016 ft/ft
Thickness of Treatment Zone = 10.56 m
Height of Upper Screen = 1.71 m
Height of Lower Screen in Saturated Zone = 1.16 m
Q, Flow from Upper Zone to Lower UVB Zone = 4 m^3/h (measured)

For the UVB-250 treatment system, the estimated downgradient and upgradient stagnation points (S) for the circulation cell were 56 m (183.7 ft) from the center of the system. One-half width of the circulation cell was {(Bb + Bt)/4} calculated to be = 61.8 m (202.5 ft). The capture zone width for the top of the zone (Bt) was 97.0 m (318.2 ft), and for the bottom of the zone (Bb) was 150 m (492 ft). Table 3-1 lists the parameters evaluated for the determination of the capture and circulation zones for the UVB-250. Figure 3-1 shows the plan view of the capture zone, release zone, and the circulation cell of the UVB. Figure 3-2 shows a conceptual 3-dimensional sketch of the circulation cell, capture zone, and release zone of a typical UVB system.

3.2.2 KGB System

The stripping efficiency of the KGB is also based on the air to water ratio. The KGB at Site 69 pushed in approximately 3.4 m^3/h of air with the compressor, and achieved an estimated groundwater circulation flow rate of 0.5 m^3/h, thus producing an air to water ratio of 6.8.

Based on an aquifer flow rate (Qo) of 0.0185 m^3/h through the cross sections, and an internal combined flow rate (Q) of 0.5 m^3/h, the KGB system was be able to recirculate 96 percent of the influent more than once though the circulation cell.

Assuming complete mixing is occurring, 4 percent of the effluent that moved downgradient passed once through the stripping zone, while the remaining 96 percent of the effluent passed through the KGB system at least twice.

(i) Capture Zone and Circulation Cell of the KGB

The capture zone and circulation cell for the KGB system installed at Site 69 are estimated using the KGB parameters in the same way as described for the UVB. The fundamental equations governing the hydraulics of vertical circulation cells are same for both systems.

(ii) Assumptions for the KGB system:

Darcian velocity = 6.5×10^{-8} m/sec
Kh (Horizontal Hydraulic Conductivity) = 1.0×10^{-4} cm/sec
Kv (Vertical Hydraulic Conductivity)= 1.0×10^{-5} cm/sec
Horizontal Hydraulic Gradient = 0.065 ft/ft
Thickness of Treatment Zone = 3.26 m
Height of Upper Screen = 1 m
Height of Lower Annulus Zone = 1 m
Q, Flow from Upper Zone to Lower Zone = 0.5 m^3/h (estimated).

For the KGB treatment system, the estimated downgradient and upgradient stagnation points (S) for the circulation cell were 13.86 m (45.5 ft) from the center of the system. One-half width of the circulation cell was {(Bb + Bt)/4} was calculated to be 14.27 m (46.8 ft). The capture zone width for the top of each zone (Bt) was 18.91 m (62.03 ft), and for the bottom of each zone (Bb) was 38.14 m (125.10 ft). Table 3-2 lists the parameters evaluated for determination of the capture and circulation zones for the KGB. Figure 3-3 shows the plan view of the capture zone, release zone, and the circulation cell of the KGB.

3.3 System Installation and Start Up

3.3.1 KGB System Installation and Start Up

On January 24th, 1996, SBP and its subcontractor, Badger Drilling, augured a 12 inch diameter borehole to 13 feet bgs to install the KGB system. The KGB system is installed in the borehole, and no casing is required. Figure 3-4 shows an as-built diagram of the KGB well. The driving mechanism of the KGB system consists of an air distributor located at the bottom of the well. The open area around the air distributor was packed with 2 feet of gravel (0.5 inch size). The double cased screen was connected to the air distributor via a 7 foot long coaxial riser pipe. The double cased screen (3.25 feet long, 6 inches in diameter) was located such that the top of the screen was 6-9 inches above the water table. The space around the riser pipe and the double cased screen was packed with sand (3-4 mm in size). Another coaxial riser pipe was attached to the top of the double cased screen, and extended 2 feet above ground where it was hooked up to the compressor and the blower. The inner tube of the coaxial pipe carries compressed air for sparging, while the outer tube is used to extract air from the sparging operation, and from the vadose zone. The inner tube is connected to a compressor, and the outer tube is connected to a blower. Off-gases from the blower were processed in GAC drums before being vented. Figure 3-5 shows a schematic diagram of the KGB off-gas treatment system.

The KGB borehole draws in and accumulates a lot of sediment (from fine sands). The sediment build-up created a significant back pressure, and limited the air flow into the air distributor. The KGB borehole was redeveloped several times to remove the sediments before a successful start up of the KGB system was possible. On March 23, 1996, the KGB system was considered to be fully operational.

3.3.2 UVB System Installation and Start Up

On February 11th, 1996, SBP and its subcontractor, Badger Drilling, augured a sixteen inch diameter borehole to 15 feet bgs, and set the surface casing for the UVB well. The surface casing was required to prevent contamination between the perched zone and the upper Castle Hayne aquifer when penetrating through the confining clay layer. The surface casing was allowed to set overnight before drilling the UVB well. The next day, a 14-inch borehole was drilled using mud rotary techniques through the surface casing to a depth of 74 feet bgs. Due to excessive silting the borehole was in danger of collapsing. To prevent this, a polymer solution was added to keep the borehole open long enough to set the 10 inch PVC well casing.

The ten inch PVC well casing was cut on site to the required measurements. The well consisted of a lower sump, a lower irrigator screen, a central riser pipe, an upper irrigator screen, and a riser pipe (which extended through the confining clay layer, and the shallow aquifer) to 3 feet above grade. An as-built drawing of the well is shown in Figure 3-6. The upper well screens were constructed such that the top of the screen was below the confining clay unit. The upper screen was positioned between 35.30-40.90 feet bgs, while the lower screen was positioned between 66.15-69.95 feet bgs.

On February 22nd, 1996 the prefabricated UVB system components were measured and cut on site to meet exact specifications of the UVB well casing installed. The UVB system consisted of: 1) a lower riser pipe to serve as an intake for water from the lower screen, 2) a fixed double packer sealing the upper screened zone from the lower screened zone, 3) a submersible pump, 4) a middle riser pipe connected to the pump discharge to convey water to the aerator/stripper,

5) an aerator/stripping reactor which was located at the water table, 6) an upper riser pipe installed on the aerator/stripping reactor, which extended above the flange as an ambient air intake, 7) a flange to seal the well, and 8) an above-ground blower. Off-gases from the blower were processed in GAC drums before being vented. Figure 3-7 shows a schematic diagram of the UVB off-gas treatment system.

Due to the problems associated with keeping the UVB borehole open at the time of drilling, the two (shallow and deep) proposed UVB annulus wells were not installed. A sampling port was constructed on the middle riser pipe (between the pump and the stripping reactor) to enable collection of influent water samples using an above-ground peristaltic pump. The effluent (after being stripped) water sample were collected using a bailer from the UVB well.

The UVB system was started up on February 29, 1996. During the first three weeks of March 1996, the system experienced problems due to foaming (from use of excess polymer during drilling), pump failure due to thunder storms, and electrical shut downs by the utility company. On March 23, 1996 the UVB system was considered fully operational.

3.3.3 Monitoring Well Installation

Drilling and installation of monitoring wells were performed in accordance to the standard operating procedures (SOPs) described in the Final Treatability Study Workplan [9]. To monitor the performance of the UVB system, 12 UVB monitoring wells were installed (6 shallow and 6 deep) in the upper Castle Hayne aquifer between February 10-16, 1996. Of the 12 wells, 10 were installed by SBP/Badger, and 2 (wells 20 IW and 20 UW) were installed later (March 1996) by Baker/Paratt Wolff. Shallow UVB monitoring wells were installed in the upper zone of the Castle Hayne aquifer to approximately 40-45 ft bgs, while the deep wells were installed to 69-74 ft bgs in the intermediate zone of the Castle Hayne aquifer. Figures 3-8 and 3-9 show layouts of the UVB shallow and deep monitoring wells, respectively. To monitor the performance of the KGB system, 8 KGB monitoring wells were installed in the perched aquifer (4 shallow and 4 deep) between January 23-25, 1996. Shallow KGB monitoring wells were installed to approximately 9 ft bgs, while the deep wells were installed to 12 ft bgs. Figure 3-10 shows the layout of the KGB and the KGB monitoring wells.

All wells were developed in accordance with the SOPs described in the Final Treatability Study Workplan [9]. Logs for the drilling and well development activities are attached in *Appendix A.*

3.3.4 Well Survey

All monitoring wells and the two treatment wells were surveyed by Lanier Surveying Company in October 1996. The UVB monitoring wells were referenced to the top of the UVB well flange (Table 3-3), and the KGB monitoring wells were referenced to the top of the KGB well (Table 3-4).

3.4 System Monitoring

Both the KGB and the UVB systems were monitored periodically for specific parameters as outlined in the field monitoring plan section of the Final Treatability Study Workplan [9]. In brief, during a site monitoring visit parameters such as water level, dissolved oxygen, pH, conductivity, and temperature were measured in all of the monitoring wells. In addition, parameters such as influent and effluent air flow rates, air temperature, air humidity, compressor air pressure, and UVB well vacuum were also measured. All of these parameters were used as indicators to determine the operation and performance of both systems.

The field monitoring data sheets are attached in *Appendix B.* Results from the monitoring data are discussed in Section 4.1.

3.5 Dye Study

3.5.1 Background

Dye tracer study was conducted to evaluate the dynamics of the UVB and the KGB circulation cells. The theoretical models predicted that a vertical groundwater circulation cell would be developed such that groundwater flowing out of the upper well screen would move away (divergent flow) from the UVB and KGB wells and groundwater drawn into the lower screen would move towards (convergent flow) the UVB and the KGB wells. To verify that these conditions were developed at Site69, a dye tracer study (using fluorescent dyes) was designed in which four different dyes were used to evaluate the divergent and convergent flows created by the UVB and KGB systems. The objectives of the dye tracer study were to:

- Ascertain that groundwater circulation cells had established under the given hydrogeologic conditions.
- Determine the dimensions of the groundwater circulation cells.
- Determine and/or extrapolate the time required after system start-up to establish fully developed circulation cells.

Site 69 is an inactive disposal site where drums containing chemicals and warfare agents were reportedly buried. Since the possibility of finding fluorescent dyes at the site existed, background sampling of site groundwater was done to evaluate if background dye levels would prohibit the use of selected dyes.

Collection, and analysis of water and charcoal samples for dyes was conducted in accordance with the SOPs developed by Ozark Underground Laboratory (OUL), which are described in the Final Treatability Study Workplan [9]. All samples collected for dye analysis were analyzed by OUL.

The results of the baseline sample analysis indicated that no fluorescent wavelength peaks were detected in any of the UVB and KGB monitoring wells. Thus, fluorescent dyes, which could interfere with the tracer study, were not present at the site. Eosine and fluorescein were selected as tracer dyes for the UVB system, and pyranine and rhodamine WT were selected as tracer dyes for the KGB system. Although, the UVB and the KGB systems were installed in two different and distinct aquifers, a different set of dyes were selected for each system to determine if any hydraulic connection did exist between the two aquifers.

3.5.2 Dye Injection

On May 10, 1996, the dye test was initiated by mixing the dyes as per the instructions provided by OUL. The dyes were mixed in five gallon pails downwind and away from the study plot to avoid cross-contamination. Eosine was used to trace the divergent component of the UVB system. A 5 lb sample of eosine was mixed with distilled water and injected in deep monitoring well 21 IW located 60 feet upgradient of the UVB. Fluorescein was used to trace the convergent component of the UVB system. An 8 lb sample of fluorescein was mixed with distilled water and injected in monitoring well 18 IW located 94 feet downgradient from the UVB well.

For the KGB system, rhodamine WT was used to trace the divergent component, while pyranine was used to trace the convergent component. A 10 lb liquid sample of rhodamine WT was mixed with water and injected in monitoring well 23B located 20 feet crossgradient from the KGB well.

A 5 lb sample of pyranine was mixed with distilled water and injected in monitoring well 25B located 28 feet downgradient from the KGB well.

3.5.3 Monitoring and Sampling

After the dyes were injected, charcoal absorbent packs and water samples were collected on a bi-weekly interval and analyzed for the respective dyes. Sample collection, preparation, and analytical procedures are described in the Final Treatability Study Workplan [9]. The UVB and KGB dye studies were initiated on May 10, 1996. The UVB dye study was terminated on October 7, 1996 after 21 weeks. During this 21 week period, the UVB dye study showed positive dye recoveries at several monitoring stations in spite of the fact that the UVB system had a downtime of 6 weeks (from power shut downs due to Hurricanes Bertha and Fran).

The KGB dye study had no positive dye recoveries in any of the monitoring stations during the first 21 weeks of monitoring. The inconsistent performance of the KGB system (from silting and sediment build-up) along with shut downs due to power failure may have adversely affected the KGB dye study. The total downtime for the KGB system was 7 weeks during the 21 week dye study period. Consequently, another dye injection was conducted in the KGB system on November 14, 1996. Rhodamine WT was injected in well 23B, and fluorescein was injected in well 25B. Samples were collected on a weekly interval for the first 4 weeks, and are scheduled for collection on a bi-weekly interval thereafter for the next 12 weeks. Results of the dye study are discussed later in Section 4. All dye analytical reports from OUL are included in *Appendix C.*

3.6 Sampling and Analysis for VOCs

To evaluate the performance of the UVB and the KGB systems, and to provide a database that would document the level of reduction in groundwater contamination, a Sampling and Analysis Plan (SAP) consisting of the Field Sampling Plan (FSP), Field Monitoring Plan (FMP), and the Quality Assurance Project Plan (QAPP) was prepared [9]. Four sampling events were planned and conducted to measure the concentrations of target VOCs in groundwater and off-gases. In brief, samples were collected before start-up to determine the baseline levels of target VOCs, following this they were collected after every two months of actual operation (excluding downtime). During each sampling event all UVB and KGB monitoring wells were sampled. In addition, groundwater samples were also collected from the UVB influent port and the UVB well (effluent). Due to the nature of its construction, groundwater samples from the KGB well cannot be collected frequently (this requires that the system be turned OFF, and the air lines removed). One groundwater sample was collected from the KGB well before start-up. The system is being modified to enable sample collection on a as-needed basis. Off-gas samples were taken from both systems (UVB and KGB) before and after GAC treatment.

The groundwater samples were analyzed by Roy F. Weston, Inc., Lionville, PA, and the off-gas samples were analyzed by Environmental Science and Engineering, Gainesville, FL.

The workplan also called for sampling and analysis of GAC from the two off-gas treatment systems. These samples have not been collected as of yet because the adsorption capacity of the GAC units has not been exhausted.

All the samples were collected, prepared, labeled, shipped, and analyzed in accordance with the QAPP [9]. Results of samples collected for VOC analysis are discussed in Section 4.4.

3.7 Sampling and Analysis for Inorganics

The potential for corrosion or encrustation of groundwater well casings and screens may be estimated by considering several parameters which characterize the inorganic groundwater quality. These parameters include: pH, concentration of dissolved gases (i.e., oxygen, hydrogen sulfide, and carbon dioxide), total dissolved solids, chloride, carbonate hardness, iron, and manganese.

Potentially corrosive conditions are indicated by low pH, significant concentrations of the dissolved gases listed above, high total dissolved solids concentration, and high chloride concentration. Potentially encrusting conditions are indicated by high pH, high carbonate hardness, and significant levels of iron and manganese.

Corrosive and encrusting conditions require additional maintenance or engineered controls to minimize the problem. The costs associated with these activities have to be factored in for a full-scale remediation project. In order to perform an evaluation of corrosion and encrustation potential at Site 69, SBP analyzed groundwater from well 69-GW15UW at time zero, and after 8 months for inorganic quality. Inorganic water analyses were conducted by York Laboratories, New Haven, CT. These results are presented and discussed in Section 4.5.

3.8 Pressure Transducer Tests

Pressure transducers are used to measure pressure differential created in groundwater when a UVB or a KGB system is turned ON, thus giving us information about the circulation cell. Pressure transducer tests can be designed to be qualitative (less monitoring points) or quantitative (a network of monitoring points). A qualitative pressure transducer test was conducted on June 15, 1996 at the UVB site, and on August 18, 1996 at the KGB site by IEG during their scheduled maintenance. These tests were conducted with a single transducer in selected wells by turning the system OFF, and ON alternatively. *Appendix D* includes a brief narrative of the pressure transducer test that was conducted.

3.9 Data Management

Data collected during this treatability study consists of that documented on field monitoring data sheets, analytical data for groundwater VOCs, dye trace analytical reports, off-gas VOCs analytical reports, and inorganic water quality data.

All these reports were submitted by individual laboratories, and the field monitoring team (Roy F. Weston, Inc.) to SBP. In addition, copies of groundwater VOCs, and off-gas VOCs were also submitted to Baker by the individual laboratories. The analytical results were periodically summarized in the weekly, bi-weekly, and monthly reports prepared by SBP for Baker.

Groundwater analytical reports (without the QA/QC package) are included in *Appendix E*, off-gas analytical reports (without the QA/QC package) are included in *Appendix F*, and *Appendix G* contains the inorganic water quality analytical reports.

3.10 Deviations from the Workplan

3.10.1 Drilling

(i) The workplan included installation of two annulus UVB monitoring wells (deep and shallow) within the same borehole. These wells are typically used to measure the physical/chemical groundwater parameters, and also to determine the UVB systems influent and effluent contaminant concentrations, or the removal efficiency. These wells were not installed because the drilling crew did not implement a temporary borehole casing, and could therefore not install both the system 10 inch casing and the two monitoring wells before the danger of borehole collapse set in. The well was collecting a lot of sand and silt, and was in danger of collapsing.

An in-line sampling port was installed in the riser pipe (6 inches above the pump discharge) to collect the UVB well influent sample. Groundwater from this port was sampled using a peristaltic pump from above-ground. The UVB effluent sample was collected by dropping a bailer in the UVB well and collecting a sample of the groundwater as it exited the upper UVB screen.

(ii) The workplan called for the placement of the upper UVB screen, and the screens for shallow monitoring wells at 30-35 ft bgs. This was based on the study of past geologic logs from the site. However, the shallow screens for all monitoring wells, and the upper UVB screen were positioned between 37-45 ft bgs because the confining clay layer was generally encountered at lower depths.

(iii) The spacing between KGB monitoring wells 22B and 25B was only 5 ft compared to the planned 8-12 ft separation. A larger separation was not possible because of suspected unexploded ordinance activity or buried drums in that area as per the recommendations of the UXO clearance subcontractor.

(iv) Screen sections on all UVB monitoring wells were planned to be 5 ft in length. All wells, however, were installed with screen sections in the range of 2-3 ft. Since the wells were being installed in a semi-confined aquifer, a smaller screen section can be used. When a small screen is used, the analytical data has less variations with respect to its vertical distribution.

3.10.2 Operation

The treatability study was scheduled for six months of operation (from the last week of March 1996 to the end of September, 1996) However, significant downtime was encountered due to two major hurricanes. The sampling events had to be rescheduled in order to comply with the plan of having a two month period of actual operation between successive sampling events. The study was extended by 5 weeks.

3.10.3 Sampling and Analysis

(i) The dye study at the KGB site was repeated after the first dye test showed no recoveries of the dyes in any monitoring wells.

(ii) Sampling for the first dye study was scheduled on a weekly basis for the first 4 weeks, followed by bi-weekly for the next 12 weeks for both systems. Instead, all sampling for dyes was done on a two week interval from start. This change was done in order to span the samples over a longer time.

(iii) GAC drums for the off-gas treatment have not been sampled because they have not reached breakthrough (evident from periodic PID measurements, and summa canister analyses).

3.10.4 Reporting

The economic feasibility analysis has not been conducted for either system. In view of the study being extended by another 3-6 months, a feasibility study done with additional data will be more valuable. If the study is not continued, an economic analysis will be performed and submitted under separate cover.

4. RESULTS AND DISCUSSIONS

4.1 Field Monitoring and Performance

Tables 4-1 & 4-2 summarize the operating status of the UVB and the KGB systems, respectively. These tables show the status of each system over the nine month study, and are used in the discussion of data later in this section. The UVB had a downtime of 27.6%, while the KGB had a downtime of 29.1%. The actual treatment time (operation time less downtime) for the UVB was 27 weeks, and that for the KGB was 26 weeks. The majority of the downtime was due to power outages as opposed to operating problems.

4.1.1 UVB Field Monitoring

Table 4-3 summarizes the groundwater elevation data for the UVB monitoring wells. All measurements are referenced to the top of the UVB flange for easy comparison. When a UVB system is in operation, the changes in groundwater elevations are large enough to measure, and show a trend for the circulation cell. Figure 4-1 shows a contour map of groundwater levels in shallow UVB monitoring wells on April 11, 1996. It is seen that groundwater is flowing away from the UVB (divergent flow). Figure 4-2 shows a contour map of groundwater levels on the same day in deep UVB monitoring wells. Here, the groundwater is flowing towards the UVB (convergent flow). The data presented in Figures 4-1 & 4-2 provide qualitative information about the circulation cell, and cannot be used to predict or estimate the dimensions of the cell. The contour maps were generated in SURFER by interpolating (Krigging) the field data.

Table 4-4 summarizes the dissolved oxygen concentration in UVB monitoring wells. DO measurements are used as qualitative indicators to show operation of the system, as well as determine how far out the DO is being transported by the circulation cell in the aquifer. The data shows that average DO levels were lower when the system was OFF (0.11 to 0.27 ppm) when compared to levels when the system was ON (0.2 to 0.49). In general, DO levels in both deep and shallow wells increased over time during the nine month operation.

Tables 4-5, 4-6, and 4-7 summarize the groundwater temperature, pH, and conductivity data respectively, for the UVB monitoring wells. Collectively, this information is useful in 1) discussing system performance, 2) monitoring unusual changes in any monitoring wells, and helps in discussing physical, chemical and biochemical changes in the circulation cell. For example, pH varied from 6.67 to 11.33 at the start, and stabilized in the range of 6.12 to 9.20 after 9 months, indicating mixing and homogenization within the circulation cell. Groundwater temperatures remained fairly constant (63.24 to 64.45 ^{O}F) for the lower aquifer throughout the nine months. Since this aquifer is semi-confined, seasonal atmospheric changes in temperature should not affect this groundwater. Groundwater conductivity data showed an unusually high conductivity in well 15 UW (an average of 1388 m mhos/sec) compared to other wells (an average range of 195 to 465 m mhos/sec). This is probably due to the location of this well (transition zone between clay and sand, as well as its proximity to the area of high contamination).

Table 4-8 lists air measurement data for the UVB system. Except during the first two weeks of start up, the UVB maintained an air to water ratio in the range of 26 to 45. This ratio is within the optimum desired range for the UVB-250.

4.1.2 KGB Field Monitoring

Table 4-9 summarizes the groundwater elevation data for KGB monitoring wells. All measurements are referenced to the top of the KGB flange for easy comparison. The groundwater saturated thickness being treated by the KGB was 10.7 ft (at start), and hence changes in groundwater levels due to the operation of the system were minimal. In addition, periodic shut downs, and excessive rains caused the natural background groundwater levels to vary making comparisons to the KGB system's impact difficult. Consequently, groundwater level measurements from five monitoring events representing optimum operating conditions were averaged to study the trend in groundwater flow. This data (see Table 4-9) shows that in shallow wells, groundwater was flowing from well 22A to 25A, and from well 23A to 24A, both in a direction away from the KGB (divergent flow). In deep KGB monitoring wells, groundwater was flowing from well 24B to 23B, and from well 22B to 25B, both in a direction towards the KGB. This trend in groundwater flow in deep KGB monitoring wells indicates that a circulation cell may have been established in that area.

The preliminary transducer test conducted in August 1996 also indicated that the head in wells 22B and 25B (except well 24B) did reverse (rising or falling hydraulic head) when the KGB was cycled in ON and OFF positions. However, the transducer test was only qualitative in nature, and was also inconclusive. The current data is not sufficient for further predictions about the KGB circulation cell. Therefore, an extended transducer test (see Section 6.1 on Recommendations) has been proposed to answer the more specific questions regarding the ZOI of the KGB.

Table 4-10 summarizes the DO levels in KGB monitoring wells. The DO levels ranged from 0.13 to 0.23 ppm when the system was OFF, and from 0.32 to 0.61 when the system was ON. In general, DO levels in both deep and shallow wells increased over time. Overall the DO levels may be low because of consumption of DO by microbiological processes. The area surrounding the KGB is highly contaminated, and serves as a good source of organic carbon for the indigenous microorganisms.

Tables 4-11, 4-12, and 4-13 summarize the groundwater temperature, pH, and conductivity data, respectively, for the KGB monitoring wells. Collectively, this information is useful 1) in discussing system performance, 2) in monitoring unusual changes in any monitoring wells, and 3) discussing physical, chemical and biochemical changes in the circulation cell. For example, pH varied from 3.86 to 7.00 (unlike the UVB which ranged from 6.67 to 11.33). A low pH can be viewed as an indicator of microbiological activity for chlorinated compounds which are mineralized into hydrochloric acid. Groundwater temperatures varied from 51.6 to 75.2 ^{o}F in KGB monitoring wells due to atmospheric changes in groundwater (unlike the groundwater in UVB monitoring wells which remained fairly constant). The groundwater conductivity data did not show any unusual patterns of the KGB monitoring wells.

Table 4-14 lists air measurement data for the KGB system. The average influent air flow (through the compressor) was 1.9 acfm, and the average true effluent (sparged air plus soil air) air flow was 38.9 acfm. The true effluent air flow ranged from 4.4 to 103.5 acfm. Low air flow rates reflect a high water table, and minimum soil vapor extraction, while high effluent flow rates indicate aeration through a deeper vadose zone due to a low water table.

4.1.3 Surface Water Pools

During the course of this study, pools of water with an oily sheen were seen in the vicinity of the treatment systems. Questions were raised if these pools were as a result of the operation of these systems. The UVB system operates in the upper Castle Hayne aquifer (confined or semi-confined), and cannot create this problem. Although the KGB is installed in the shallow aquifer, the upper limit of its circulation cell is 1.5 ft bgs by design (from position of its SVE screen). Consequently, these pools cannot be created by either system. The RI/FS workplan prepared by Baker in 1993-94 indicated the presence of many such pools, and one near the present UVB location was even sampled. These pools are believed to be from seasonal changes in groundwater.

4.2 UVB Dye Study

As explained earlier, the purpose of the dye tracer study was to verify how far out the circulation cell was established which would transport contaminants to the well for treatment. Two different dyes were used to trace the convergent (fluorescein), and the divergent (eosine) components of the UVB circulation cell. Fluorescein was injected in monitoring well 69-GW-18IW located 94 ft downgradient from the UVB on May 10, 1996. This well was installed to a depth of 70 ft bgs. Table 4-15 summarizes the movement of fluorescein, and shows the time and concentration at which it was detected in the UVB monitoring wells. Figure 4-3 shows a travel time contour map of fluorescein as it traveled in deep UVB monitoring wells after it was introduced in well 69-GW-18IW. This figure clearly shows that fluorescein moved upgradient, and reached the UVB well approximately 24 days after it was injected in well 69-GW-18IW. Positive recoveries of fluorescein were seen in all the deep monitoring wells except well 2IW which is located at a distance of 172 ft from the UVB and is probably at the fringe of the circulation cell. Well 18IW was not monitored because the dye was injected in that well.

The path of fluorescein movement in deep wells showed that the convergent component of the UVB circulation cell was established, and that at a minimum the UVB circulation cell had a ZOI of 188 ft in diameter. This is based on the assumption that the geology in the other three directions (south, north and west) is the same as it is in the direction to the east of the UVB where the study was focused.

Eosine was used as the divergent dye, and was injected in UVB monitoring well 21IW. In other dye tracing studies we injected the divergent dye in the UVB well or in a shallow well nearest to the UVB. This resulted in extremely high concentration of the divergent dye in the UVB well masking the low concentration convergent dye moving towards the UVB. Therefore, eosine was injected in deep well 21IW so that it would travel to the UVB, and after entering the UVB, it would be radially released at a lower concentration in the upper diverging part of the UVB circulation cell. Surprisingly, the divergent dye (eosine) was not recovered in any of the UVB monitoring wells. Two possible explanations for this observation are:

(a) eosine was highly retarded, and as a result, was not mobilized by the circulation cell, and
(b) the geology to the west of the UVB was not similar to that to the east of the UVB resulting in eosine being lost via preferential flow pathways to the north or the south.

Divergent flow in the upper region of the circulation cell was, however, confirmed by fluorescein. After fluorescein entered the UVB well, it was released through the upper UVB screen in the divergent circulation path. Figure 4-4 shows a travel time contour map of fluorescein for UVB shallow monitoring wells. The travel times of fluorescein in the divergent circulation path were more or less identical to those in the convergent circulation path. All shallow monitoring wells with the exception of well 21UW had positive recoveries of fluorescein.

Eosine is a brominated fluorescein dye, and hence the two dyes can be considered to be similar in physical and chemical properties with the exception of a different and distinct wavelength of absorbance. This suggests that the failure of the system to mobilize eosine from, and fluorescein to well 21IW, was probably due to unfavorable geologic conditions around the well or as a result of improper well construction.

4.3 KGB Dye Study

As discussed in Section 3.5, two dye tracer experiments were done at the KGB site. No positive dye recoveries were seen in KGB monitoring wells during both experiments. When compared to the UVB system, the KGB system had 50% less monitoring wells. In a dye study like this we do not look for results from individual wells, but we look for trends (flow to and away from the well) to draw conclusions. Since dye recoveries were not seen in any monitoring wells, we cannot draw any conclusions regarding the circulation cell. The geology of the shallow Castle Hayne aquifer was definitely disturbed by way of trenching and backfilling activities in the past which may have created preferential pathways. Chemical retardation or inactivation of the dye could be other reasons why the dyes were not mobilized.

As recommended in Section 6.1, a pressure transducer test will be conducted to confirm if a circulation cell was established at the KGB location.

4.4 Contaminant Fluctuations in Groundwater

During the nine month operation, both decreases and increases in concentration of target contaminants in groundwater were observed. The processes that can cause a decrease in the concentration of contaminants are dilution, stripping, biodegradation in the aquifer, and convective transport of contaminants away from the circulation cell. The processes that could cause an increase in concentration are convective transport into the cell from an upgradient area of high contamination, soil flushing followed by dissolution of contaminants within the cell, and transport by molecular diffusion into the cell from contaminated unsaturated zone and capillary fringe soils. Four sampling events were conducted during the nine month operation. Baseline samples were collected in Feb./March 1996, and the last sampling event was in Oct/Nov. 1996.

4.4.1 Contaminant Reduction in UVB Circulation Cell

Table 4-16 summarizes the groundwater VOCs data for the UVB monitoring wells. Three contaminants (VC, TCE, and 1,2-DCE) were consistently detected in these wells. PCE and 1,1,2,2-TCA were not detected. The average total concentration of contaminants decreased by 16% in the circulation cell, decreased by 23% in the shallow wells, and increased by 36% in the deep wells. The total average COI value is used to summarize the overall change within the circulation cell. The actual concentration of contaminants decreased by 6,774 ppb (from 29,135 ppb to 22,361 ppb) in shallow monitoring wells, and increased by only 215 ppb (from 605 to 820 ppb) in deep monitoring wells. These results suggest that there was an overall reduction in concentration of target contaminants in the UVB circulation cell.

Figures 4-5, 4-6 & 4-7 show variations in concentration of VC, DCE, and TCE, respectively. The average concentrations decreased by 30% for VC, and 16% for DCE. The average concentration for TCE increased by 21%. An increase in concentration has been observed in many cases where these systems have been installed, and is a result of mixing and homogenization. Typically, increasing and decreasing trends continue for more than a year before a steady decline is seen.

Most of the above observed reduction may be due to dilution and *in situ* biodegradation. Air stripping presumably has not removed significant amounts of contaminants (see Table 4-17) because the contaminants moving towards the well are being diluted with remediated and clean recirculating groundwater. Table 4-18 shows calculations for the volume of water in a zone 52 ft (well 15UW) from the UVB, and in the entire circulation cell as modeled. The average concentration of target VOCs in the 52 ft diameter zone (based on concentrations in wells 21UW, 21IW, 16UW, 16IW, 17UW, 17IW, and 15IW) was determined to be 4,475 ppb. When this is diluted in the entire circulation cell the final concentration is estimated to be 354 ppb. This value (354 ppb) assumes that no stripping, *in situ* degradation, and/or retardation is taking place, and is conservative.

The UVB well is positioned 50 ft from the area of high contamination. In perspective, the area of high contamination is located at the midpoint of the lateral extent of influence ([Bb+Bt]/4) of the UVB. In its present location, the UVB is being utilized as a containment system and not an active remediation system.

Well 15UW has the highest total concentration of target VOCs. This well has not shown significant change in concentrations of target VOCs over time. One explanation is that this well is not been actively flushed by the circulation cell. Table 4-19 shows the vertical positions of the monitoring well screens, in addition to the positions of the upper and lower screens of the UVB well. The bottom of well 15UW is 2.9 ft below the top of the upper UVB screen. In comparison, the bottom of all other shallow monitoring wells range from 9.69 to 13.65 ft below top of the upper UVB screen. If the vertical component of flow is more dominant than modeled, the screen of well 15UW may not be actively flushed by the circulation cell.

The circulation cell has a maximum thickness at the UVB, which decreases as we move away from the UVB. This theoretical decrease in thickness (slope) can be determined by extensive modeling. As a rule of thumb a 3 ft drop is expected at the lateral extreme of the cell ([Bb+Bt]/4) which is 202 ft from the UVB, but may vary from site to site. This results in a drop of 0.8 ft at well 15UW which is at a distance of 52 ft from the UVB. Consequently, well 15UW (with a 5 ft screen) is only 2.1 ft deep in the circulation cell. These calculations suggest that the circulation cell may not be actively mobilizing the contaminants from well 15UW.

4.4.2 Contaminant Reduction in KGB Circulation Cell

Table 4-20 summarizes the groundwater VOCs data for the KGB monitoring wells. All five target VOCs (VC, TCE, 1,2-DCE, PCE and 1,1,2,2-TCA) were consistently detected in these wells. The average total concentration of contaminants decreased by 15% in the circulation cell (estimated from modeling), decreased by 44% in the shallow KGB monitoring wells, and decreased by 13% in the deep KGB monitoring wells. The total average COI value is used to summarize the overall change within the circulation cell. The actual concentration of contaminants decreased by 10,505 ppb (from 24,172 ppb to 13,667 ppb) in shallow monitoring wells, and decreased by 7,255 ppb (from 56,038 to 48,783 ppb) in deep monitoring wells. Of the eight total monitoring wells, the concentrations of target VOCs had decreased in seven wells, and increased in one (well 24B).

Figures 4-8, 4-9, 4-10, 4-11, and 4-12 show variations in concentration of VC, DCE, TCE, PCE, and TCA , respectively. The average concentrations increased by 26% for VC, and 290% for DCE. The average concentrations for TCE, PCE and TCA decreased by 60%, 94%, and 64%, respectively. Increases in VC and DCE are likely due to the mineralization (biological degradation) of TCE and PCE, which is a typical trend for chlorinated solvent contaminated sites.

Most of the observed reduction may be due to a combination of *in situ* biodegradation and air stripping. Fluctuations in dissolved VOCs in the shallow aquifer may also be from changes in the water table (excess precipitation). Since the groundwater and soil are in a dynamic equilibrium, a mass balance cannot be based on groundwater VOCs data alone. The mass of contaminants removed by stripping alone can be determined from the off-gas data.

Table 4-21 shows the off-gas data from the KGB system. During the first two sampling events, the off-gas samples were collected with the blower ON. As seen in Table 4-14, the average 1.9 acfm of sparged air, and the 38 acfm of soil air were diluted to 73 acfm by the bleed air. The bleed air was required to reduce the vacuum on the well, and hence keep the groundwater from rising in and out of the well. This dilution may have probably lowered the concentration of some constituents to below detection limits. Consequently, during the third sampling event, the blower was switched OFF before sampling. The data collected showed that the concentration of target compounds were one to two orders of magnitude higher than those seen in the two earlier events.

The mass flow of target VOCs in the off-gas was calculated to be 55.21 g/day during the third sampling event, when compared to 2.65 and 5.60 g/day during the first two sampling events. It is likely that the mass flow was higher than 55.21 g/day during the first two sampling events (if dilution effects are considered). Considering a treatment time of 183 days, and a mass flow of 55.21 g/day results in a mass removal of 10.10 kg of VOCs. A 90 kg carbon can will adsorb approximately 14 kg VOCs (15% by wt.), therefore we could see breakthrough across the KGB GAC canister during the next sampling event in March 1997.

4.5 Groundwater Inorganic Analysis

The Ryznar Stability Index was devised to predict the corrosive or encrusting tendencies of a particular water. It is widely used for predicting the reaction of metals in water saturated conditions. A water is corrosive if the index is higher than 7, and encrusting if lower than 7.

Table 4-22 shows the inorganic analytical data for well 15UW. Two samples were taken, one at time zero, and the other after nine months. The Ryznar Stability Index was calculated to be 8.79 at time zero, and 9.84 after six months. This indicates a potential for corrosion as the index is increasing. This is also in agreement with reports that no visual signs of encrustation were observed during routine maintenance activities. The shift in the index may also be due to a seasonal change in the sub-surface geochemistry. Additional samples will be taken to determine the trend in the index. At present this value does not pose a problem to the system's various components.

5. CONCLUSIONS

The following conclusions have been drawn based on the data obtained from a six month operation of both the UVB and the KGB systems.

A. The UVB System

- The dye tracer study was successful, and along with the water level data and a very preliminary transducer test, has demonstrated that a circulation cell was established in the upper Castle Hayne aquifer. The circulation cell had established both the divergent and the convergent components of flow.

- At a minimum, the zone of influence of the UVB system was determined to be 188 ft in diameter from the dye tracer study. Fluorescein dye traveled to the UVB well from a downgradient injection point in half the time predicted by the model. In view of this, the zone of influence can be very well assumed to be greater than 188 ft in diameter as predicted by the model.

- On average, the concentration of three target VOCs in the upper Castle Hayne aquifer had decreased by 16% from baseline levels after six months of operation.

- Most of the observed reduction may be due to dilution and *in situ* biodegradation. *In situ* stripping has not been a significant component as indicated by the off-gas data.

- The UVB system in its present position (50 feet from the area of high contamination) is functioning as a passive remediation system or a containment system. Active remediation can be evaluated by moving the UVB to the area of high contamination.

B. The KGB System

- The dye tracer study indicated that the KGB system was unsuccessful in mobilizing the three dyes that were tested. However, water level measurements, and a preliminary transducer test indicated that a circulation cell may have been established.

- The ZOI of the KGB system could not be determined and/or estimated from the dye study.

- On average the concentration of target VOCs in shallow groundwater had decreased by 15% from baseline levels after six months of operation. Of the eight monitoring wells, seven wells showed a decrease in concentration.

- Concentrations of PCE, TCE, and 1,1,2,2-TCA decreased, while that of DCE and VC showed an increase. This trend is typical for a chlorinated solvent contaminated site where a combination of anaerobic and aerobic processes break down PCE and TCE into daughter products (VC and DCE). These increases are associated with high concentrations of PCE and TCE, and are prominent during the early phase of the treatment process. Eventually, there will be a decrease in concentration of all the VOCs.

- Off-gas data indicated that target VOCs were being stripped at a rate of 55.21 g/day from groundwater in the shallow Castle Hayne aquifer. At this rate it is estimated that 10.10 kg of target VOCs were removed from the shallow Castle Hayne aquifer during the six months of operation.

6. RECOMMENDATIONS

Some of the information indicates that the UVB and the KGB systems are functioning as designed under the difficult geologic conditions encountered at Site 69. The groundwater VOC data for the UVB circulation cell has shown some trends which are yet difficult to explain with limited sampling events to date. The KGB system's zone of influence is not known, although, there is evidence (e.g., water level data) that a circulation cell exists. Data collected to date is insufficient to evaluate the economic feasibility of using these systems for remediating the shallow, and the upper Castle Hayne aquifers at Site 69, MCB Camp Lejeune. SBP recommends that both studies be extended for at least three and preferably six months in order to perform a thorough evaluation of these technologies.

6.1 Recommendations for the KGB System

The ZOI of the KGB circulation cell has not been confirmed experimentally via dye tracer studies. It is recommended that an extensive pressure transducer test be done to determine the ZOI of the KGB circulation cell. A pressure transducer responds to the pressure wave created by the cell, and measures the pressure head irrespective of the direction of groundwater flow. The disadvantage for the pressure transducer test is that the probes have to be sensitive enough to measure small changes in pressure heads that are typically induced by a KGB type system.

Overall, the preliminary pressure transducer test was inconclusive in determining the ZOI of the KGB circulation cell. This test was conducted without adequate background and barometric control or measurements. The absence of KGB monitoring wells in all four radial directions makes interpretation of the data even more difficult. In addition, moderate amounts of precipitation fell during this test (the shallow aquifer is sensitive to changes in water levels from precipitation). Finally, the measurements were collected from selected wells one at a time, and the KGB well was not developed after the OFF, and before the ON cycle.

The proposed test will be performed on a dry day, and will be conducted as follows:

- (i) Measurements will be taken in all the wells while the system is ON.
- (ii) System turned OFF.
- (iii) Measurements taken in all the wells until stabilization.
- (iv) The KGB system will be removed and checked for sediment build up in the well. The well will be developed if sediments are found. We have seen sediment build up in the past when the system has been OFF for long times.
- (v) The system will be turned ON, and adjusted to optimum operating conditions.
- (vi) Measurements will be taken in all the wells.

When the system is ON, a successful test will show that in shallow monitoring wells, a gradient exists in a direction away from the KGB, and in deep monitoring wells, a gradient exists in a direction towards the KGB. It should also show that the pressure heads reverse from rising to falling in shallow monitoring wells, and reverse from falling to rising in deep monitoring wells when the system is turned from an OFF to an ON position. Any well showing this trend is considered to be within the ZOI of the circulation cell.

It is also recommended that at least four more monitoring wells (a deep and a shallow each at two locations) be installed around the KGB well, so that the circulation cell can be monitored from all four radial directions. These new wells will be positioned to the northeast and the northwest of the KGB at a distance of 20 feet. The deep wells will be installed to 12 ft bgs as before. The shallow wells will be installed such that the screen interval matches the KGB screen. This will result in a separation of more than 3 ft (6-8 ft range) between the shallow and deep monitoring wells. A greater separation will allow us to measure differential pressure heads more accurately during the transducer test.

In addition, to conducting a transducer test, we recommend that the sampling and analysis of the KGB well off-gas, the KGB well groundwater, and four nearest KGB monitoring wells be done on a more frequent interval. It is recommended that these samples be analyzed twice a month for a three month study, or once a month for a six month study. Off-gas data can determine the exact quantity of VOCs physically removed, and hence the rate of physical treatment.

6.2 Recommendations for the UVB System

Although we know that the UVB circulation cell (minimum ZOI of 188 ft) has been established, it has not mobilized and/or transported significant amounts of contaminants to the remediation well for treatment. The bulk of the contaminant seems to be 50 ft away from the UVB laterally, and more than 5 ft above the circulation cell. The current vertical and horizontal location of the UVB well appears to be such that it is only passively remediating the highly contaminated zone.

We recommend that the UVB system be moved to well 15UW, the highly contaminated well. The upper screen of the UVB should be positioned such that it matches with the current screen interval of well 15UW. By reducing the total depth of the well from 75 ft bgs to 60 ft bgs, dilution affects (from the lower less contaminated zone) will also be minimized, and the stripping efficiency increased.

By frequently monitoring the concentration of target VOCs in groundwater entering and leaving the well, and in the off-gases, the success or failure of the UVB to perform active remediation will be tested. Once again, at least a three month or preferably a six month period of operation is recommended at the new location. It is recommended that the above samples be analyzed twice a month for a three month study, or once a month for a six month study.

The existence of the UVB circulation cell at the new location will be confirmed via a pressure transducer test as described in Section 6.1.

6.3 Reporting

Reporting for the Phase II Treatability Study will include:
(i) Bi-weekly Progress Reports
(ii) Draft Phase II Treatability Study Report

6.4 Phase II Schedule

February 5, 1997:	Approval to proceed
February 16-20, 1997:	Mobilize for UXO clearance
February 23-27, 1997:	Mobilize to drill UVB well and KGB monitoring wells
March 2-6, 1997:	System installation and start-up
March 9, 1997:	Phase II treatability study begins
April 6-10, 1997:	Pressure transducer test (UVB/KGB)
June 9, 1997:	Phase II treatability study ends (3 months)

PHASE II TREATABILITY STUDY

7. TREATABILITY STUDY APPROACH

7.1 Phase II Treatability Study Objectives

Based on recommendations from the Phase I Treatability Study, the objectives of the Phase II Treatability Study were:

1. Study the contaminant removal efficiency of the UVB system by relocating it to well 15UW (well showing highest contamination level) over a three month period of operation.
2. Conduct drawdown and pressure transducer tests to determine the effective zone of influence of the UVB system in it's new location.
3. Estimate required operating time for the UVB system to achieve clean up goals for the upper Castle Hayne aquifer.
4. Continue operation of the KGB system in its original position with better and frequent well developing methods to minimize silting which has a negative impact on the systems' performance.

7.2 UVB-400 System Installation and Start Up

On June 24, 1997, SBP and its subcontractor, McCall Brothers, started overdrilling the existing monitoring well 15 UW. On June 25, 1997, an 18 inch UVB bore hole was completed to 13 ft bgs, and a 18 inch UVB surface casing was installed. On June 26, 1997, a 16 inch bore hole was advanced through the 18 inch surface casing to a depth of 73 ft bgs. The UVB well was installed following completion of the bore hole with an upper screen section between 37.65 and 44.15 ft bgs, and a lower screen section between 62.95 and 67.20 ft bgs. The total depth of the UVB well is 69.4 ft bgs. Figure 7-1 shows a schematic diagram of the completed well, and the field boring logs are included in *Appendix A.*

On June 27, 1997, the UVB well was developed by pumping water in 1 hour cycles from the upper and the lower screens of the well. The total development time was 7 hours. Development water was collected in a 5000 gallon tanker. Visual monitoring of the development water for turbidity and sand particles was done. Samples of the development water were sent to VOC Analytical Laboratory for analysis using method 5030/8260 (see *Appendix H*). The development water was disposed at the wastewater treatment plant on the base.

Drilling mud and soil cuttings were staged on plastic covered ground nearby, and were later transferred to 36 steel drums (55 gallon capacity) for disposal. A composite soil sample from four drums was collected by IEG on August 26, 1997. Headspace analysis of this sample indicated the presence of vinyl chloride (1.28ppmv), t-1,2 DCE (4.76 ppmv), c-1,2 DCE (11.31 ppmv), TCE (0.52 ppmv), and unidentified VOCs (1.04 ppmv). These drums were later disposed by Baker.

The in-well components of the UVB system were installed in stages between July 2, 1997 and August 19, 1997 due to problems such as power shut down, pump failure, and broken piping. The UVB system was in full operation on August 12, 1997.

The Phase II UVB was a canister UVB-400 system, an upgrade from the UVB-250 used during the Phase I study. The UVB-400 system has a larger air stripper, and achieves a higher air to water ratio, which increases the stripping efficiency.

7.3 UVB-400 Design Calculations

Table 7-1 shows the design parameters for the UVB-400 system. The hydraulic conductivity (K_H = 4.07 x 10^{-6} m/s) was determined using two slug tests (explained later in Section 7.7). At the new location, the aquifer could sustain a recirculation flow rate of only 1.69 m^3/hr (7.3 gpm), compared to 20 gpm at the previous location. The saturated zone being treated (H, distance between the two screen sections) is 9.7 m (32 ft) thick. The estimated stagnation point (S) is 34.6 m (113.5 ft) from the UVB, and the maximum width of the circulation cell in a direction perpendicular to groundwater flow ([Bb + Bt]/4) is 34.5 m (113 ft) from the UVB well.

The upgradient (at a distance of 5H or 160 ft) capture zone cross sectional area (A) is estimated to be 702 m^2 (7552 ft^2). Groundwater flow through this capture zone is estimated to be 0.189 m^3/hr (0.8 gpm). With a recirculation flow of 1.69 m^3/hr (7.3 gpm) through the well, 89% of the water passing through the UVB well at any time is recirculated water. Consequently, the dilution effect is very significant.

Figure 7-2 shows a graph of circulation time for the UVB 400 system. Under the above conditions, it will take 4.5 years to complete one pore volume flush through the ZOI (113.5 ft radially from the UVB).

Figure 7-3 shows layout of the UVB-400 well and the UVB-400 monitoring wells. The figure also shows the estimated zone of influence of the UVB-400 system.

7.4 System Monitoring

Both the KGB and the UVB systems were monitored periodically for specific parameters as outlined in the field monitoring plan section of the Final Treatability Study Workplan [9]. In brief, during a site monitoring visit parameters such as water level, dissolved oxygen, pH, conductivity, and temperature were measured in selected monitoring wells. In addition, parameters such as influent and effluent air flow rates, compressor air pressure, and UVB well vacuum were also measured. These parameters were used as indicators to determine the operation and performance of both systems.

The field monitoring data sheets for the Phase II study are attached in *Appendix I*. Results from the monitoring data are discussed in Section 8.1.

7.5 Sampling and Analysis for VOCs

To evaluate the performance of the UVB and the KGB systems, and to provide a database that would document the level of reduction in groundwater contamination, selected monitoring wells for both systems were sampled every two weeks. In addition, UVB well influent and effluent groundwater samples were also collected every two weeks. Off-gases from both the KGB and the UVB systems were also analyzed along with the groundwater samples. The samples were analyzed on-site by the headspace analysis method using a field gas chromatograph (Photovac). A total of six sampling events were planned over three months of actual operation (excluding downtime). The analytical procedure was set to detect vinyl chloride, TCE, *cis*-1,2 DCE, and *trans*-1,2 DCE. Other compounds detected were reported as unidentified VOCs.

Two sets of groundwater samples (8/25/97 and 12/16/97) were also sent to a certified laboratory (CompuChem, Research Triangle Park, NC). All the samples were collected, prepared, labeled, shipped, and analyzed in accordance with the QAPP [9]. Results of samples collected for VOC analysis are discussed in Section 8.2.

7.6 Pressure Transducer Test

On December 17, 1997, a pressure transducer test was conducted at monitoring well cluster MW 17 to determine if monitoring wells 17UW and 17IW were being influenced by the UVB circulation cell. Monitoring well cluster MW 17 was selected because well 17UW has the highest contamination, and the objective was to determine if the area around well 17UW was being flushed by the circulation cell. Results of the pressure transducer test are discussed in Section 8.3.

7.7 Slug Test

Two slug tests were performed to determine the hydraulic conductivity of the upper Castle Hayne aquifer in the vicinity of the UVB-400. These tests were conducted in monitoring well 15IW, which is 18 ft from the UVB-400 well. The first test was performed on October 21, 1997 with the UVB system in the ON position. The second test was performed on December 17, 1997 with the UVB system in the OFF position. Data from both studies were analyzed by the Hvorslev Method as well as by the Bouwer and Rice Method.

With the system OFF, the Hvorslev Method, and the Bouwer and Rice Method predicted the hydraulic conductivity to be 4.75×10^{-6} m/sec, and 3.79×10^{-6} m/sec, respectively. With the system ON, the Hvorslev Method, and the Bouwer and Rice Method predicted the hydraulic conductivity to be 4.07×10^{-6} m/sec, and 3.21×10^{-6} m/sec, respectively. The variation in hydraulic conductivities determined by these methods was not significant. An average value of 4.0×10^{-6} m/sec was used in the calculations. Results of the slug test are shown in *Appendix J.*

7.8 Data Management

Data collected during this treatability study consists of that documented on field monitoring data sheets, analytical data for groundwater VOCs, off-gas VOCs analytical reports, pressure transducer data, and slug test data.

All these reports were submitted by individual laboratories, and the field monitoring team (IEG Technologies) to SBP. All the results were periodically summarized in the bi-weekly or monthly reports prepared by SBP for Baker.

Groundwater analytical reports from the laboratories (without the QA/QC package) are included in *Appendix H*, field monitoring data sheets are included in *Appendix I*, and *Appendix J* contains the slug test data.

7.9 Deviations from the Workplan

7.9.1 Operation

1. Due to continuing problems with silting and sedimentation, the KGB system was shut down on 10/22/97, and the KGB treatability study was abandoned.
2. The UVB-400 treatability study was scheduled for three months of operation (from July to October 1997) However, downtime was encountered due to equipment failure, power failure, and delays in sampling periods. Consequently, the study was stretched to almost six months during which the UVB-400 system operated continuously for 16 weeks (instead of the planned twelve weeks).

7.9.2 Sampling and Analysis

The workplan called for sampling and analysis at every two week interval. However, due to equipment failure, power shut down, and other delays, sampling was done at an interval that ranged from two to four weeks.

8. RESULTS AND DISCUSSIONS

8.1 Field Monitoring and Performance

8.1.1 The KGB System

The KGB system was switched ON on 7/2/97, and was switched OFF on 10/22/97. The KGB system did not operate continuously over this period. The new well development method employed was able to remove the fine sand and silt. However, the critical problem with the KGB system was a poor sand pack which allowed fines to continuously deposit in the KGB well. This problem could only be solved by reinstalling the KGB system with an appropriate sand pack.

Table 8-1lists the operating parameters measured for the KGB system. These parameters were measured immediately after the KGB well was redeveloped and restarted during the indicated site visit. These parameters of air flow and pressure are typical of a properly functioning KGB system. However, the KGB system at Site 69 operated under these conditions for not more than 2 weeks after the well was redeveloped due to sediment build up.

8.1.2 The UVB-400 System

After initial tests with different pumps, and different flow rates, continuous operation of the UVB-400 system was initiated on 8/12/97. The last measurements were taken on 12/16/97, and the system is still in operation. Table 8-2 lists the operating parameters measured for the UVB-400 over this sixteen week of continuous operation. These parameters (influent and effluent air flow, and vacuum) are typical for a properly operating UVB-400 system. The air to water ratio was maintained in excess of 150 to allow for greater than 95 % stripping efficiency.

The circulation cell was also established as indicated by the pressure transducer test results presented in Section 8.2 below.

8.2 Pressure Transducer Test

As indicated earlier, a pressure transducer test was conducted to qualitatively determine that a circulation cell had established. Table 8-3 and Table 8-4 show the data for wells 17IW and 17UW, respectively. Table 8-3 shows that the pressure head decreases from baseline when the UVB pump and the UVB blower are switched ON. This is because groundwater in the vicinity of well 17IW is being pulled towards the UVB. When the pump and the blower are switched OFF, the pressure head rises, and given sufficient time would return to the baseline level. The pump and the blower were switched ON again for a longer period of time. The data shows that the pressure head decreases once again and reached an equilibrium level of 1.3169 ft as compared to the baseline level of 1.4153 ft.

Table 8-4 shows that the pressure head also decreased in well 17UW when the pump and the blower were switched ON. This is because the UVB well initially acts like an extraction well, drawing water from the aquifer to fill up the casing. The pressure head rises as soon as the system is shut OFF, a response to the release of water into the aquifer from the upper UVB screen. The system was switched ON again and pressure data was collected over a longer time. Once again, the pressure decreased initially but increased after 90 minutes of operation, and reached an equilibrium value close to the baseline value.

The above data clearly indicates that the area around monitoring well cluster MW17 is being influenced by the circulation cell.

8.3 Contaminant Removal from Groundwater

8.3.1 KGB System

Two sets of groundwater samples were collected from the KGB monitoring wells for VOC analysis. The first sample was collected on 7/2/97, and the second on 7/16/97. Due to inconsistent operation of the KGB system, no further samples were collected.

Table 8-5 shows headspace analytical results for groundwater samples collected from the KGB monitoring wells. These samples were analyzed on-site using a field GC. This data does not indicate any trends, and cannot be used to comment on the performance of the KGB system due to the wells' erratic operation. This data only indicates that there is still a significant amount of contamination in the perched aquifer, which is a potential source for contamination in the upper Castle Hayne aquifer.

Table 8-6 shows the off-gas analysis results for the KGB system. Once again, the data shows that volatile contaminants were being removed by the KGB system when it was in operation, indicating that the stripping mechanism worked appropriately.

8.3.2 UVB-400 System

Table 8-7 through Table 8-12 contain data on groundwater headspace analysis for the six UVB monitoring wells that were sampled during the Phase II study. In general, concentrations of target compounds decreased in all the wells except well 17UW during the four month period from 7/2/97 to 11/10/97. The decrease in total VOCs in well 15IW during this period was 21.61%, while well 17UW showed an increase of 32.88%. Well 15IW is a deep well which is located 18 ft from the UVB. Relatively speaking, this well is not sensitive to contamination from the semi-confining unit as is the shallow well 17UW. Also, the rate at which well 15IW is flushed by the circulation cell is faster than the rate at which well 17UW (56 ft from the UVB) is flushed. Based on model calculations, the circulation cell has completed one pore volume flush through well 15IW, while it will take another 12 weeks of operation to complete one pore volume flush through well 17UW.

Between 11/10/97 and 12/16/97, groundwater level in the aquifer increased by 1 to 1.5 feet (see Table 8-13). This resulted in an increase in concentration of target compounds as a result of dissolution from the highly contaminated semi-confining zone (a common observation made at other sites). This trend of increase and decrease in groundwater contamination will continue until contaminants from the source area have been completely removed.

Influent and effluent groundwater samples from the UVB well were also collected to determine VOC removal by stripping, and to show mobilization of the contaminants to the well for treatment. Table 8-14 lists the headspace analysis for UVB influent and effluent samples collected during this study. Influent sample on 7/31/97 showed total VOC concentration of 84.70 ppmv in the headspace. With treatment (stripping and dilution) the influent VOC concentration decreased (99.57 %) with time and was detected at to 0.36 ppmv on 12/16/97. Effluent VOC concentration in most cases were non-detect, indicating that adequate stripping was being achieved in the UVB system.

Table 8-15 shows the UVB Off-gas analytical data. Concentration of VOCs in the off-gas was measured at 11.38 ppmv on 7/31/97. The VOC concentration decreased with time to non-detect after three months of operation. The average mass removal rates by stripping (based on off-gas data) was estimated to be 4.8 lb during the first month, 3.1 lb during the second month, and 0.4

lb during the third month of operation. The total mass removal by stripping was estimated at 8.3 lb during the Phase II study.

As stated before, two sets of groundwater samples were sent to a certified laboratory for confirmatory analysis. Results (see Table 8-16) show that the total concentration of target VOCs in well 15IW decreased by 12.5%, and that in well 17UW increased by 31% during the period from 8/25/97 to 12/16/97. This observation is consistent with that obtained from the headspace analysis described earlier.

Table 8-17 shows comparison of the laboratory data to that extrapolated from the headspace analysis for wells 15IW and 17UW. The data indicates that within the limits of experimental error, the field analytical method used was able to predict the laboratory data closely.

Phase II study was initiated to show that high concentrations in well 15UW could be reduced by installing the UVB-400 system on well 15UW. Table 8-18 shows trends in target VOCs at well 15UW during the Phase I study, and after it was converted to a UVB-400 well during the Phase II study. At the end of Phase I study, the total concentration of target VOCs had reduced by only 5%, but at the end of Phase II study, there was a 99% reduction.

An attempt was made to calculate the first order rate constants for compounds based on the reductions seen at well 15IW. These values are not the true first order decay constants because they can't be corrected for an increase in contaminant concentration (due to mobilization or dissolution from the source area or by mixing from a higher contamination area). The rate constants were used to estimate the time required to reach a concentration of 5 ppb for target contaminants at well 15IW. This analysis presents a worst case scenario, and clean up may be achieved in shorter time. Table 8-19 shows that it will take 7 years to reduce cis-1,2 DCE to 5 ppb from 7900 ppb, 2.2 years to reduce TCE to 5 ppb from 500 ppb, and about a year to reduce the concentration of vinyl chloride to 5 ppb from 340 ppb.

Rate constants for well 17UW could not be estimated because this well has consistently shown an increase in contamination.

9. CONCLUSIONS

The following conclusions can be drawn from the data obtained and field observations made during the Phase II study:

A. The KGB System

1. The KGB system failed to operate and perform consistently due to frequent plugging from fine sand and sediments. This problem resulted from the formation material being substantially finer than the sand pack.
2. Every time after the well was redeveloped, the KGB system did operate adequately for a period of up to two weeks. Data collected during this period showed that volatile contaminants were being removed in the off-gas.
3. The zone of influence of the KGB system could not be determined because it appears to be smaller than the monitoring wells positioned for such measurements.
4. For the above reasons, the KGB system failed to meet the objectives of the treatability study.
5. The perched water table still contains dissolved phase chlorinated hydrocarbons that migrate continually into the confined aquifer though various pathways in the aquitard. This process is increased when high water tables occur because of the increase in the vertical gradient downward.

B. The UVB-400 System

1. The UVB-400 system was successful in reducing the high concentrations observed in well 15UW after the Phase II study. Concentrations of target VOCs in the well were reduced by 99%. A high ratio (85%) of recirculated water to fresh water entering the cell from the capture zone is causing excessive dilution of the contaminants, particularly near the UVB well. The treatment is predominantly via dilution, particularly if the fresh water entering the cell is not highly contaminated.
2. In it's present position, the UVB system will effectively treat contamination in well 15IW. However, an asymptotic decrease in the concentration of contaminants will not be seen until at least a year of operation. This is based on the fact that it will take a maximum of seven years of operation to reduce the concentrations of target compounds to less than 5 ppb in well 15IW.
3. The slow treatment rate observed at wells 15IW, 17IW, and 17UW may be due to two factors: (a) Well 15IW is probably located immediately below the source area, and contaminants are being released from the source at a significant rate, and (b) mobilization of contaminants is being controlled by molecular diffusion from the sand/clay formation. In addition, monitoring well nest 17UW and 17IW may be at the fringe of the UVB-400 circulation cell.
4. Pressure transducer test conducted at well cluster MW17 indicated that at a minimum, the circulation cell is influencing a radial distance of 56 ft from the UVB. However, this test does not directly validate that contaminants from these wells are being mobilized to the well for treatment.
5. Off-gas data indicated that the air stripping mechanism of the UVB system was functioning properly at an air to water ratio of 182:1, and a stripping efficiency of 98%. Approximately 8.3 lb of VOCs were removed during the Phase II study.
6. The spread of contamination in the upper Castle Hayne aquifer is not uniform. Areas of high contamination appear scattered. This is primarily because some buried drums are leaking while others are not. Also, contaminants from these leaky drums tend to migrate along the trenches in which they were buried, probably due to favorable geologic conditions. As a result of this complex setting from geologic as well as from contamination point of views, it is

difficult to design, position and operate a single in-situ treatment system efficiently in the upper Castle Hayne aquifer.

7. The groundwater recirculation rate attainable at the UVB-400 site (7.42 gpm) is less than that attainable at the UVB-250 site (20 gpm). The reason for such a variation is not clearly known since the hydraulic conductivities at both wells were comparable. A possible reason could be blockage of the influent screen.
8. The chlorinated hydrocarbons in the area around monitoring well 15IW has been reduced by 16 %. This is based on laboratory analysis of groundwater sample showing 9980 ppb total volatiles on August 28, 1997 and of 8400 ppb on December 12, 1997.
9. All other monitoring areas (except well 15IW and 17UW) show little or no chlorinated hydrocarbon contamination.

10. RECOMMENDATIONS

A. The KGB System and the Shallow Castle Hayne Aquifer

1. Until the dissolved chlorinated hydrocarbons are removed from the Shallow Castle Hayne aquifer, they will continue to leach into the Upper Castle Hayne aquifer through the aquitard. To remediate this site in an expedient manner, dissolved chlorinated hydrocarbons from the Shallow Castle Hayne aquifer will have to be treated at first.
2. Even if the KGB system was made to operate consistently, it's maximum ZOI would not be more than 10 ft. This conclusion was derived from preliminary air sparging experiments done by IEG in one of the KGB monitoring wells (MW-22A, at 6 acfm). It is believed that the KGB system would not be economically feasible in treating the shallow Castle Hayne aquifer. Alternatively, a network of 2 inch diameter sparging wells would provide a cost effective treatment.
3. SBP/IEG will remove the above ground components of the KGB system.

B. The UVB-400 System and the Upper Castle Hayne Aquifer

1. It is recommended that the UVB-400 canister system be updated with a new packer, and a new pump to increase the flow rate to 9 gpm in an effort to increase the remediation rate in the area of well 15IW and well 17UW. These changes will be done by IEG Technologies at no cost to the Navy.
2. It is recommended that the updated UVB-400 system be allowed to operate for at least a year in its present location in an attempt to clean contamination at well 15IW. This will allow the circulation cell at least five or more pore volume flushes through the area surrounding well 15IW. Sampling on a quarterly basis of few critical wells is recommended.
3. It is also recommended that the old UVB-250 system be started up again in its original location. The UVB-250 system was able to achieve 49% reduction in target VOCs around monitoring well cluster MW17 in seven months of operation during the Phase I study. Although, both the UVB-250 and the UVB-400 system are approximately equidistant from the well cluster MW17, it seems that for reasons such as preferential pathways, trenching etc., the UVB-250 system was more effective than the UVB-400 system in treating contamination at well 17UW. SBP/IEG will install the UVB-250 system as an equal value exchange for the KGB system.

11. REFERENCES

1. Draft Final Remedial Investigation Report for Operable Unit No. 4, Marine Corps Base, Camp Lejeune, North Carolina (Baker, June 1995).

2. U.S. Patent Office (1990). Aerating apparatus for expelling volatile impurities from groundwater. U.S. Patent No. 4,943,305.

3. U.S. Patent Office (1992). Arrangement for driving volatile impurities from groundwater. U.S. Patent No. 5,095,575.

4. U.S. Patent Office (1992). Arrangement for cleaning contaminated groundwater. U.S. Patent No. 5,143,606.

5. Herrling, B., Stamm, J., Alesi, E.J., G. Bott-Breuning, and Diekmann, S. (1993). *In Situ* Bioremediation of Groundwater Containing Hydrocarbons, Pesticides, or Nitrates Using Vertical Circulation Flows. In R. Hinchee (ed.) "Air Sparging for Site Remediation". Lewis Publishers, Boca Raton, FL. Pages 56-80.

6. Herrling, B., Stamm, J., Buermann, W. (1991). Hydraulic Circulation System for *In Situ* Bioremediation and/or In Situ Remediation of Strippable Contamination. Proceedings of *In Situ* and On-Site Bioreclamation Symposium, March 19-21, 1991, San Diego, CA.

7. Sick, M., Alesi, E.J., Bott-Breuning, G. (1993): In Situ Biological Remediation of Soil and Groundwater Contaminated with Triazine Pesticides using the UVB-Technology. H.J.P. Eijsackers and T. Hamers (eds.), Integrated Soil and Sediment Research: A Basis for Proper Protection, 663-667, Kluwer Academic Publishers.

8. Herrling, B., Stamm, J., Alesi, E., Brinnel, P., Hirschberger, F., and Sick, M (1991). In Situ Groundwater Remediation of Strippable Contaminants by Vacuum Vaporizer Wells (UVB): Operation of The Well and Report About Cleaned Industrial Sites. Third Forum on Innovative Hazardous Waste Treatment Technologies: Domestic and International, June 11-13, 1991, Dallas, TX, USA.

9. Final Treatability Study Workplan, for Operable Unit No. 4, Marine Corps Base, Camp Lejeune, North Carolina (Baker and SBP, June 1995).

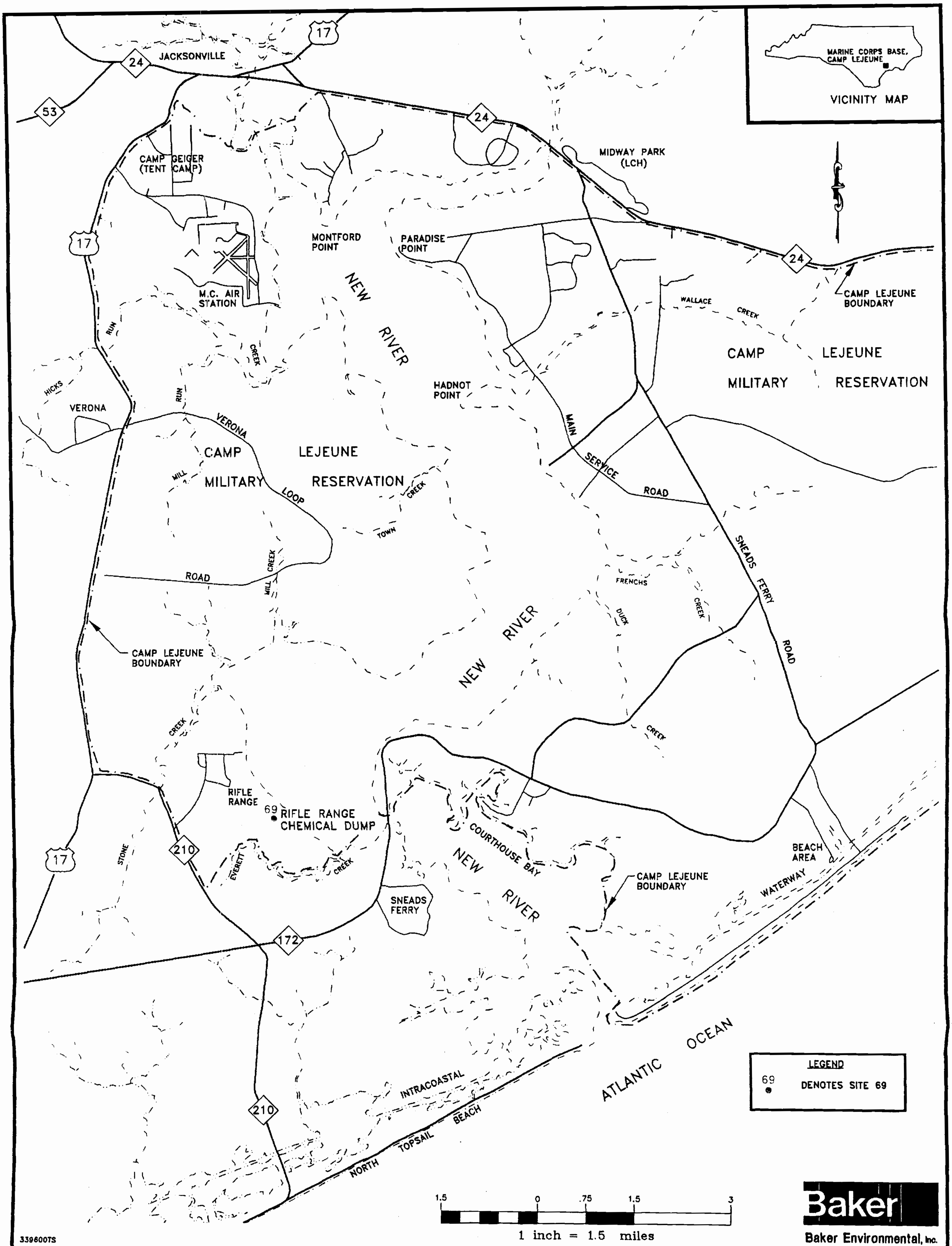
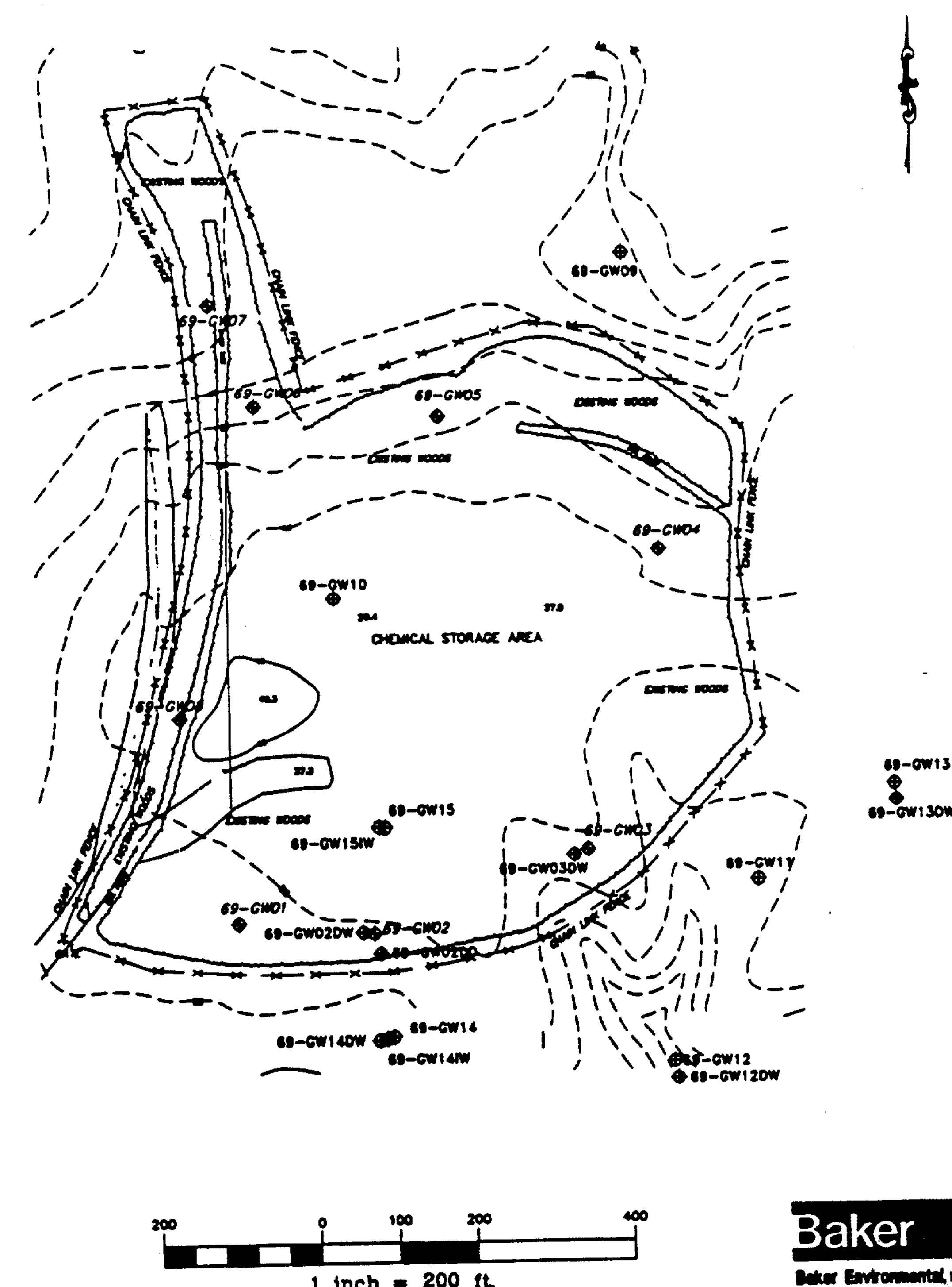


FIGURE 2-1
LOCATION MAP OPERABLE UNIT No. 14
SITE 69
REMEDIAL INVESTIGATION CTO-0332
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

01792 CC012



Baker

Baker Environmental, Inc.

LEGEND

69GW2	EXISTING SHALLOW WELLS (ESE)
69GW09	EXISTING SHALLOW WELLS (BAKER)
19GW02DW	EXISTING DEEP WELLS (BAKER)
	TOPOGRAPHIC ELEVATION LINES (FEET, MSL)

SOURCE: REVISED FROM LANTDIV, OCT. 1991

FIGURE 2-2
SITE MAP

SITE 69 – RIFLE RANGE CHEMICAL DUMP
CTO-0212
MARINE CORPS BASE, CAMP LEJEUNE
NORTH CAROLINA

S = Stagnation Point
Bt = Width at Top
Bb = Width at Bottom

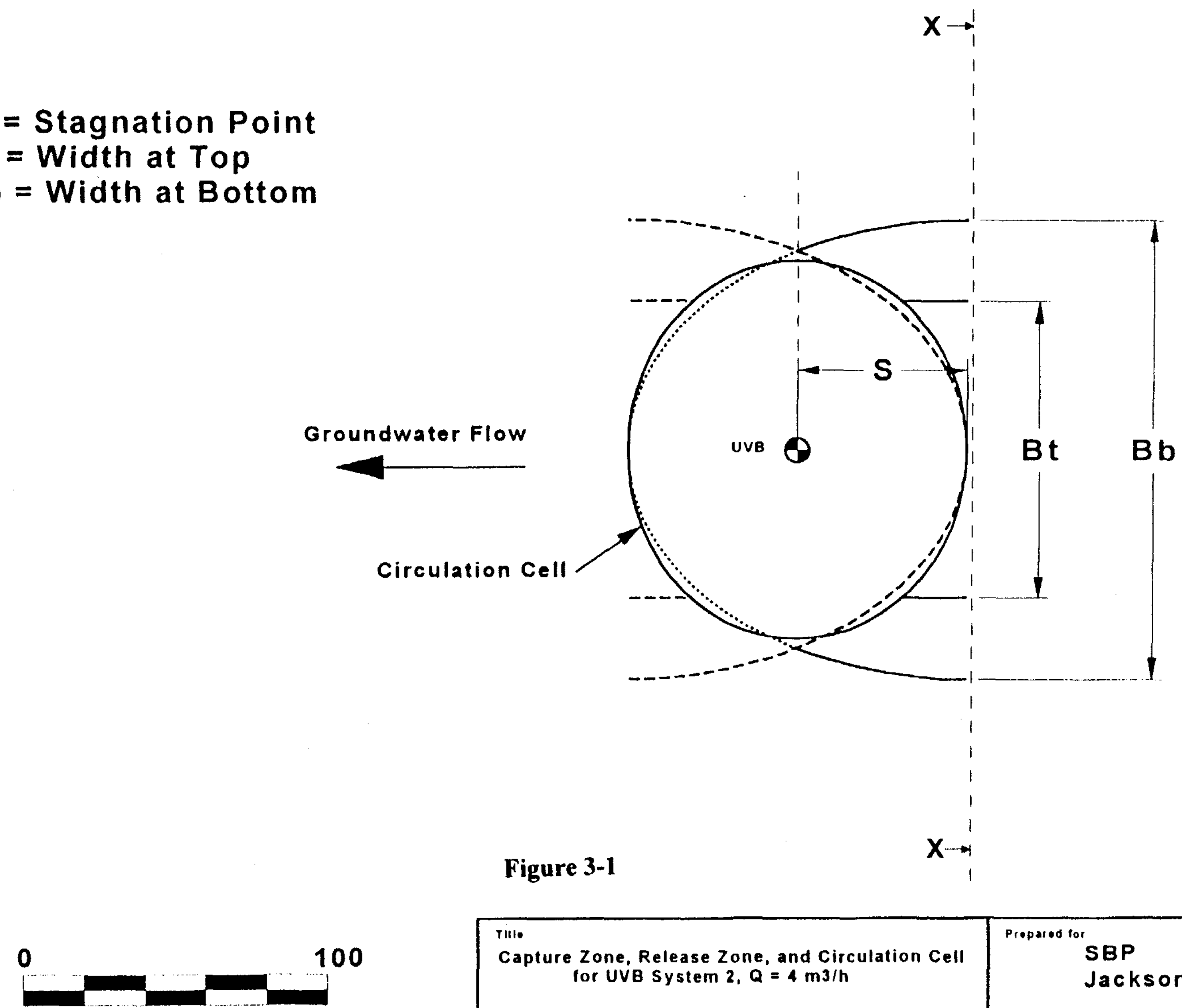
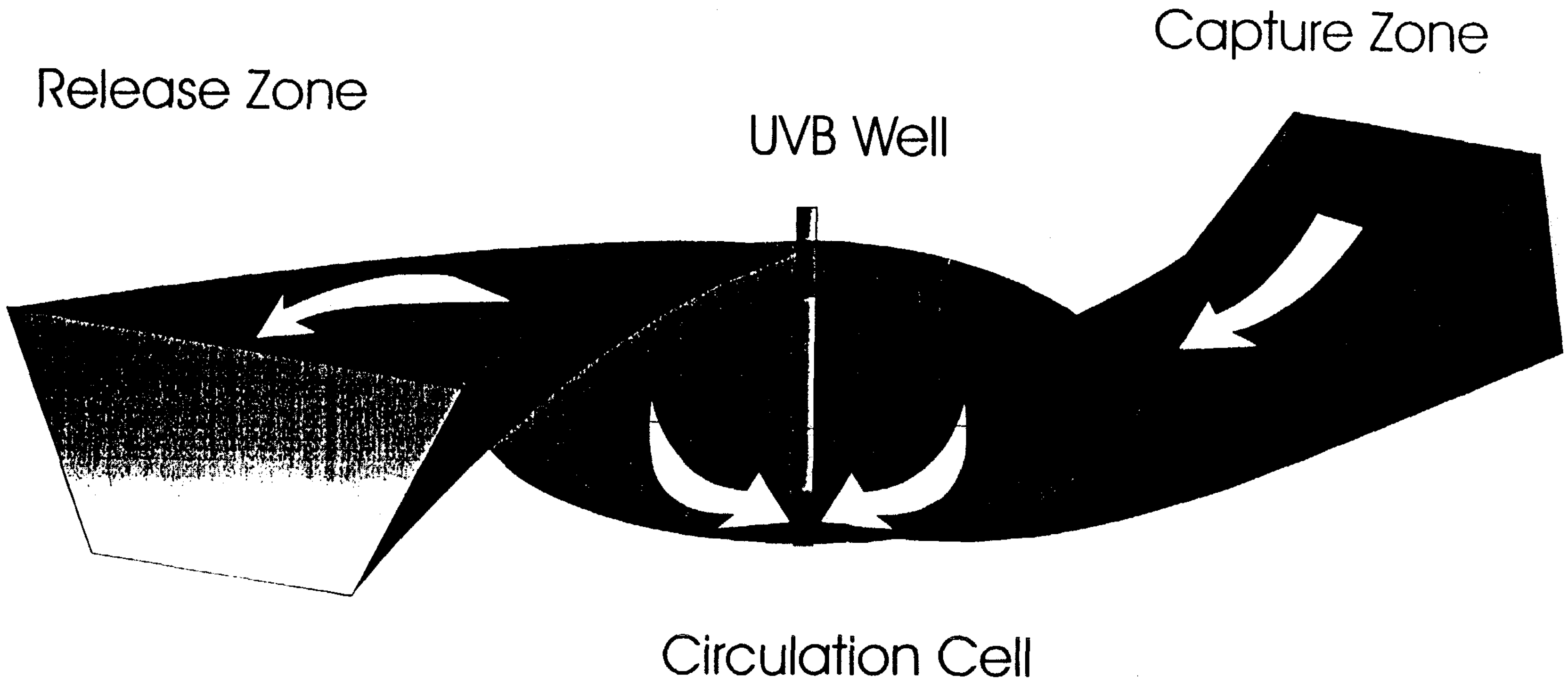


Figure 3-1

Title: Capture Zone, Release Zone, and Circulation Cell for UVB System 2, Q = 4 m3/h	Prepared for: SBP Jacksonville, NC
Scale: 1cm = 20m; Drawing No.: 117cu.prt; By: BL; Project No.: 117.15.95	IEG TECHNOLOGIES CORP. 5015-D West WT Harris Blvd. Charlotte, NC 28269
Date: 4/29/96; Description: Circulation Cell	

Figure 3-2: Schematic Capture Zone, Release Zone, and Circulation Cell



S = Stagnation Point
Bt = Width at Top
Bb = Width at Bottom

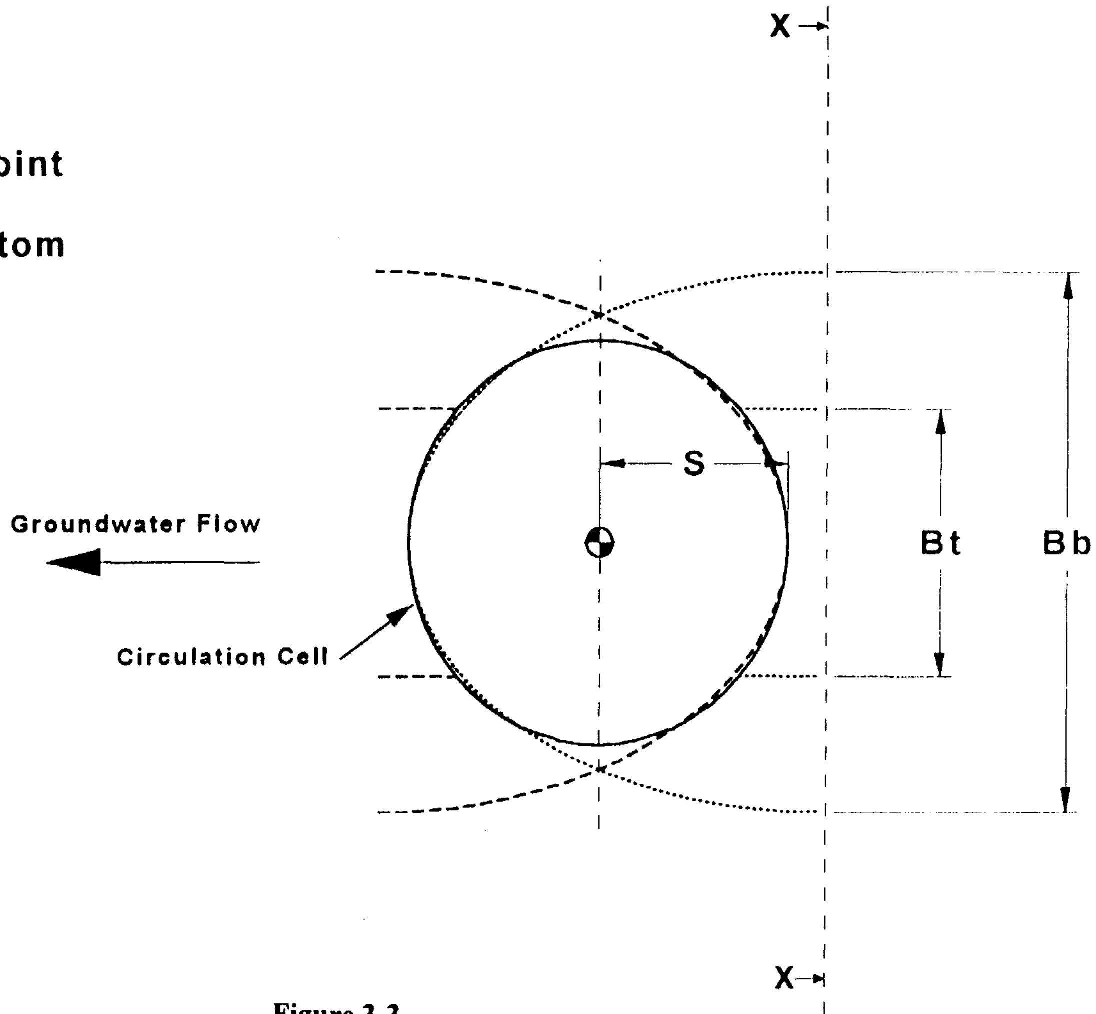
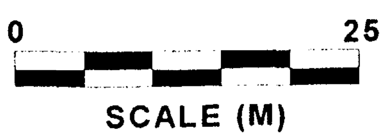


Figure 3-3



Title: Capture Zone, Release Zone, and Circulation Cell for KGB System			Prepared for: SBP Jacksonville, NC
Scale: 1cm = 5m	Drawing No.: 117ck.prt	By: BL	Project No.: 117.15.95
Date: 4/29/96	Description: Circulation Cell		IEG TECHNOLOGIES CORP. 5015-D West WT Harris Blvd. Charlotte, NC 28269

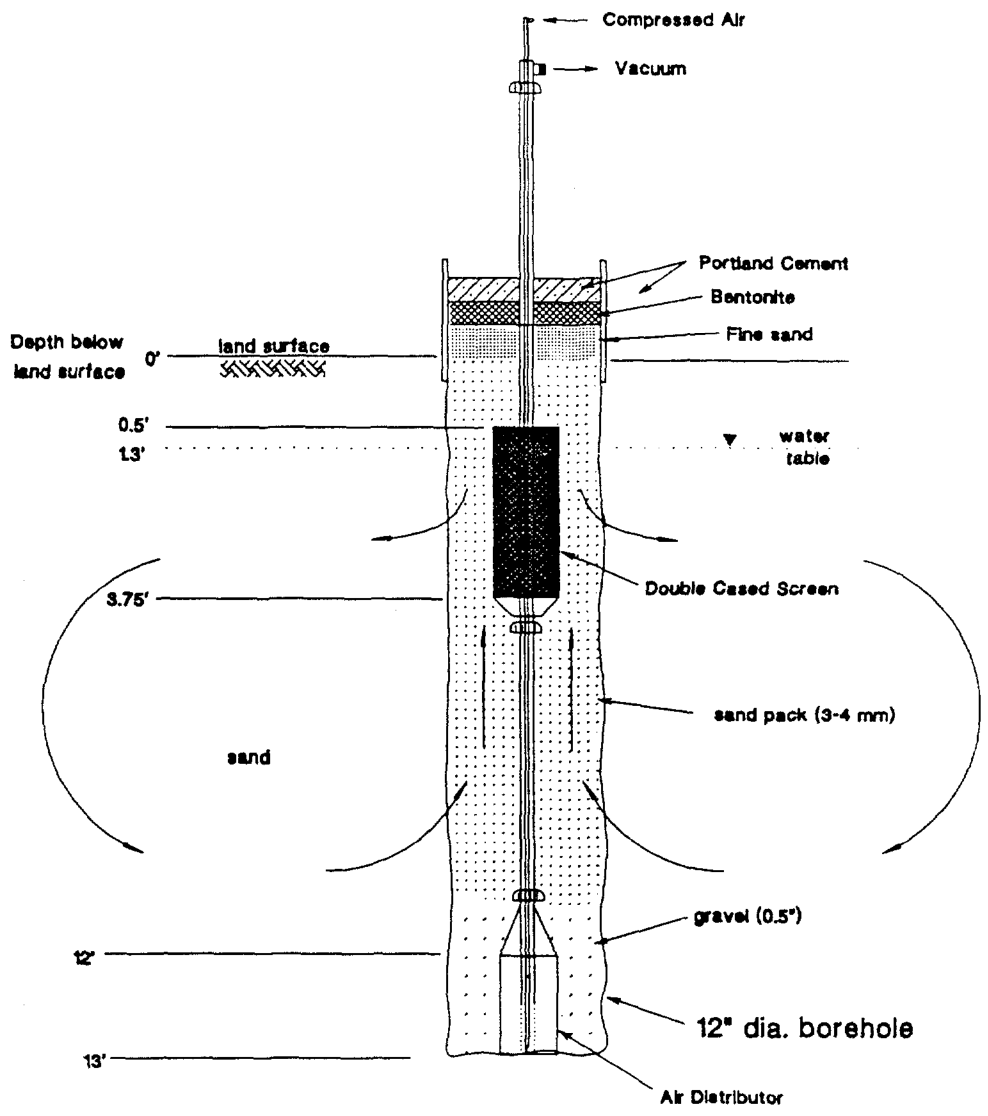


Figure 3-4

NOT TO SCALE

IEG - Technologies 5015-D West W.T. Harris Blvd. Charlotte, N.C. 28269 Phone: (704) 599-4818 FAX: (704) 599-4815	Drawn By BL	Date 4/29/96	Description KGB
	Saved as 117SK.DW2	Proj. No. 117.15.94	Prepared for SBP Camp Lejeune, NC

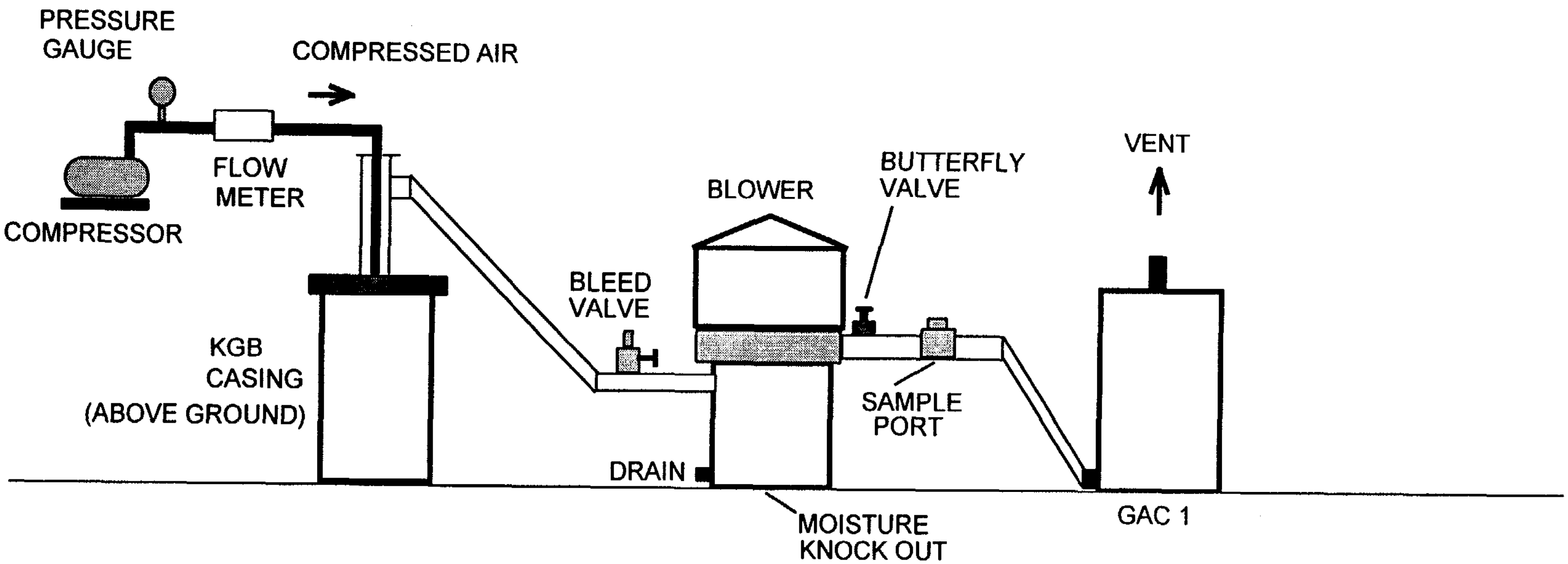


Figure 3-5: SCHEMATIC DIAGRAM OF KGB OFF-GAS TREATMENT

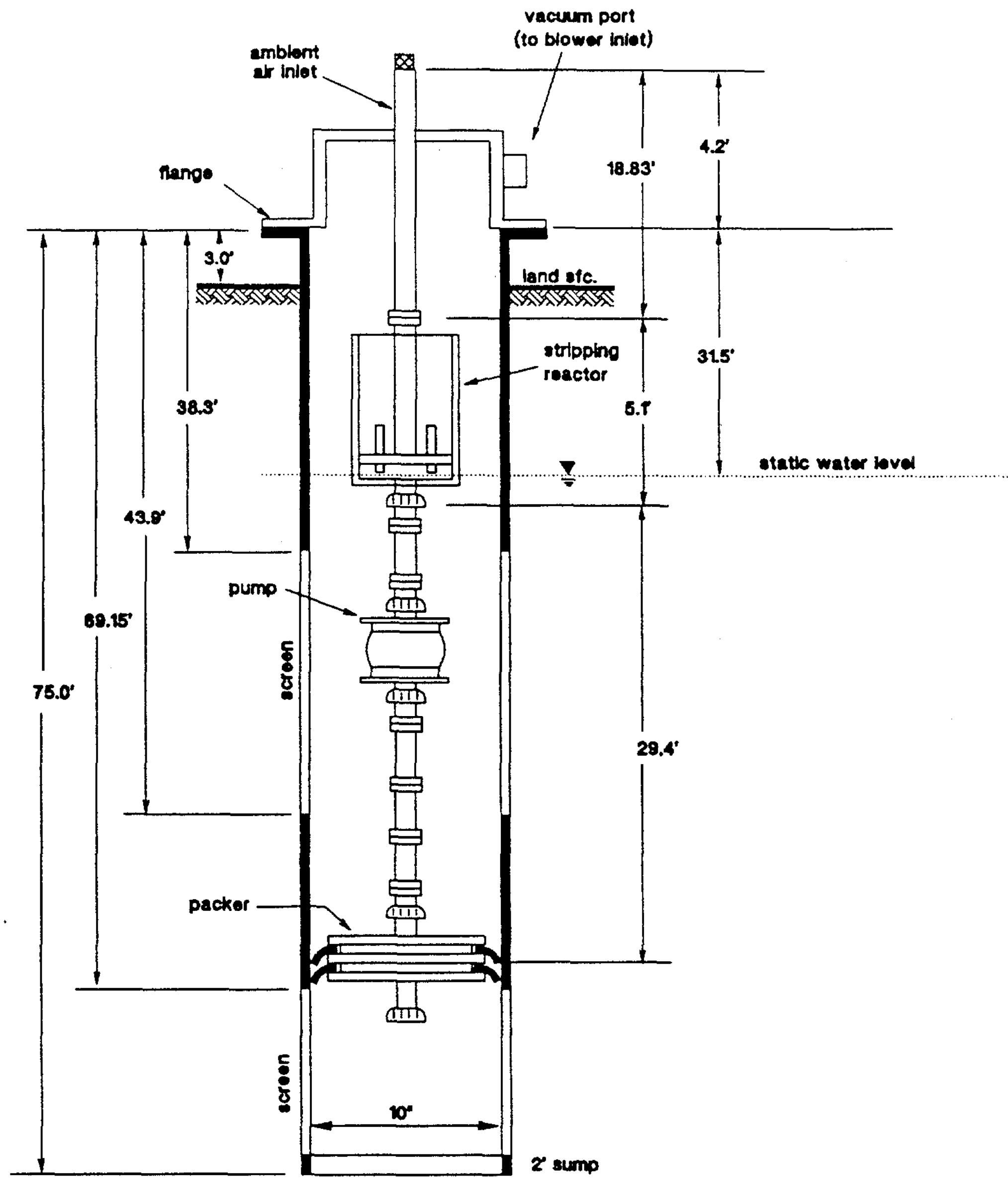


Figure 3-6

IEG - Technologies 5015-D West W.T. Harris Blvd. Charlotte, N.C. 28269 Phone: (704) 599-4818 FAX: (704) 599-4815	Drawn By BL	Date 4/29/96	Description Fixed standard-flow UVB-250 Jacksonville, NC
	Saved as 117su.dw2	Proj. No. 115.15.95	Prepared for SBP

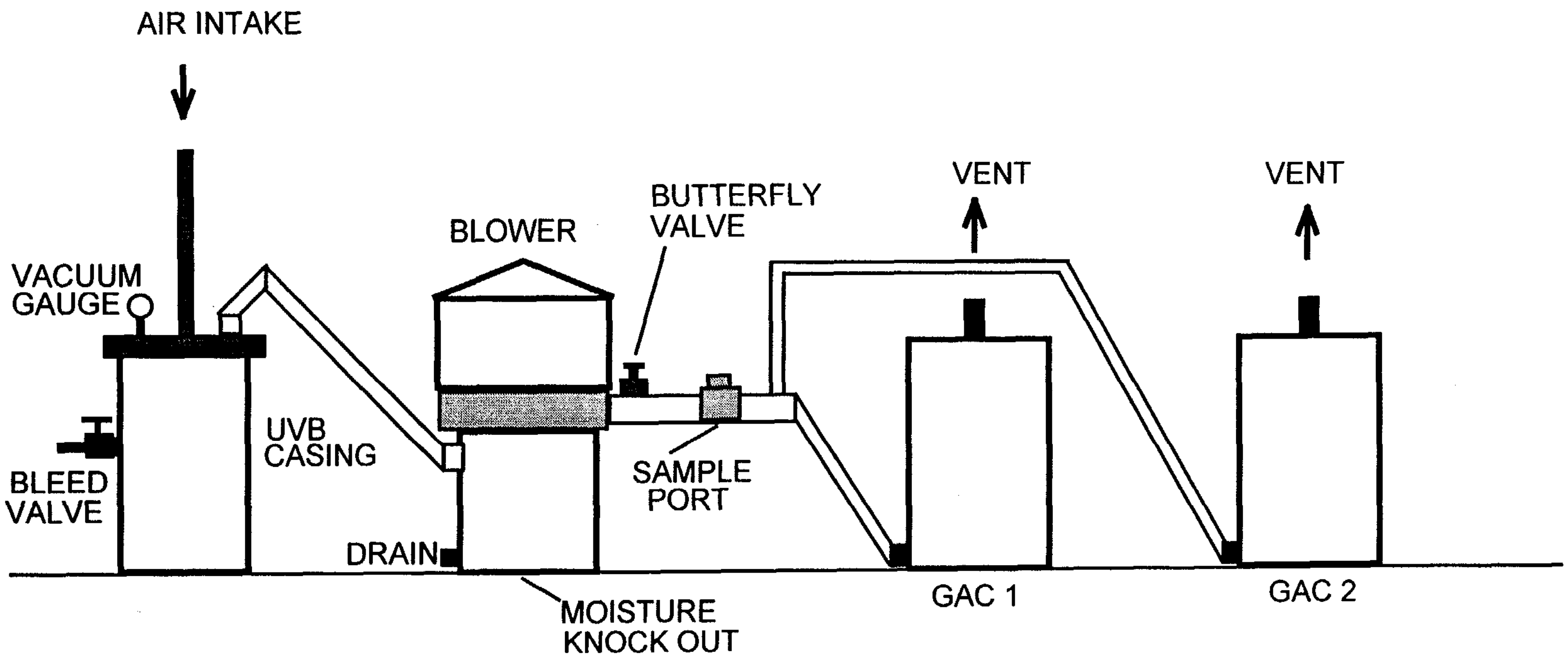
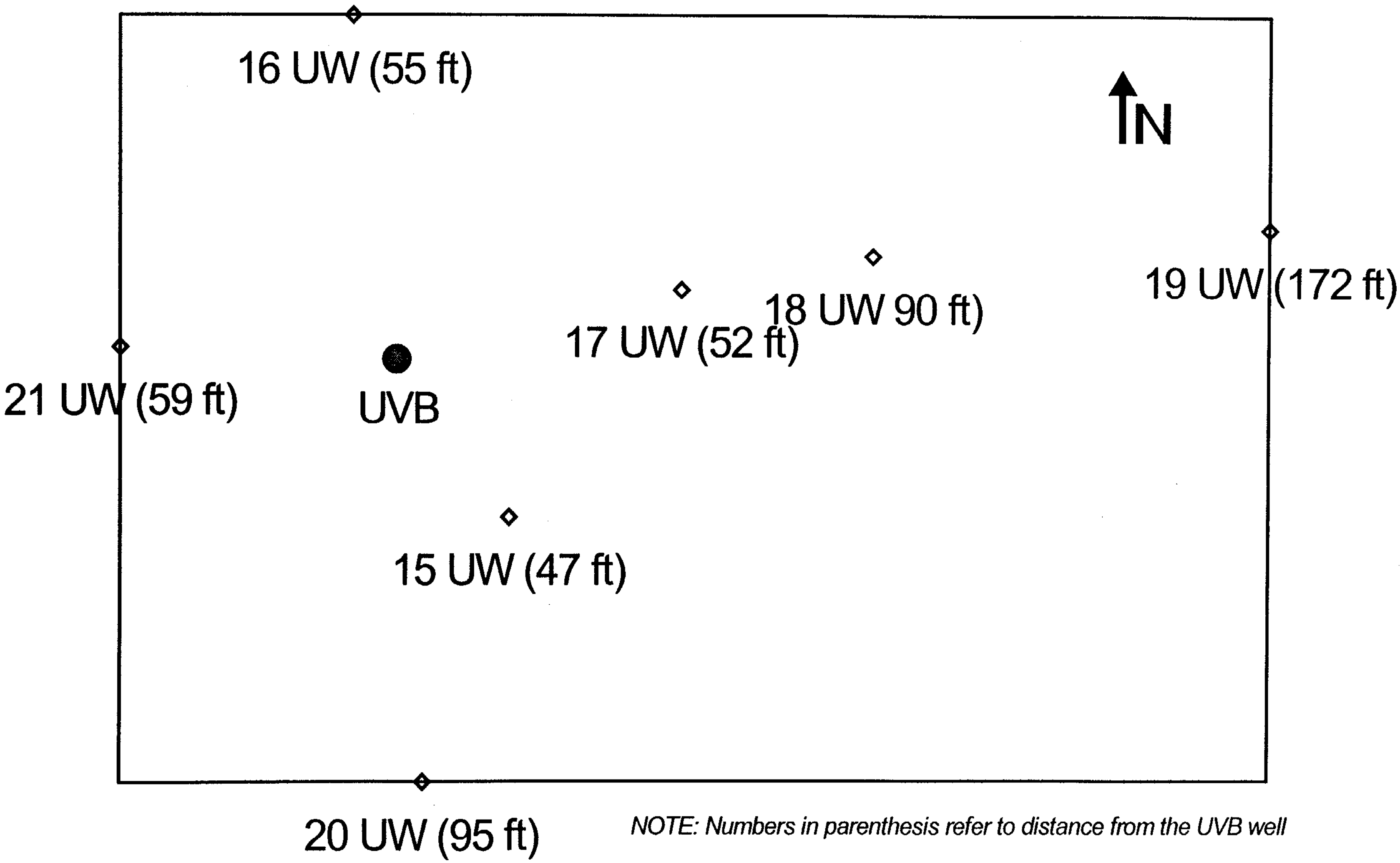


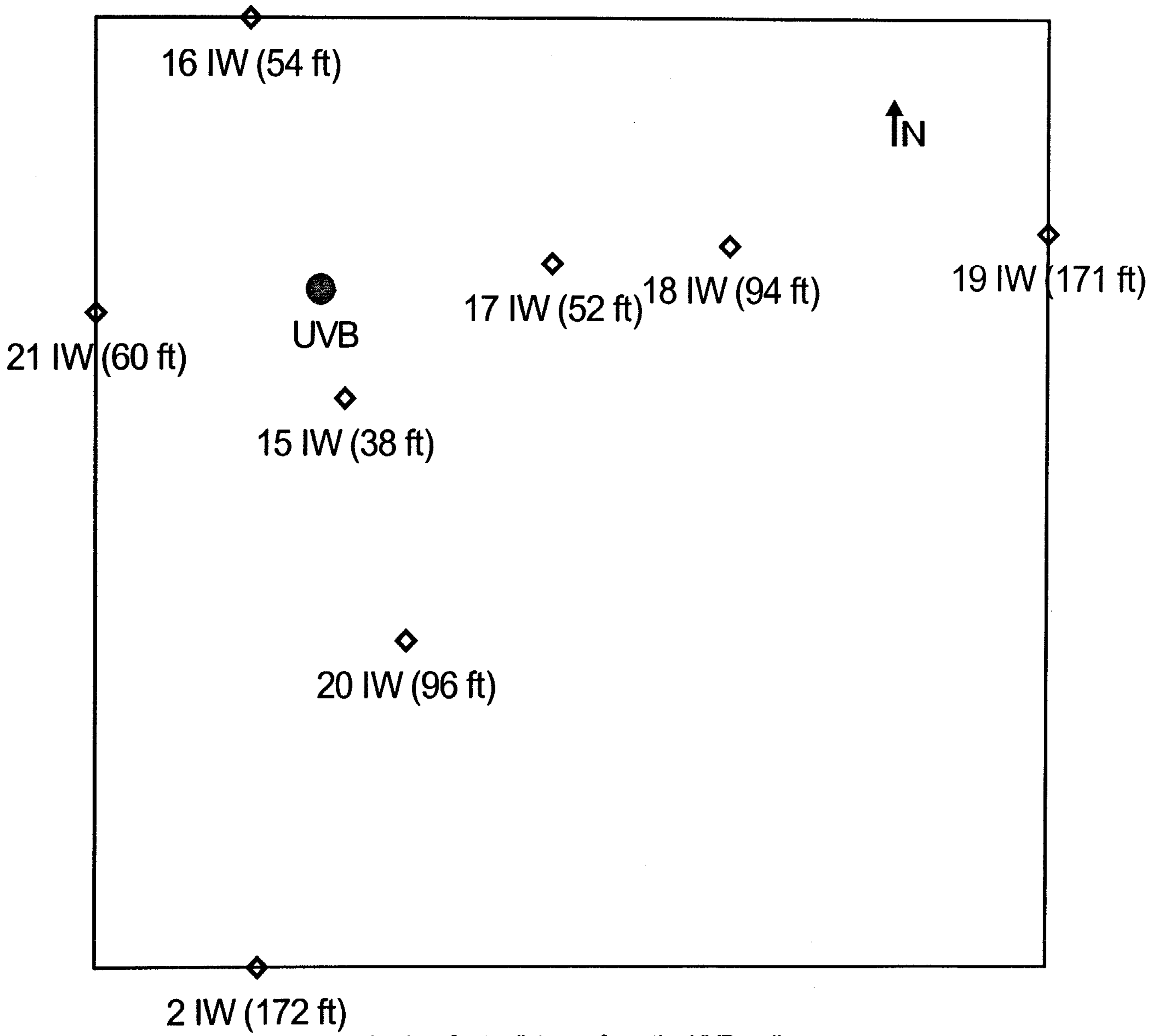
Figure 3-7: SCHEMATIC DIAGRAM OF UVB OFF-GAS TREATMENT

Figure 3-8: Layout of the UVB and Shallow UVB Monitoring Wells
Site 69, MCB Camp Lejeune



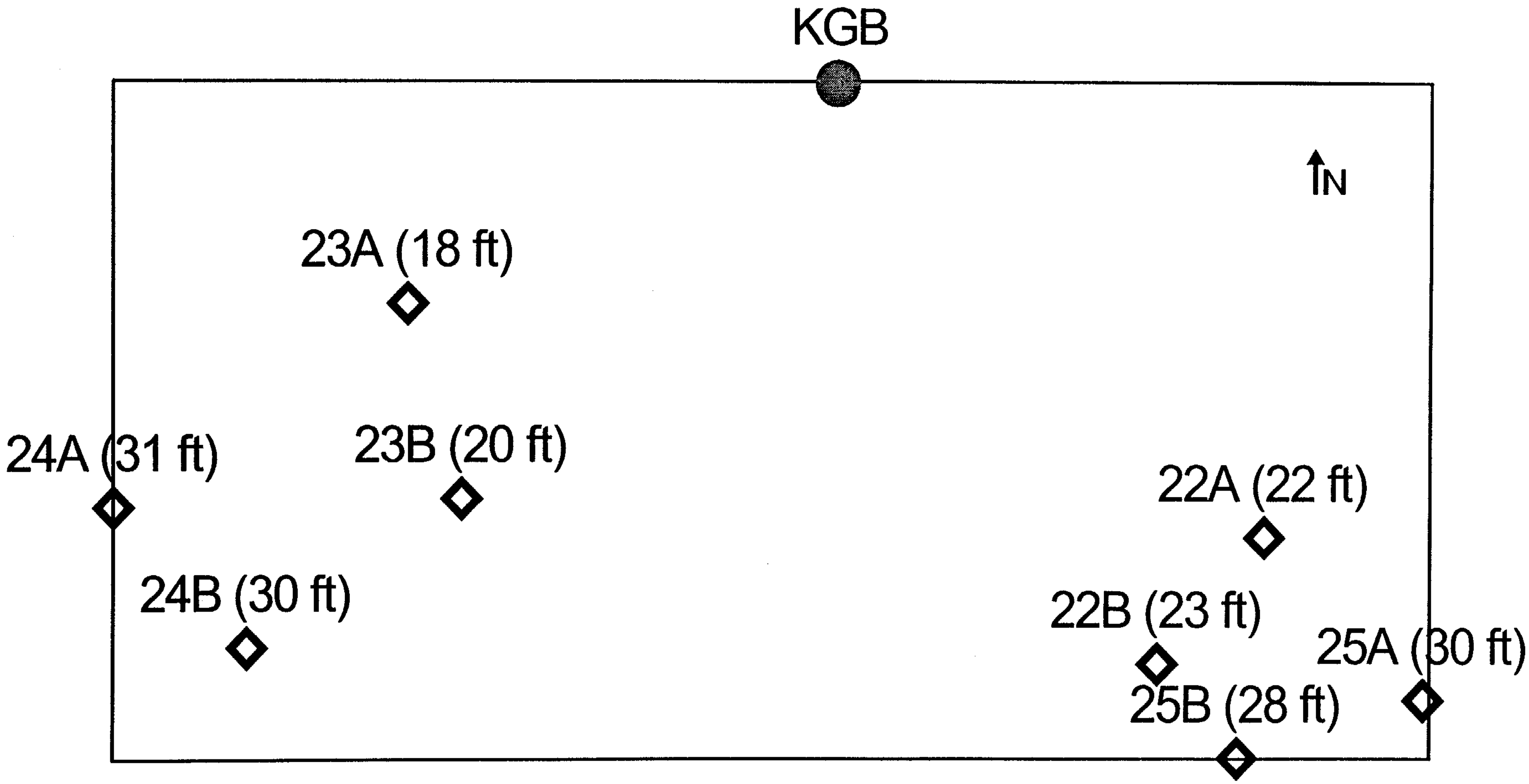
NOTE: Numbers in parenthesis refer to distance from the UVB well

Figure 3-9: Layout of the UVB and Deep UVB Monitoring Wells Site 69, MCB Camp Lejeune



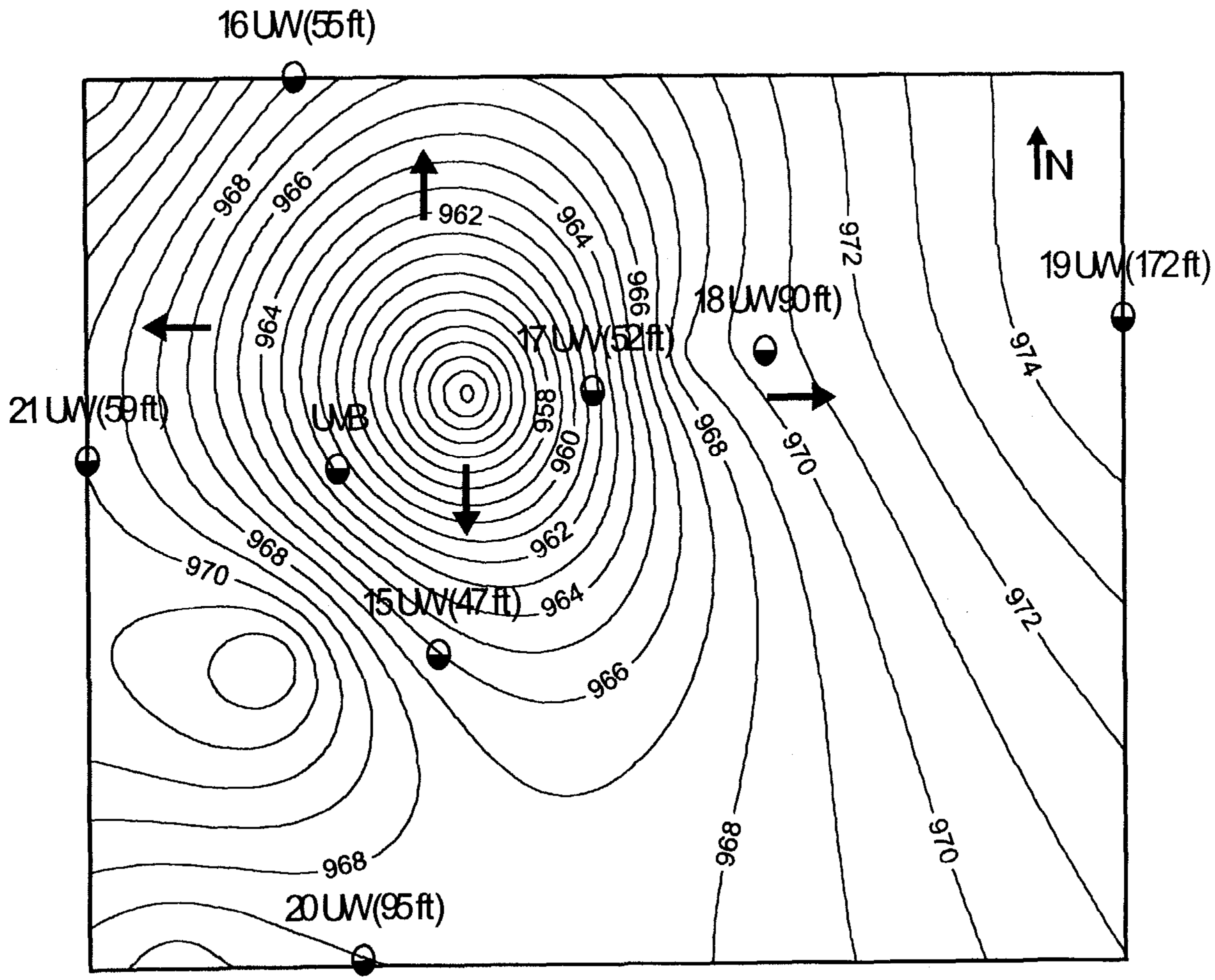
NOTE: Numbers in parenthesis refer to distance from the UVB well

Figure 3-10: Layout of the KGB and KGB Monitoring Wells Site 69, MCB Camp Lejeune



NOTE: Numbers in parenthesis refer to distance from the KGB well

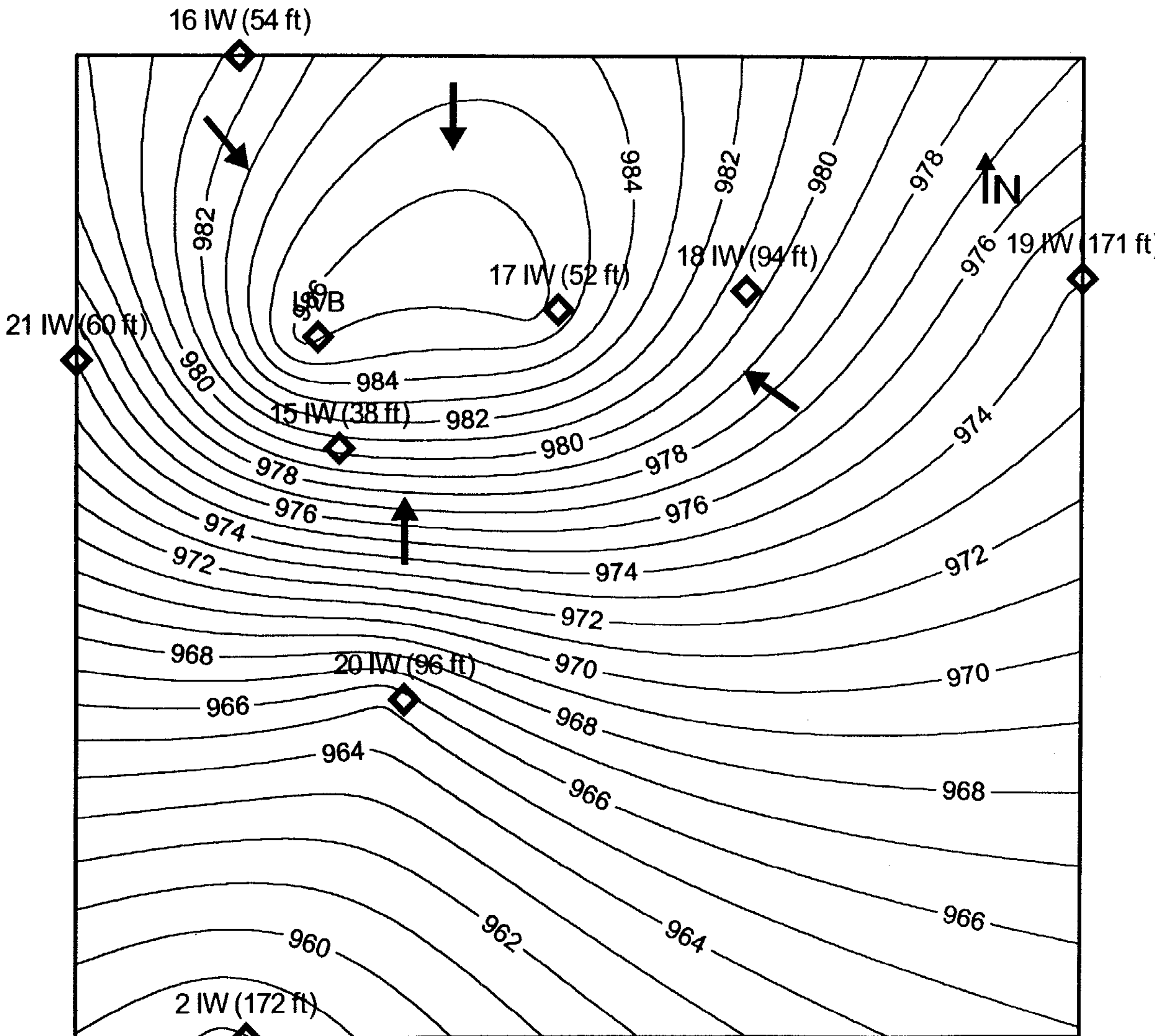
Figure 4-1: Water Levels in Shallow UVB Monitoring Wells, System On, 4/11/96
Depth (cm) from Top of the UVB Flange
Site 69, MCB Camp Lejeune, NC.



NOTE: Numbers in parenthesis refer to distance from the UVB well

Monitoring Station

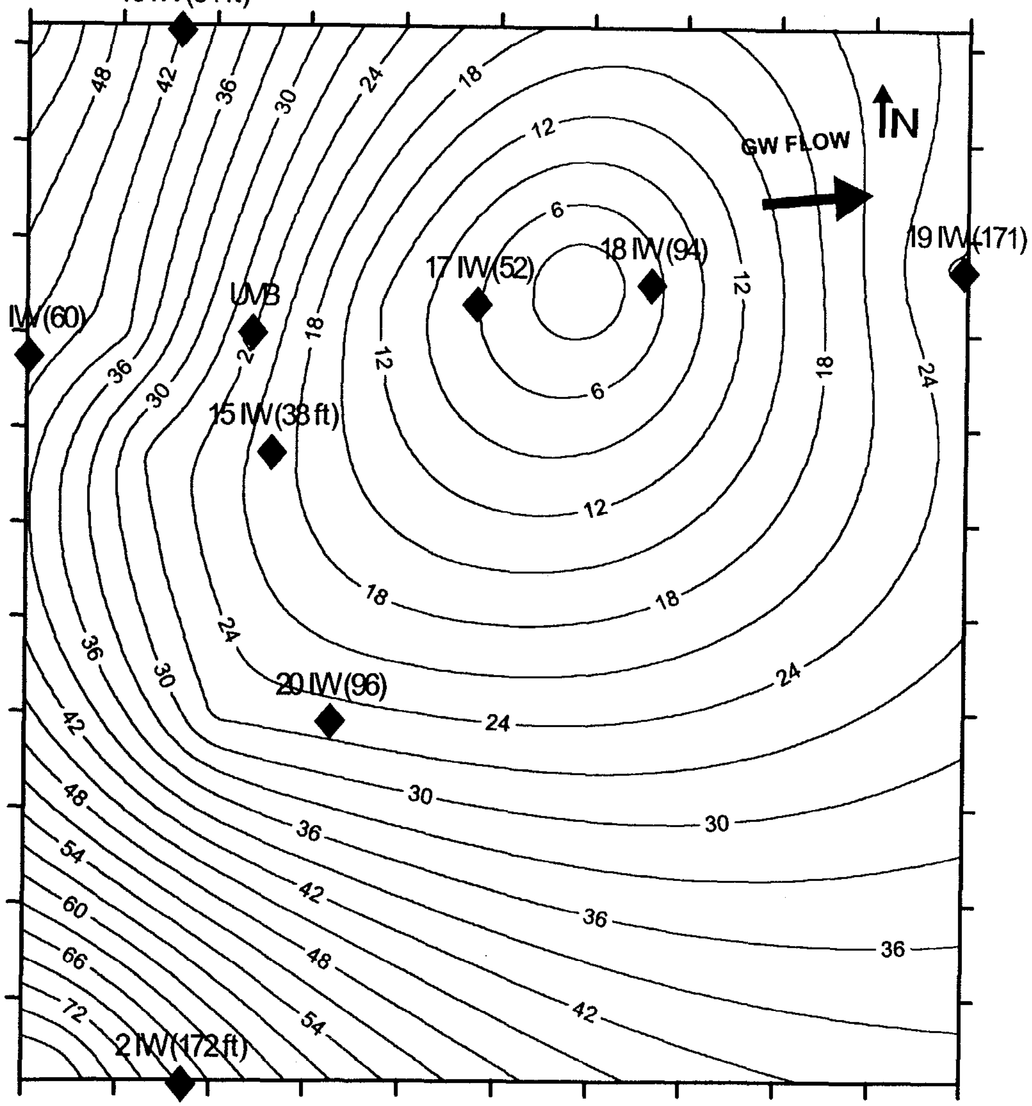
Figure 4-2: Water Levels in Deep UVB Monitoring Wells, System ON, 4/11/96
Depth (cm) from top of the UVB Flange
Site 69, MCB Camp Lejeune



NOTE: Numbers in parenthesis refer to distance from the UVB well

◇ Monitoring Well

Figure 4-3: Travel Times of Fluorescein in Deep Monitoring Wells UVB Convergent Dye Trace, Site 69, MCB Camp Lejeune



Dye Injected in Well 18 IW
All values in Days

◆ Monitoring Station

Figure 4-4: Travel Times of Fluorescein from UVB Well in Shallow Monitoring Days UVB Divergent Dye Trace, Site 69 MCB Camp Lejeune

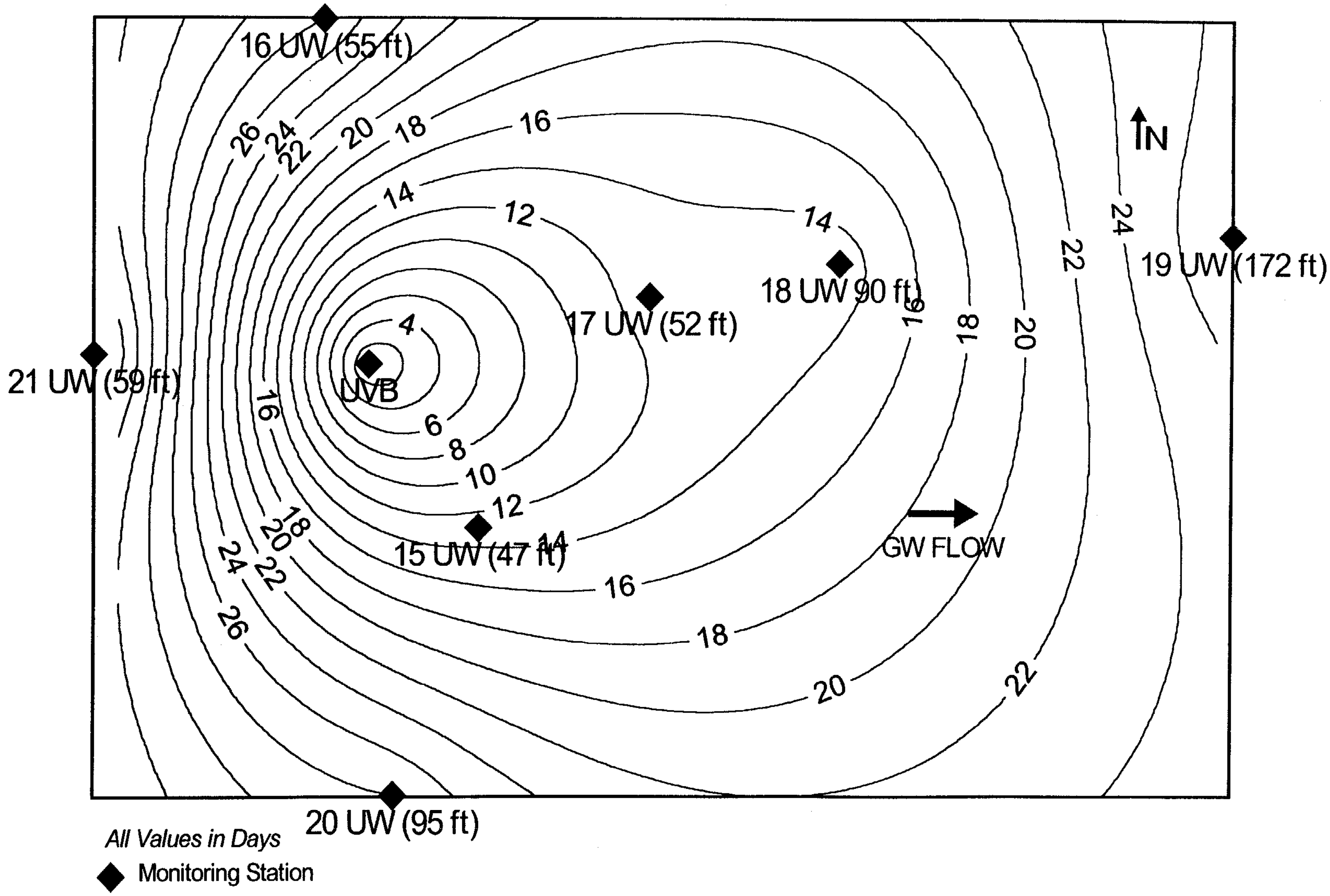
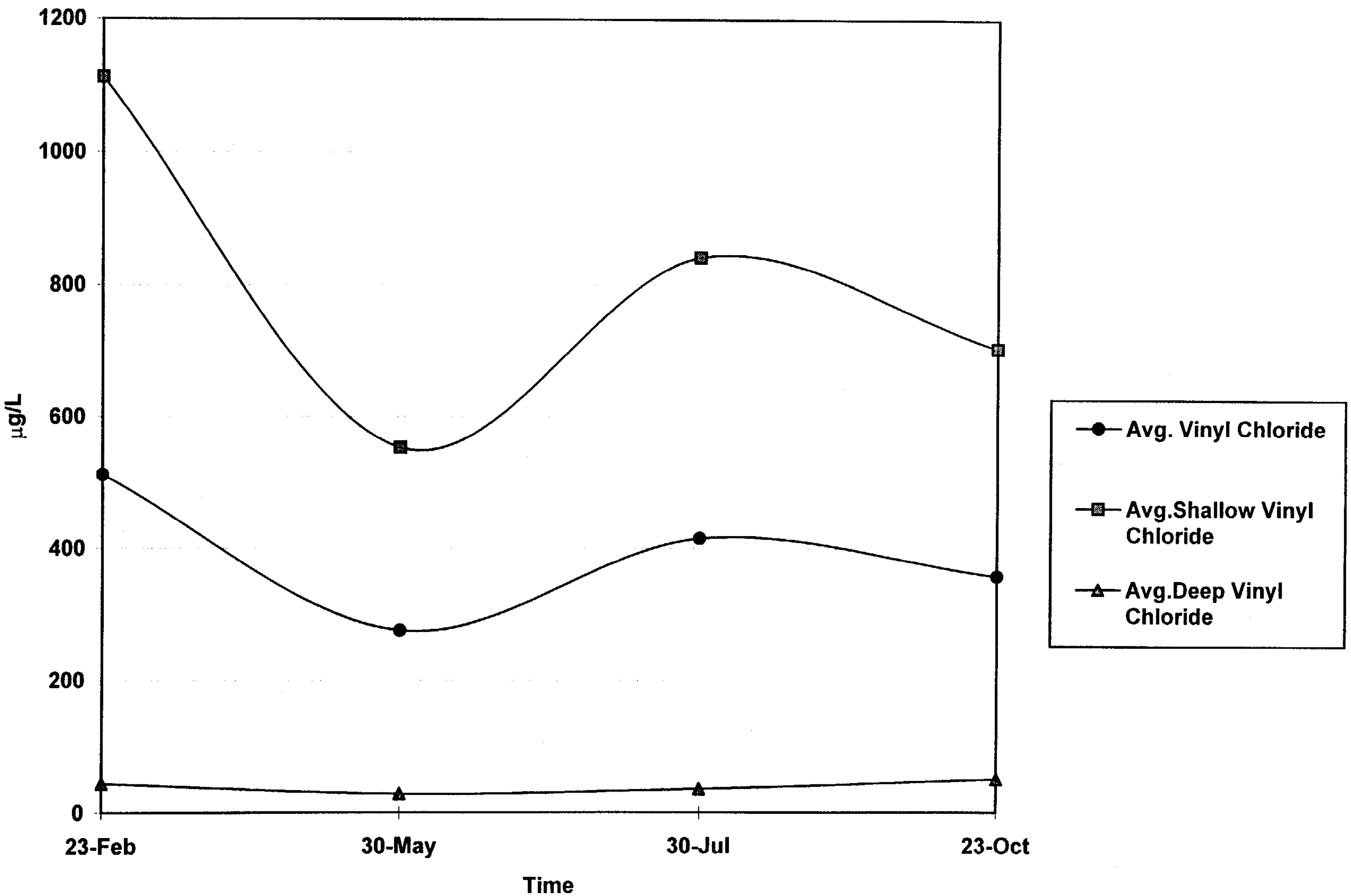


Figure 4-5: Variation in Concentration of Vinyl Chloride In UVB Monitoring Wells



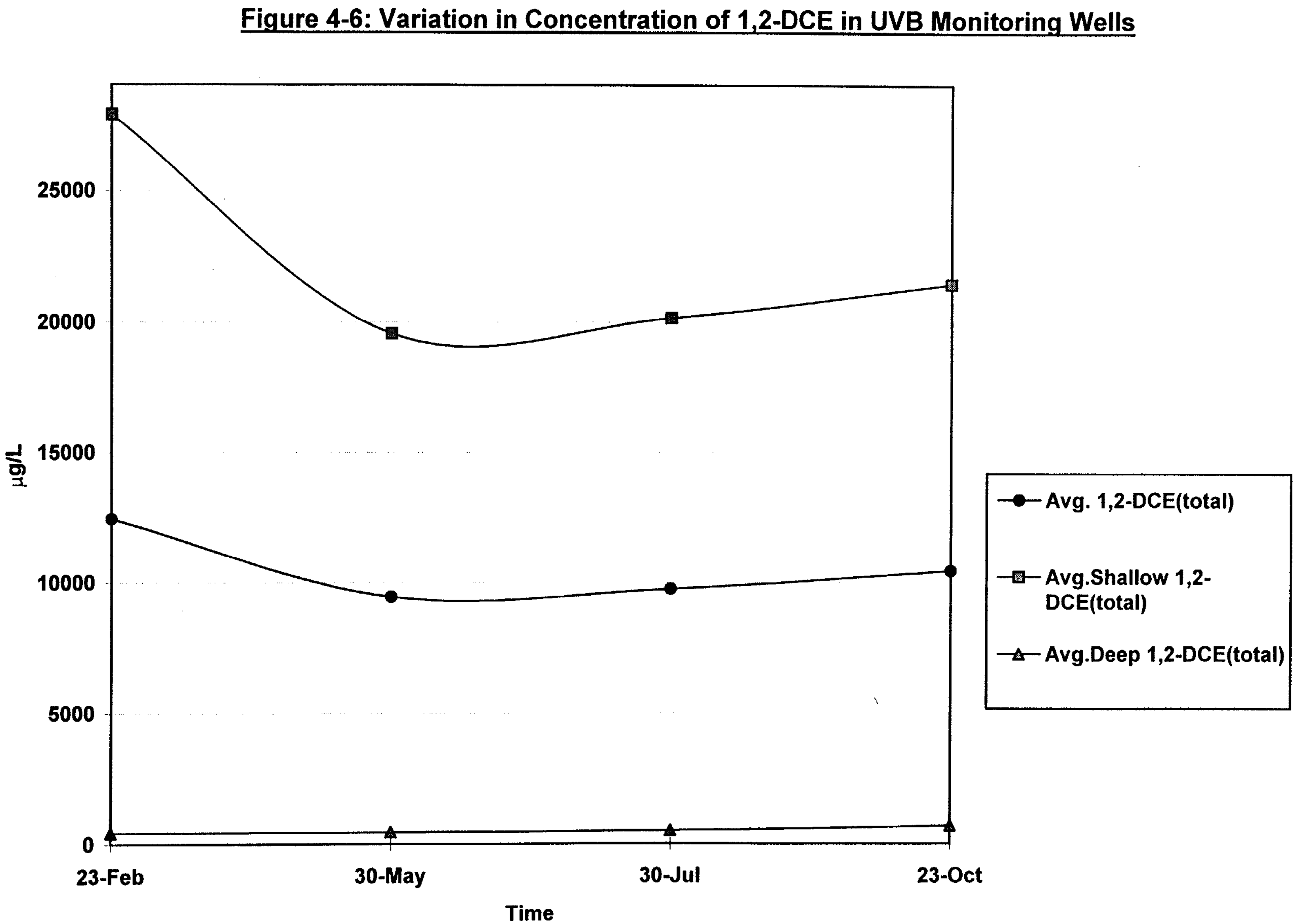


Figure 4-6: Variation in Concentration of 1,2-DCE in UVB Monitoring Wells
25000
20000
15000
10000
5000
0
µg/L
23-Feb
30-May
30-Jul
23-Oct
Time
Avg. 1,2-DCE(total)
Avg.Shallow 1,2-DCE(total)
Avg.Deep 1,2-DCE(total)

Figure 4-7: Variation in Concentration of TCE in UVB Monitoring Wells

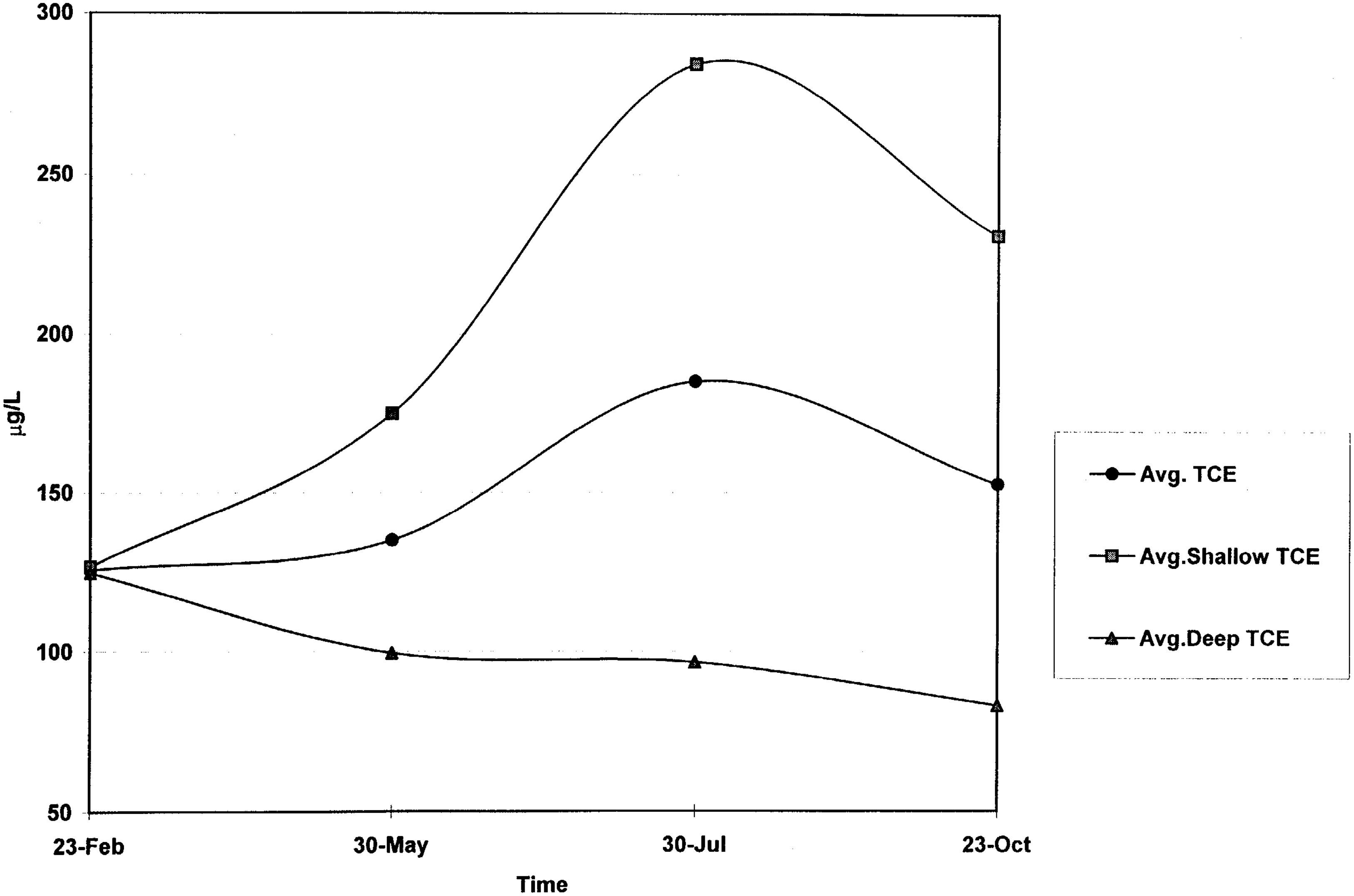


Figure 4-8: Variation in Concentration of Vinyl Chloride in KGB Monitoring Wells

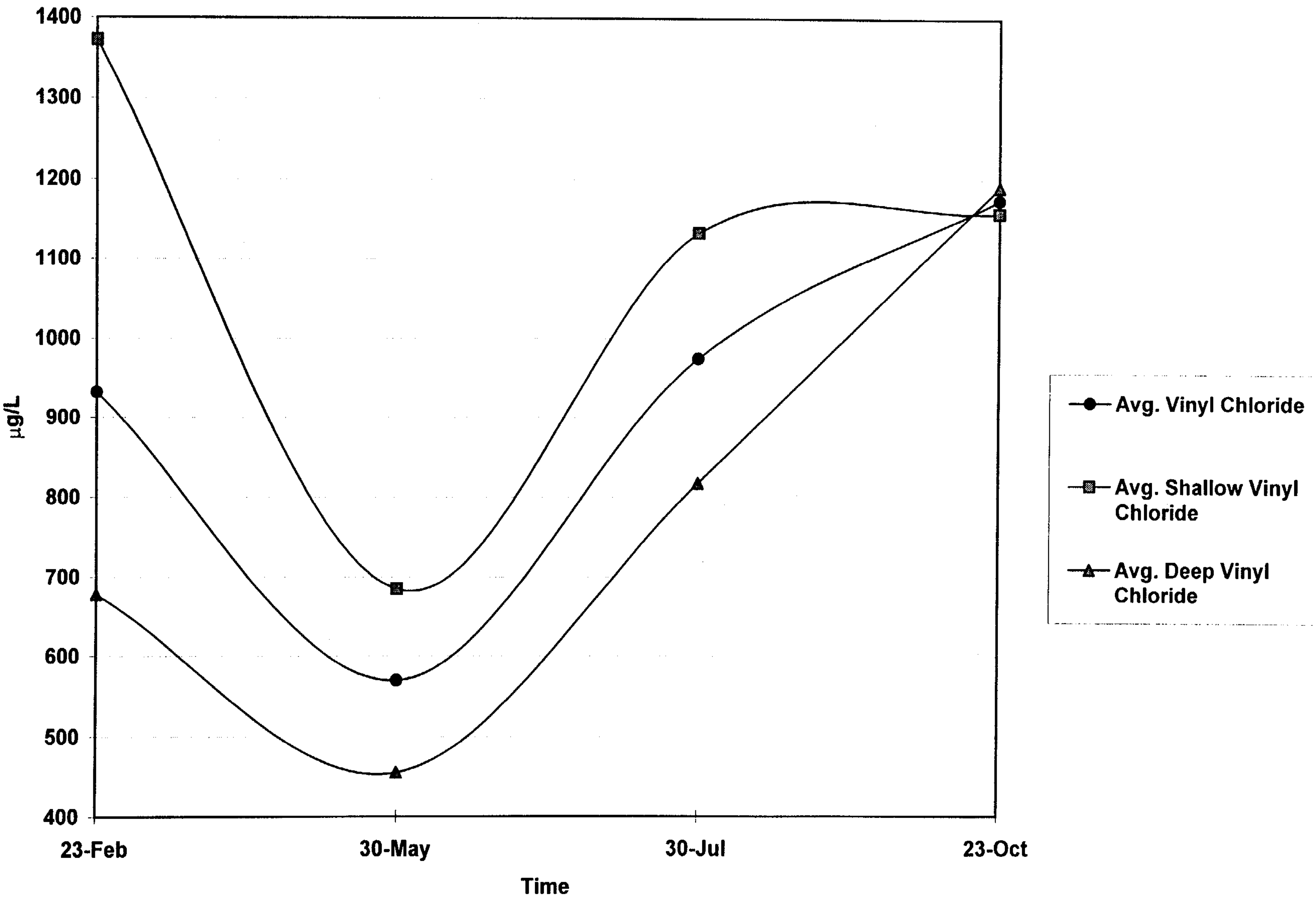


Figure 4-9: Variation in Concentration of 1,2-DCE (total) in KGB Monitoring Wells

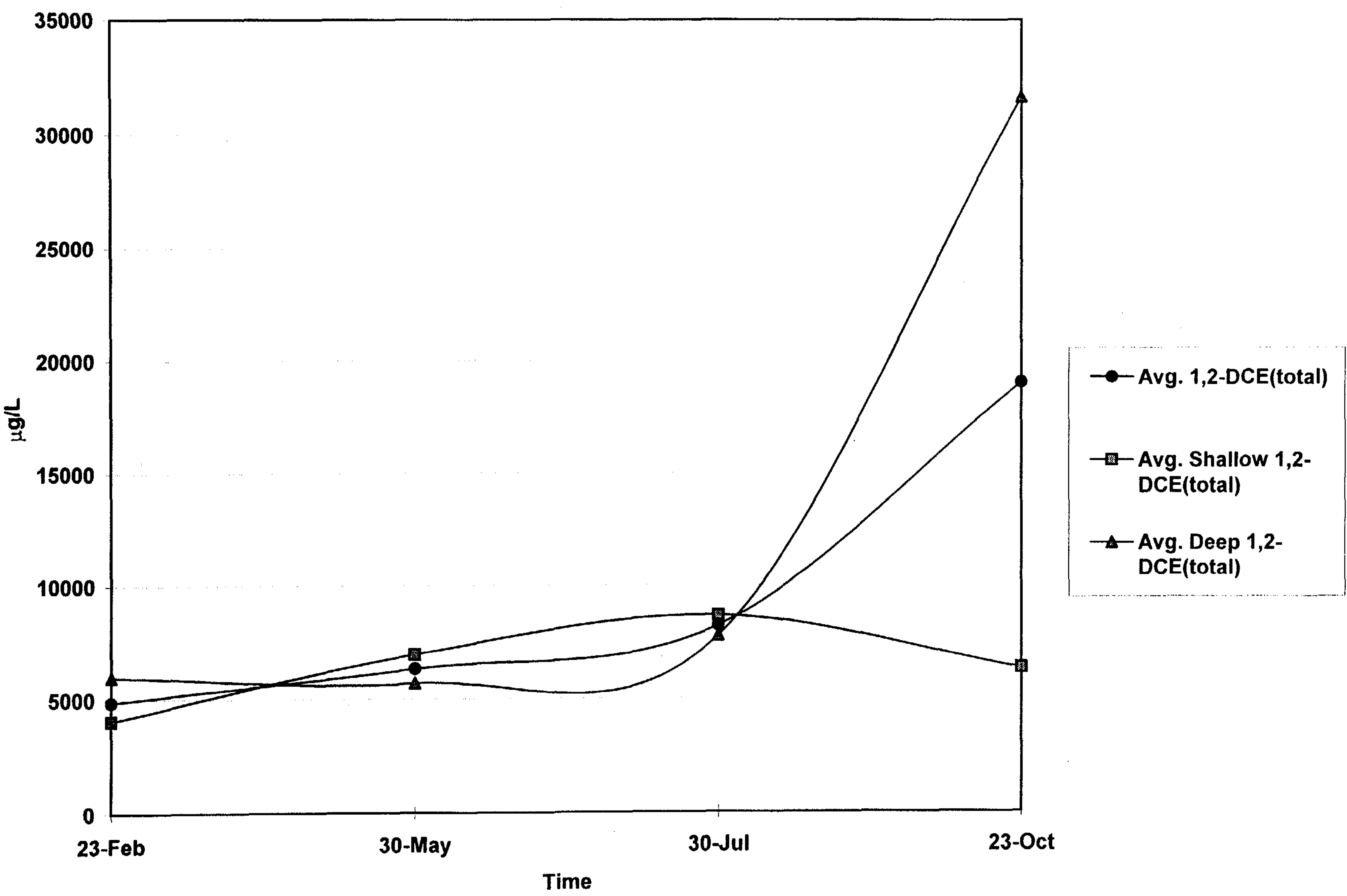


Figure 4-10: Variation in Concentration of TCE in KGB Monitoring Wells

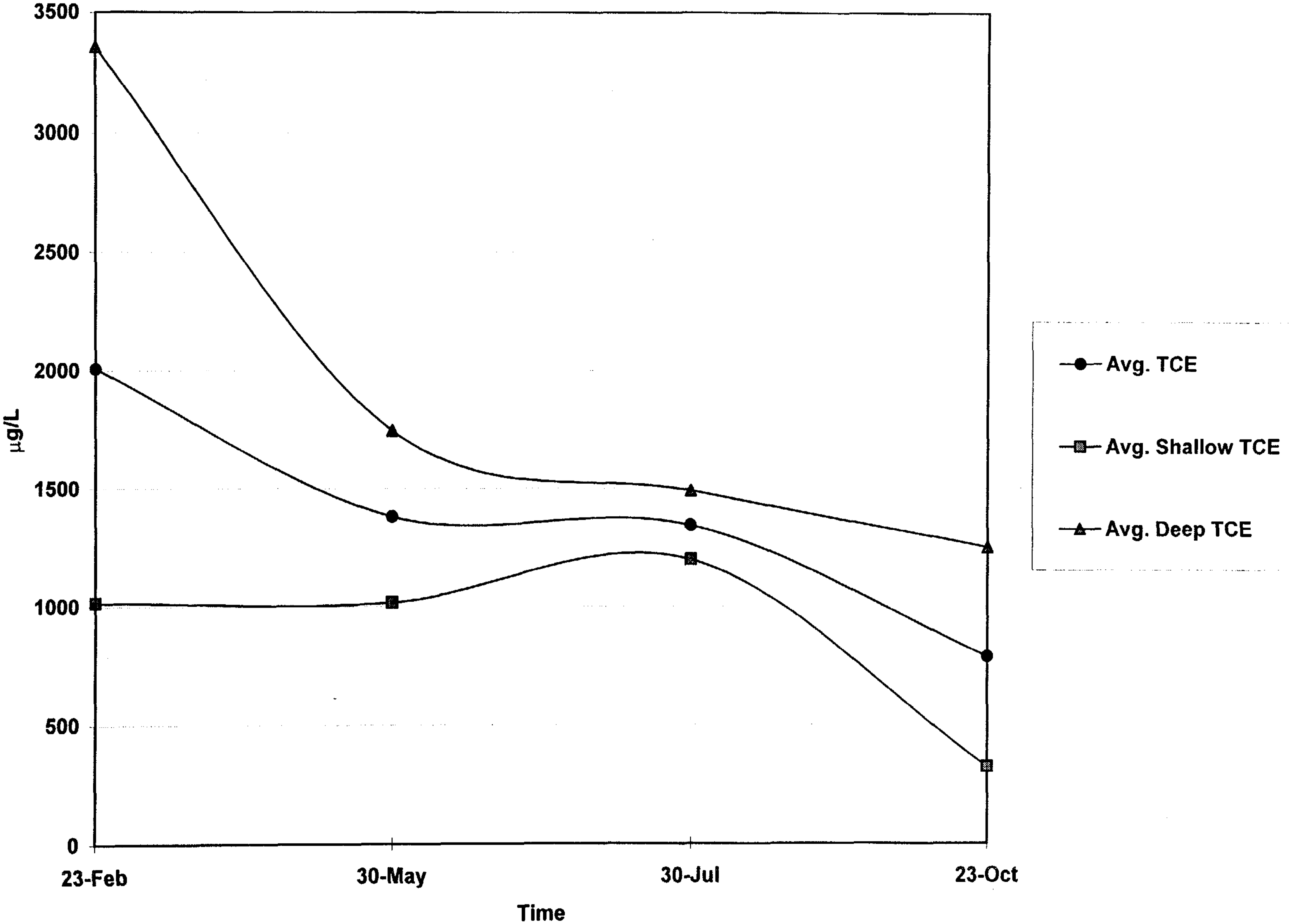


Figure 4-11: Variation in Concentration of PCE in KGB Monitoring Wells

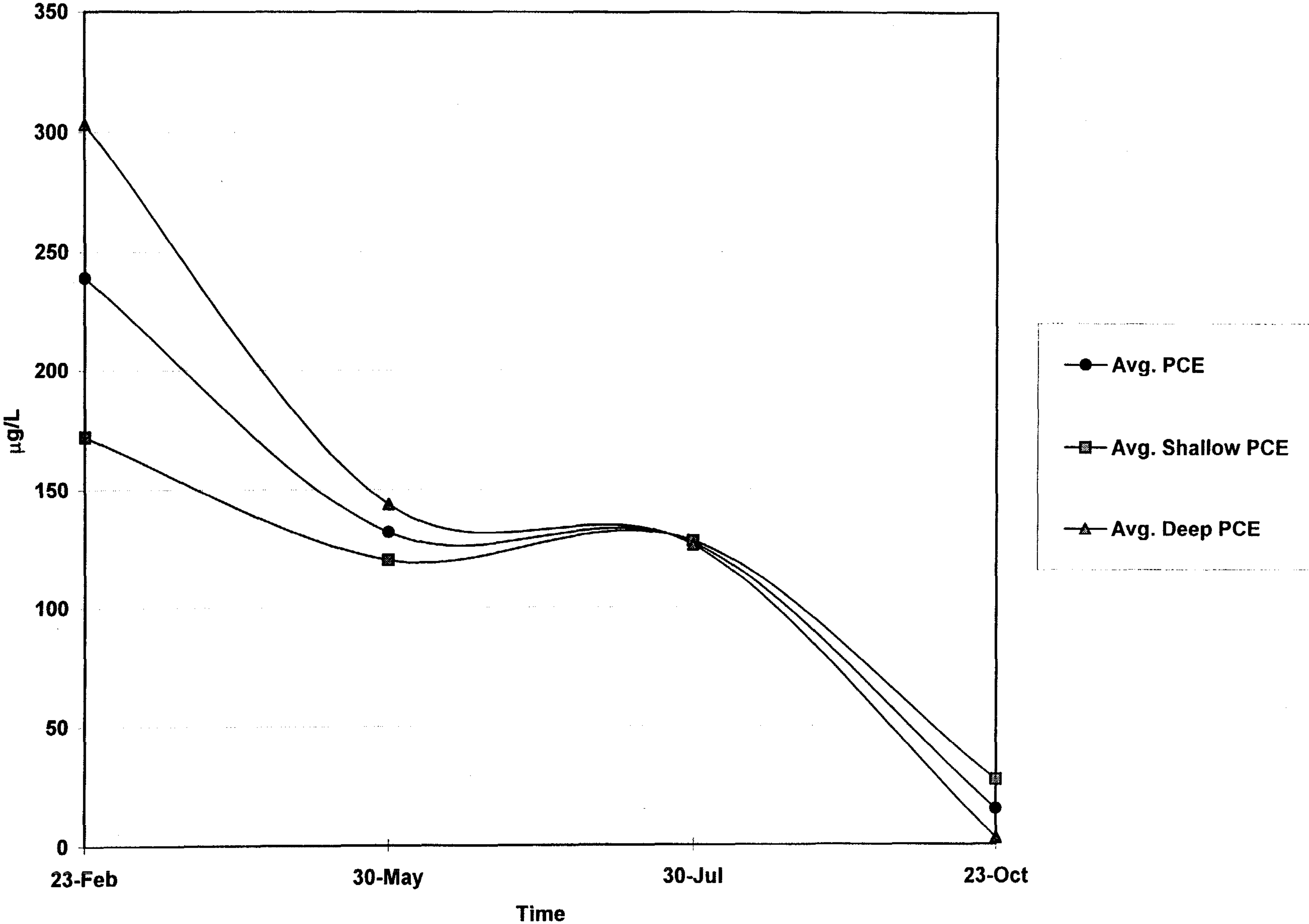
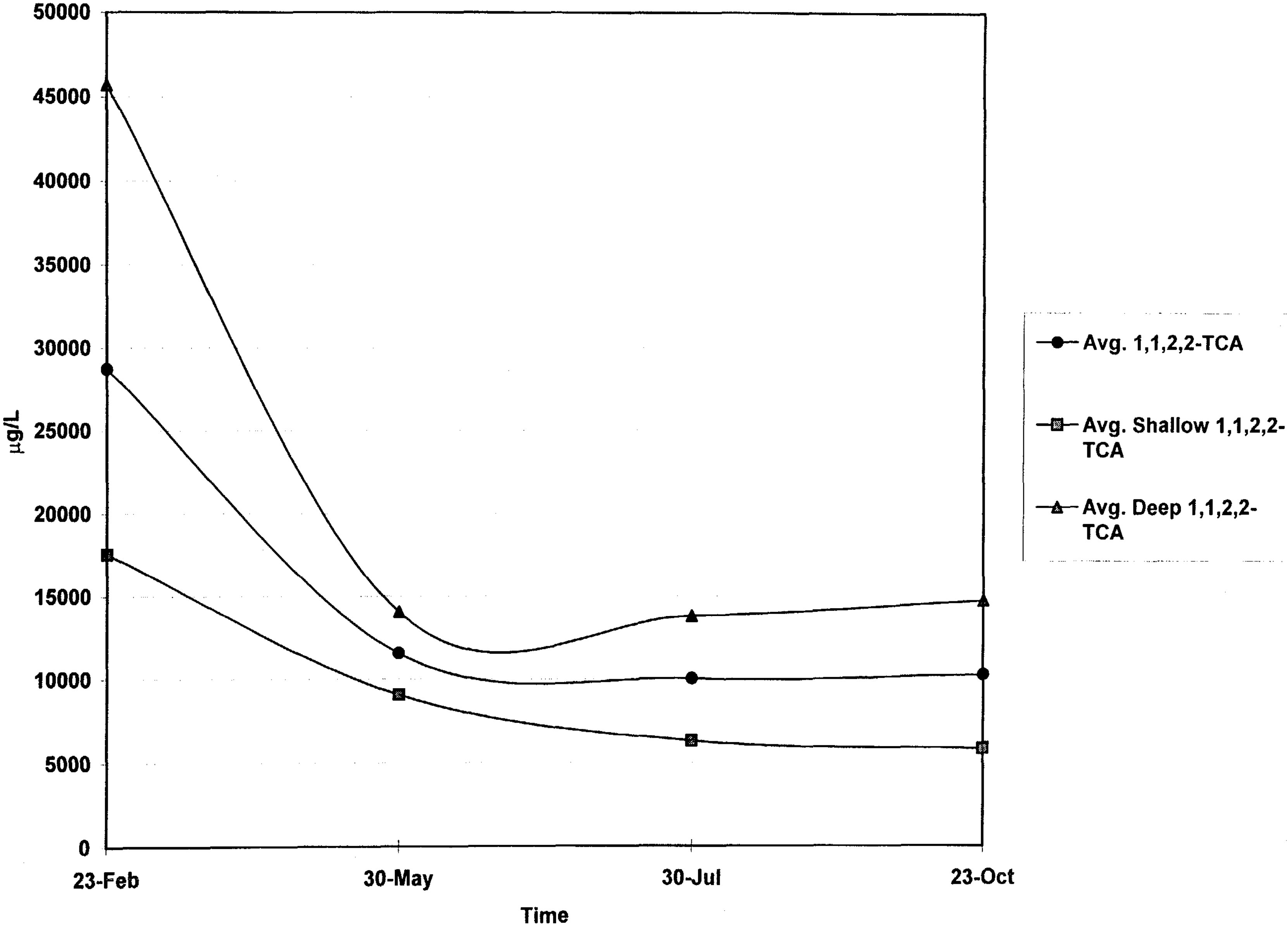


Figure 4-12: Variation in Concentration of 1,1,2,2-TCA in KGB Monitoring Wells



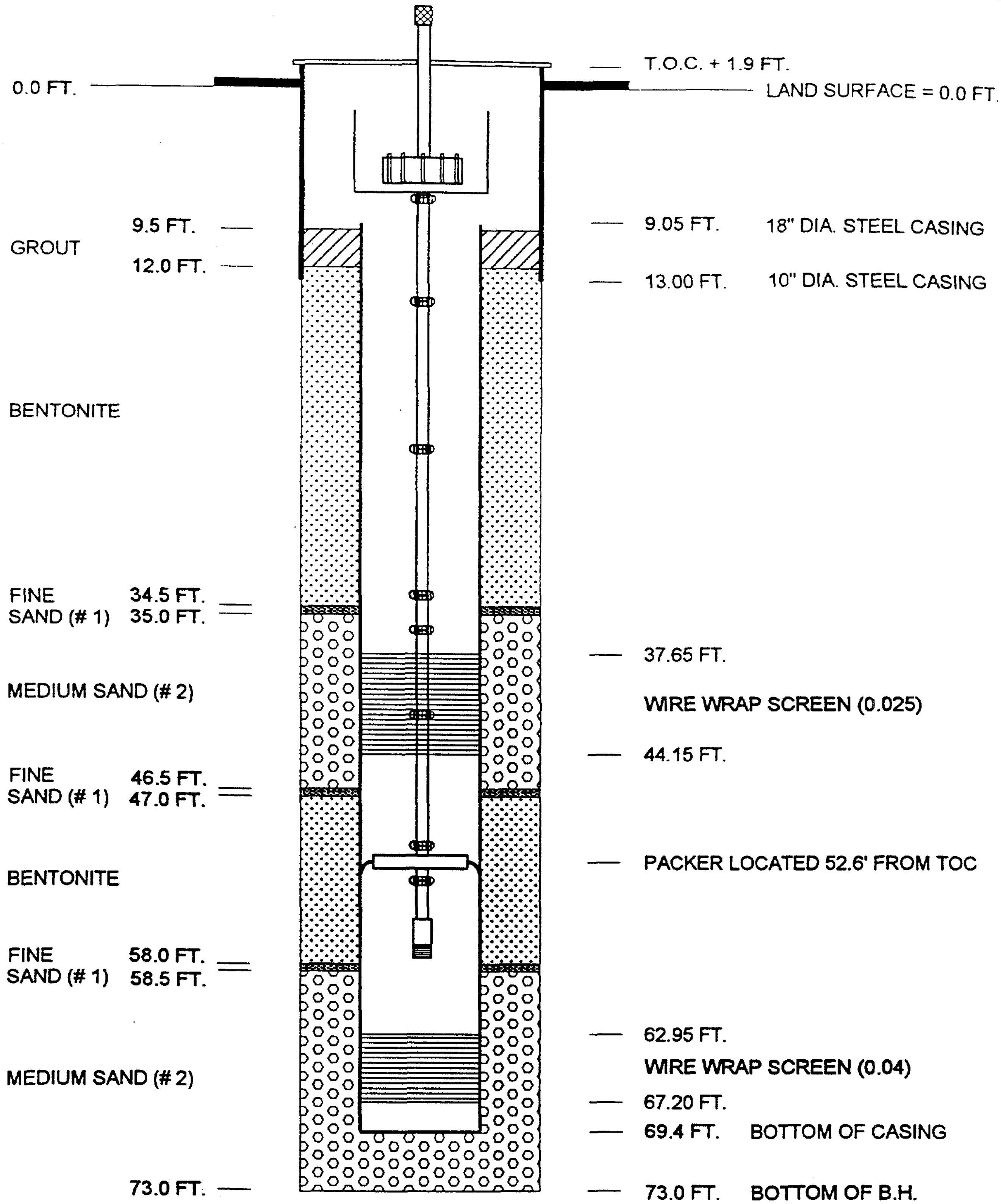


Figure 7-1:UVB-400 Well Construction Diagram

Prepared For.

SBP TECHNOLOGIES, INC.

Scale	Drawing No.	By	Project No.
NOT TO SCALE	LEJEUNE	JKS	
Date	Description		
11/3/97	UVB SCHEMATIC, CAMP LEJEUNE, N.C.		

IEG TECHNOLOGIES CORP.
5015-D West WT Harris Blvd.
Charlotte, NC 28269

Figure 7-2 : Circulation Time
Phase II UVB 400, Site 69 MCB, Camp Lejeune

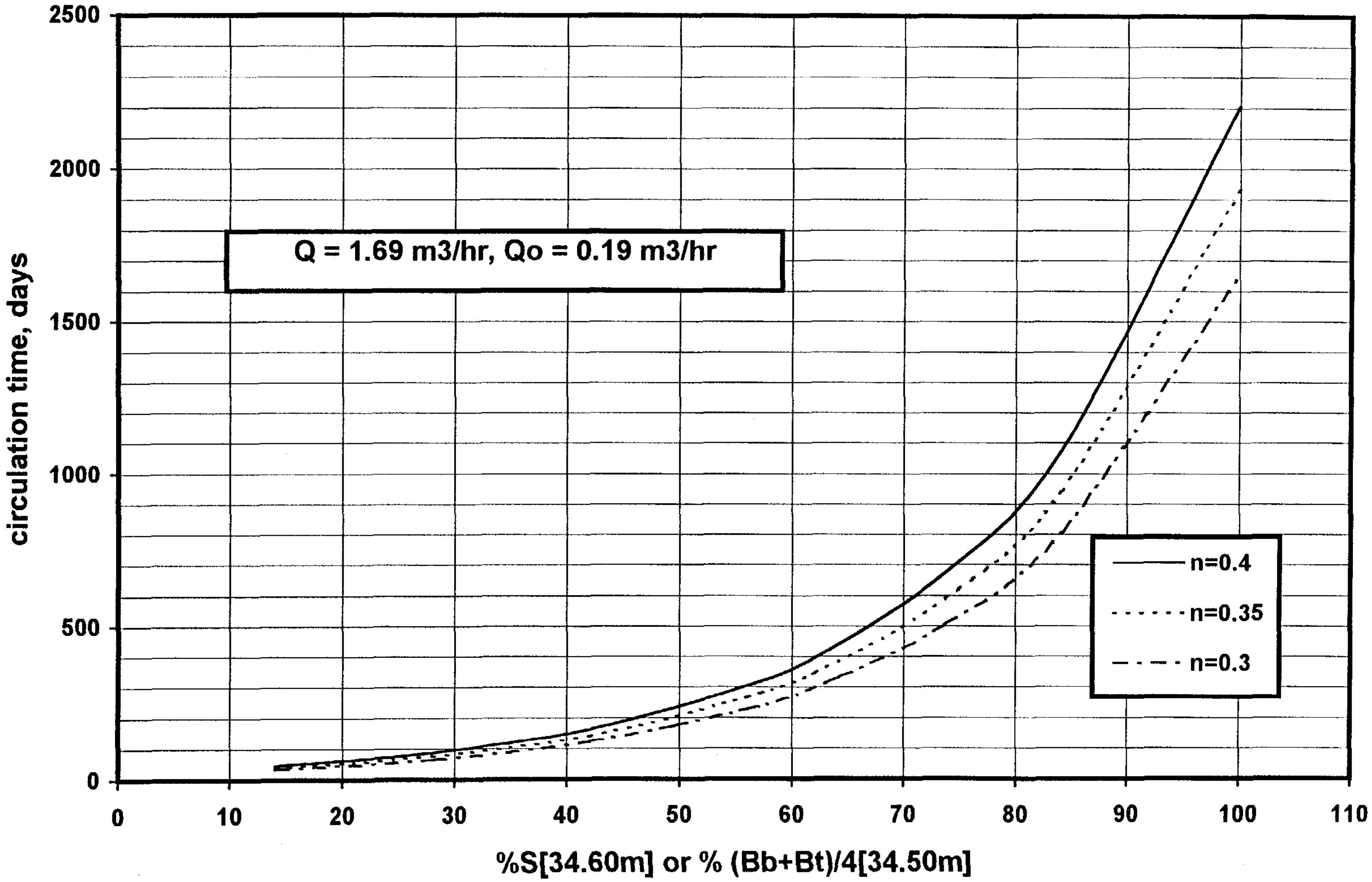
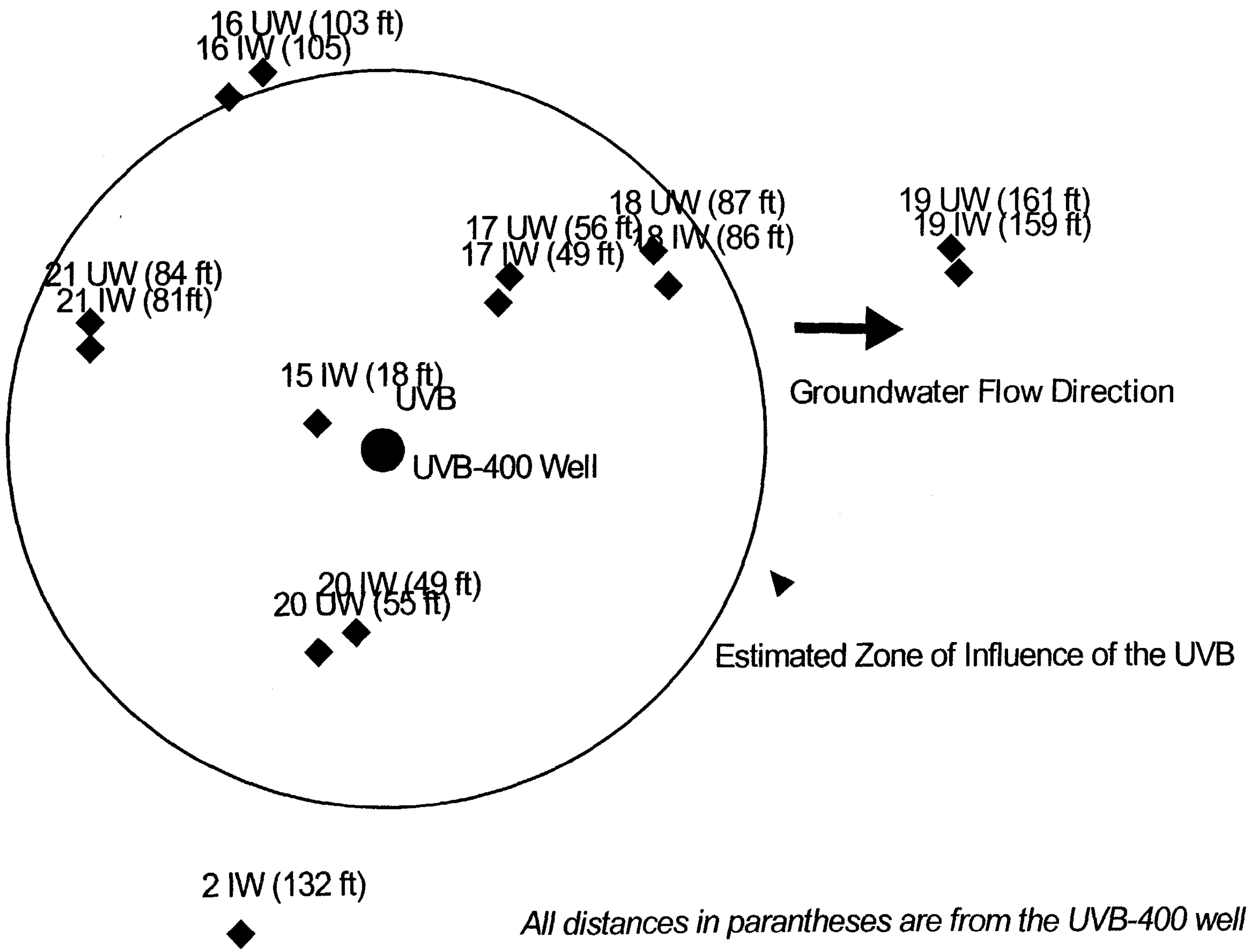


Figure 7-3: UVB and Monitoring Wells Layout: Phase II Treatability Study MCB Camp Lejeune



All distances in parantheses are from the UVB-400 well

Camp Lejeune UVB 250				4/29/96

Gradient i=		0.016		
kh=		1.00E-06 m/s		
kv=		1.00E-07 m/s		
v= kh*i=		1.60E-08 m/s		1.38E-03 m/d
thickness: saturated zone		10.56 m		

Well data

aT=		1.71 m		
aB=		1.16 m		
Q=		4 m3/h		0.00111 m3/s
a/H=	ca.	0.1		
Q/H²*kh=		10		
Q/H²*v=		623		

HERRLING'S Diagrams

S/H=	ca.	5.3	56	S (m)
D/H=	ca.	11.7	124	D (m)
BT/H=	ca.	9.2	97	BT (m)
BB/H=	ca.	14.2	150	BB (m)
Q0/Q=	ca.	0.023	0.09	Q0 (m3)
A/H²=	ca.	12.4	1383	A (m2)
**** R applies only for NO GROUNDWATER FLOW******				
R/H=	ca.			R (m)
			61.776	

Table 3-1: UVB Model Parameters

Camp Lejeune KGB				4/29/96
Gradient i=		0.065		
kh=		1.00E-06	m/s	
kv=		1.00E-07	m/s	
v= kh*i=		6.50E-08	m/s	5.62E-03 m/d
thickness: saturated zone		3.26	m	
Well data				
--------------				
aT=		1	m	
aB=		1	m	
Q=		0.5	m3/h	0.000 m3/s
a/H=	ca.	0.25		
Q/H^{2}*kh=		13		
Q/H^{2}*v=		201		
HERRLING'S Diagrams				

S/H=	ca.	4.25	13.855	S (m)
D/H=	ca.	8.7	28.362	D (m)
BT/H=	ca.	5.8	18.908	BT (m)
BB/H=	ca.	11.7	38.142	BB (m)
Q0/Q=	ca.	0.05	0.025	Q0 (m3)
A/H^{2}=	ca.	10.1	107	A (m2)
**** R applies only for NO GROUNDWATER FLOW******				
R/H=	ca.			R (m)

Table 3-2: KGB Model Parameters

Table 3-3: UVB Monitoring Wells Survey, Site 69, MCB Camp Lejeune

Well Number	Northing	Easting	Elevation TOC	Ground Surface
2 IW	305162.528	2472183.442	36.98	34.4
15 IW	305295.3589	2472204.634	37.55	35.8
16 IW	305383.6121	2472182.178	40.42	37.5
17 IW	305326.6597	2472255.348	39.41	36.9
18 IW	305330.9045	2472298.319	39.14	36.8
19 IW	305333.9895	2472374.801	39.02	36.5
20 IW	305238.3981	2472219.958	38.01	35.6
21 IW	305315.4098	2472144.761	39.09	36.6
UVB	305320.5	2472200	41	36.7
15 UW	305288.9519	2472221.694	37.47	35.8
16 UW	305386.9468	2472191.016	40.02	37.3
17 UW	305333.5246	2472256.263	39.98	36.9
18 UW	305339.9943	2472294.202	39.1	36.9
19 UW	305345.4396	2472373.219	39.17	36.3
20 UW	305237.2723	2472205.275	37.87	35.6
21 UW	305322.2459	2472144.496	39.06	36.7

Table 3-4: KGB Monitoring Wells Survey, Site 69, MCB Camp Lejeune				
Well Number	Northing	Easting	Elevation TOC	Ground Surface
22A	305264.4862	2472221.905	38.59	36.3
23A	305272.9621	2472189.776	38.52	35.9
24A	305265.5902	2472178.909	38.22	35.7
25A	305258.5946	2472228.162	38.83	36.6
KGB	305281	2472206	37.5	36
22B	305259.9214	2472217.489	38.46	36.2
23B	305265.8839	2472192.067	38.27	35.9
24B	305260.5437	2472183.434	38.02	35.7
25B	305256.4841	2472220.863	38.28	36.3

Table 4-1: UVB Operation Status

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
PERFORMANCE YEAR 1996																															
FEB																			P	P	P	P	P	P	P	P	P	P			
MAR	E	E	E	E	E	E	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	O	PF	PF	PF	PF	PF	PF	PF	PF	PF
APR	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	E	E	E	E	O	O	O	O	O	O	O	O	
MAY	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
JUN	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
JUL	O	O	O	O	O	O	O	O	O	O	O	E	E	E	E	E	E	E	E	E	E	E	E	E	E	O	O	E	E	E	E
AUG	E	E	E	E	E	E	E	E	E	E	E	E	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
SEP	O	O	O	O	E	E	E	E	E	E	E	E	E	E	E	E	E	O	O	O	O	O	O	O	O	O	O	O	O	O	
OCT	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	E	O	O	O	O	O	O	O	O	O
NOV	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O									
DEC																															
PERFORMANCE YEAR 1997																															
JAN																															
FEB																															
MAR																															

P = PRE-SYSTEM START-UP
S = START-UP / STABILIZATION
O = ON / ON-LINE
BF = BLOWER FAILURE (OFF)
PF = PUMP FAILURE (OFF)
E = ELECTRICAL SHUT-OFF

PROJECT DAYS: 261
DAYS ON: 189
DAYS ON FOR START-UP: 15
DAYS OFF DUE TO ELECTRICAL FAILURE: 48
DAYS OFF DUE TO EQUIPMENT FAILURE: 9
PERCENT DOWN TIME (TOTAL): 27.6%

Table 4-2: KGB Operation Status

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
PERFORMANCE YEAR 1996																															
FEB																			P	P	P	P	P	P	P	P	P	P			
MAR	E	E	E	E	E	E	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	CF	S	S	S	S	S	S	S	S	S	S
APR	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	E	E	E	E	O	O	O	O	O	O	O	O	
MAY	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
JUN	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
JUL	O	O	O	O	O	O	O	O	O	O	O	E	E	E	E	E	E	E	E	E	E	E	E	E	E	O	O	O	O	O	O
AUG	E	E	E	E	E	E	E	E	E	E	E	E	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
SEP	O	O	O	O	E	E	E	E	E	E	E	E	E	E	E	E	E	O	O	O	O	O	O	O	SS	SS	SS	O	O	O	
OCT	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	E	SS	SS	SS	SS	SS	SS	O	O	O
NOV	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O									
DEC																															
PERFORMANCE YEAR 1997																															
JAN																															
FEB																															
MAR																															

P = PRE-SYSTEM START-UP
S = START-UP / STABILIZATION
O = ON / ON-LINE
BF = BLOWER FAILURE (OFF)
SS = SILTING & SEDIMENT (OFF)
E = ELECTRICAL SHUT-OFF
CF = COMPRESSOR FAILURE (OFF)

PROJECT DAYS: 261
DAYS ON: 183
DAYS ON FOR START-UP: 10
DAYS OFF DUE TO ELECTRICAL FAILURE: 44
DAYS OFF DUE TO EQUIPMENT FAILURE: 24
PERCENT DOWN TIME (TOTAL): 29.1%

Table 4-3: Groundwater Levels (cm) in UVB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Well ID	Elevation	Elevation From	Elevation From	Depth From Top of UVB Flange (cm)							
	Date	TOC (ft)	Top Of UVB (ft)	Top Of UVB (cm)	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96
	UVB	41	0	0	NM	NM	NM	NM	NM	NM	NM	NM
SHALLOW	15UW	37.47	-3.53	-107.59	NM	NM	971.99	969.89	960.69	973.19	979.29	992.09
	16UW	40.02	-0.98	-29.87	968.77	991.82	986.07	974.47	964.67	975.07	989.07	1001.87
	17UW	39.98	-1.02	-31.09	962.79	967.44	959.19	950.09	939.09	951.29	966.19	978.99
	18UW	39.10	-1.90	-57.91	955.41	983.28	976.01	967.71	955.81	969.31	982.41	995.51
	19UW	39.17	-1.83	-55.78	981.68	992.13	983.88	979.58	963.78	975.68	990.28	1003.68
	20UW	37.87	-3.13	-95.40	NI	NI	NI	NI	953.40	965.30	979.90	991.50
	21UW	39.06	-1.94	-59.13	907.93	961.03	948.23	921.13	905.53	900.33	914.43	926.63
	Date				2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96
DEEP	2IW	36.98	-4.02	-122.53	951.13	NM	964.13	957.73	948.53	957.73	972.93	984.23
	15IW	37.55	-3.45	-105.16	1079.66	NM	975.66	968.06	950.96	970.16	983.56	996.36
	16IW	40.42	-0.58	-17.68	1006.28	1015.90	991.18	978.98	970.78	980.88	994.88	1008.28
	17IW	39.41	-1.59	-48.46	981.76	NM	998.26	972.26	967.16	983.26	988.76	998.26
	18IW	39.14	-1.86	-56.69	1018.69	998.52	1009.79	980.49	975.09	986.89	1005.49	999.79
	19IW	39.02	-1.98	-60.35	999.55	1009.80	992.45	982.65	975.65	974.15	995.15	1007.95
	20IW	38.01	-2.99	-91.14	NI	NI	NI	NI	952.84	965.04	979.04	983.84
	21IW	39.09	-1.91	-58.22	980.62	993.65	986.02	977.22	968.02	974.12	990.02	1003.42

NM: not measured
NI: well not installed
NMD: not measured due to dye injection

Table 4-3: Groundwater Levels (cm) in UVB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Well ID													
	Date	**5/2/96**	**5/15/96**	**5/22/96**	**5/31/96**	**6/6/96**	**6/12/96**	**6/19/96**	**7/3/96**	**7/30/96**	**8/15/96**	**8/27/96**	**9/25/96**	**10/22/96**
	UVB	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
SHALLOW	**15UW**	997.89	1011.89	1020.49	1030.19	1039.09	1043.99	1048.79	1072.89	965.30	965.60	983.29	918.79	924.15
	16UW	1008.87	1023.17	1029.87	1040.87	1048.87	1051.87	1027.10	1080.97	974.14	974.45	992.87	913.67	931.16
	17UW	985.09	998.79	1006.19	1015.89	1024.09	1028.19	1002.30	1057.29	952.20	950.67	969.69	893.69	909.83
	18UW	1001.61	1015.01	1022.31	1032.01	1040.01	1044.01	995.40	1072.81	968.96	968.04	987.71	912.21	927.41
	19UW	1008.88	1022.88	1028.08	1039.08	1046.68	1050.78	1004.70	1078.38	975.97	974.45	993.78	919.28	933.88
	20UW	998.20	1011.60	1017.70	1028.70	1037.50	1042.30	949.90	1074.70	963.17	967.13	981.60	908.00	922.93
	21UW	933.63	947.03	972.93	966.23	973.83	978.03	924.90	1001.93	891.54	893.37	909.13	831.33	847.34
	Date	**5/2/96**	**5/15/96**	**5/22/96**	**5/31/96**	**6/6/96**	**6/12/96**	**6/19/96**	**7/3/96**	**7/30/96**	**8/15/96**	**8/27/96**	**9/25/96**	**10/22/96**
DEEP	**2IW**	990.33	1005.23	1021.73	1022.63	1031.73	1035.53	1043.03	1067.33	956.16	956.16	974.13	901.53	916.53
	15IW	1002.76	1016.86	1023.56	1033.86	1040.26	1046.56	1055.86	1075.96	969.88	969.27	986.86	911.46	928.12
	16IW	1014.98	1029.68	1036.68	1046.68	1054.68	1058.48	1066.58	1087.68	982.98	980.85	999.78	1009.98	937.57
	17IW	1028.96	1020.76	1029.96	1037.26	1046.66	1049.56	1058.26	1078.46	973.22	973.53	990.86	917.06	932.38
	18IW	1045.19	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
	19IW	1013.15	1026.85	1034.75	1043.35	1050.95	1055.25	1064.65	1082.65	980.24	979.02	997.85	923.85	938.35
	20IW	997.04	1010.74	1017.44	1021.34	1038.44	1042.54	1052.54	1076.54	964.09	965.92	982.84	909.74	924.46
	21IW	1012.22	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD

NM: not measured
NI: well not installed
NMD: not measured due to dye injection

Table 4-3: Groundwater Levels (cm) in UVB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Well ID	
	Date	11/22/96
	UVB	NM
SHALLOW	15UW	987.59
	16UW	991.97
	17UW	970.09
	18UW	989.31
	19UW	995.18
	20UW	982.70
	21UW	910.33
	Date	11/22/96
DEEP	2IW	974.13
	15IW	988.26
	16IW	1000.18
	17IW	991.66
	18IW	NMD
	19IW	996.55
	20IW	982.84
	21IW	NMD

NM: not measured
NI: well not installed
NMD: not measured due to dye injection

Table 4-4: Dissolved Oxygen Measurements (ppm) In UVB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Date	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96	6/12/96	6/19/96
	Well ID															
	UVB	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
SHALLOW	15UW	NM	NM	0.10	0.14	0.60	0.20	0.15	0.18	0.10	0.15	0.53	0.13	0.10	0.15	0.20
	16UW	NM	0.35	0.15	0.11	0.45	0.15	0.15	0.10	0.11	0.25	0.30	0.13	1.40	0.15	0.20
	17UW	NM	0.06	0.15	0.15	0.30	0.18	0.28	0.15	0.10	0.15	0.52	0.15	0.53	1.13	1.00
	18UW	NM	0.15	0.20	0.11	0.35	0.18	0.20	0.15	0.15	0.20	0.65	0.10	0.10	0.15	0.20
	19UW	NM	0.25	0.23	0.15	0.45	0.10	0.20	0.11	0.15	0.18	0.15	0.15	0.55	0.60	0.75
	20UW	NI	NI	NI	NI	0.40	0.60	0.30	0.15	0.15	0.20	0.75	0.15	0.10	0.15	0.15
	21UW	NM	0.20	NM	0.10	0.50	0.73	0.33	0.15	0.13	0.05	1.33	0.10	0.10	0.15	0.20
	Date	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96	6/12/96	6/19/96
DEEP	2IW	NM	NM	0.10	0.11	0.10	0.20	0.15	0.18	0.15	0.15	1.60	0.91	0.63	1.30	1.25
	15IW	NM	NM	0.15	0.21	0.45	0.20	0.20	0.15	0.15	0.19	0.25	0.15	0.15	0.15	0.20
	16IW	NM	0.40	0.13	0.13	0.35	0.13	0.20	0.10	0.11	0.16	1.59	0.20	0.10	0.15	0.20
	17IW	NM	0.33	0.15	0.11	0.25	0.15	0.18	0.15	0.10	0.15	2.10	0.15	0.13	0.13	0.15
	18IW	NM	0.30	0.15	0.15	0.65	0.20	0.15	0.15	0.15	NMD	NMD	NMD	NMD	NMD	NMD
	19IW	NM	0.33	0.35	0.13	0.90	0.20	0.18	0.15	0.16	0.15	0.52	0.15	0.10	0.15	0.20
	20IW	NI	NI	NI	NI	0.40	0.18	0.25	0.13	0.13	0.20	0.95	0.10	0.08	0.20	0.22
	21IW	NM	0.35	0.15	0.16	0.45	0.10	0.18	0.15	0.13	NMD	NMD	NMD	NMD	NMD	NMD

NM: not measured
NI: well not installed
NMD: not measured due to dye injection
NME: not measured due to equipment failure

Table 4-4: Dissolved Oxygen (ppm) Measurements In UVB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Date	7/3/96	7/30/96	8/15/96	8/27/96	9/25/96	10/22/96	11/22/96					Avg. OFF	Avg. ON
	Well ID													
	UVB	NM	NM	NM	NM	NM	NM	NM					NM	NM
SHALLOW	15UW	0.20	0.50	0.30	0.25	NME	0.50	0.30					**0.12**	**0.27**
	16UW	0.20	0.21	0.90	0.45	NME	2.00	0.55					**0.20**	**0.45**
	17UW	0.80	0.15	2.00	0.45	NME	0.20	0.30					**0.12**	**0.49**
	18UW	0.30	0.35	0.65	0.55	NME	0.25	0.45					**0.15**	**0.29**
	19UW	0.25	0.25	0.82	0.42	NME	0.34	0.50					**0.21**	**0.35**
	20UW	0.28	0.15	0.28	0.20	NME	0.00	0.30					**NM**	**0.25**
	21UW	0.25	0.43	1.00	0.25	NME	0.34	0.30					**0.15**	**0.37**
	Date	**7/3/96**	**7/30/96**	**8/15/96**	**8/27/96**	**9/25/96**	**10/22/96**	**11/22/96**						
DEEP	2IW	2.73	0.30	1.35	1.78	NME	0.25	0.75					**0.11**	**0.81**
	15IW	1.53	0.15	0.50	0.30	NME	1.00	0.49					**0.18**	**0.37**
	16IW	0.20	0.30	1.00	0.45	NME	0.20	0.50					**0.22**	**0.35**
	17IW	0.25	0.20	3.50	0.25	NME	0.10	0.40					**0.20**	**0.49**
	18IW	NMD	NMD	NMD	NMD	NMD	NMD	NMD					**0.20**	**0.26**
	19IW	0.20	0.15	0.80	0.49	NME	0.53	0.50					**0.27**	**0.33**
	20IW	0.30	0.30	0.30	0.35	NME	0.10	0.35					**NM**	**0.27**
	21IW	NMD	NMD	NMD	NMD	NMD	NMD	NMD					**NM**	**0.20**

NM: not measured
NI: well not installed
NMD: not measured due to dye injection
NME: not measured due to equipment failure

Table 4-5: Groundwater Temperatures (^{o}F) in UVB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Date	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96	6/12/96	6/19/96
	Well ID															
	15UW	NM	NM	64.00	63.10	64.00	64.00	63.50	63.10	63.50	63.10	63.50	63.10	63.30	63.10	64.00
SHALLOW	16UW	NM	63.50	63.50	63.10	64.20	63.50	64.00	63.50	63.70	63.50	64.00	63.10	64.00	63.50	64.00
	17UW	NM	63.14	63.50	63.50	64.00	64.00	63.50	63.70	63.50	63.70	64.20	64.00	63.70	63.50	64.60
	18UW	NM	63.50	64.00	64.00	62.60	64.00	64.00	64.20	64.00	64.00	64.80	64.00	64.00	63.70	64.20
	19UW	NM	64.76	65.30	64.00	64.80	64.00	64.40	64.20	64.40	64.20	64.20	64.00	64.20	64.00	64.00
	20UW	NI	NI	NI	NI	63.50	63.10	63.50	63.10	63.10	63.10	63.60	63.50	63.10	63.10	63.50
	21UW	NM	63.50	63.50	64.00	64.40	63.50	63.50	63.90	63.10	63.10	64.00	63.50	63.50	63.10	63.10
	Date	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96	6/12/96	6/19/96
DEEP	2IW	NM	NM	64.00	63.50	63.50	64.00	63.50	64.20	63.70	63.50	71.20	63.70	64.20	63.50	63.10
	15IW	NM	NM	64.00	64.00	63.90	63.10	63.40	64.20	63.10	63.10	63.90	63.50	63.50	63.10	63.00
	16IW	NM	64.40	63.50	63.50	64.00	63.90	64.00	63.90	63.70	63.70	64.40	63.10	64.00	63.90	63.30
	17IW	NM	65.30	64.00	63.50	64.00	63.50	64.00	64.00	63.50	64.00	66.00	64.00	63.70	63.50	64.20
	18IW	NM	63.50	64.00	64.00	64.00	64.20	63.50	63.70	64.00	NMD	NMD	NMD	NMD	NMD	NMD
	19IW	NM	65.30	65.30	64.00	68.00	64.00	64.20	64.20	64.40	64.00	68.40	64.00	64.00	63.70	64.00
	20IW	NI	NI	NI	NI	64.00	63.50	63.50	63.50	63.50	63.10	64.40	63.10	63.30	63.50	63.10
	21IW	NM	64.04	63.50	63.50	63.50	63.50	63.10	63.10	62.80	NMD	NMD	NMD	NMD	NMD	NMD

NM: not measured
NI: well not installed
NMD: not measured due to dye injection

Table 4-5: Groundwater Temperatures (°F) in UVB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Date	7/3/96	7/30/96	8/15/96	8/27/96	9/27/96	10/22/96	11/22/96	
	Well ID								Avg.
	15UW	63.50	63.10	64.04	63.14	63.86	62.42	62.60	63.40
SHALLOW	16UW	63.70	63.50	64.04	63.32	64.04	63.14	64.22	63.67
	17UW	64.00	63.70	64.04	63.32	63.50	62.96	63.50	63.69
	18UW	64.00	64.20	63.50	63.50	63.32	62.78	64.04	63.83
	19UW	64.00	64.00	64.76	63.68	64.04	62.60	64.04	64.17
	20UW	63.10	63.10	63.68	62.78	63.50	62.78	63.14	63.24
	21UW	63.10	63.50	62.96	62.96	63.68	63.14	63.50	63.45
	Date	7/3/96	7/30/96	8/15/96	8/27/96	9/27/96	10/22/96	11/22/96	Avg.
DEEP	2IW	63.50	63.90	65.66	63.14	64.40	62.78	64.40	64.17
	15IW	63.10	64.00	63.50	62.96	63.14	63.14	64.40	63.50
	16IW	63.70	64.00	64.22	63.50	63.50	63.50	64.40	63.82
	17IW	63.50	64.00	63.50	63.14	63.14	62.96	63.50	63.85
	18IW	NMD	NMD	NMD	NMD	NMD	NMD	NMD	63.86
	19IW	64.00	64.00	64.22	63.50	64.04	62.60	63.50	64.45
	20IW	63.10	63.30	64.04	62.96	63.50	62.96	63.50	63.44
	21IW	NMD	NMD	NMD	NMD	NMD	NMD	NMD	63.38

NM: not measured
NI: well not installed
NMD: not measured due to dye injection

Table 4-6: Groundwater pH in UVB Monitoring Wells, SIte 69, MCB Camp Lejeune

Location	Date	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96	6/12/96	6/19/96
	Well ID															
	15UW	6.67	NM	6.41	6.22	9.58	5.97	NME	6.00	6.17	6.26	6.32	NME	6.42	6.20	6.20
SHALLOW	16UW	10.08	9.03	7.87	6.95	6.71	6.80	NME	6.86	6.73	6.78	7.27	NME	7.92	7.47	7.45
	17UW	9.95	7.75	9.56	9.44	9.29	8.61	NME	8.05	7.72	7.56	7.40	NME	7.32	7.21	7.57
	18UW	10.54	9.16	9.86	9.59	9.23	8.71	NME	7.57	7.38	7.31	7.20	NME	7.28	7.07	7.01
	19UW	11.33	10.12	10.64	10.61	10.56	10.62	NME	10.02	9.76	9.94	8.95	NME	9.27	9.17	9.04
	20UW	NI	NI	NI	NI	7.63	7.84	NME	7.70	7.73	7.62	7.94	NME	7.89	7.06	7.04
	21UW	8.47	7.90	7.14	6.99	6.96	6.82	NME	6.98	6.75	6.94	7.06	NME	7.68	7.18	7.15
	Date	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96	6/12/96	6/19/96
DEEP	2IW	7.87	NM	7.99	7.90	7.90	7.47	NME	7.30	7.62	7.43	7.90	NME	6.21	6.62	6.58
	15IW	7.64	NM	8.63	9.90	6.19	7.98	NME	7.93	7.88	7.72	7.27	NME	7.39	7.07	7.00
	16IW	7.66	8.97	8.95	8.87	8.96	8.91	NME	8.92	8.90	8.97	8.84	NME	8.09	8.26	8.26
	17IW	NM	8.05	7.72	7.56	7.30	7.56	NME	7.60	7.60	7.57	7.69	NME	7.44	7.37	7.38
	18IW	9.52	8.41	7.78	7.64	7.46	7.60	NME	7.53	7.50	NMD	NMD	NMD	NMD	NMD	NMD
	19IW	9.07	10.12	9.31	9.26	9.32	9.40	NME	9.56	9.30	9.67	9.74	NME	9.09	9.05	8.65
	20IW	NI	NI	NI	NI	11.50	11.31	NME	10.04	10.13	10.09	8.61	NME	9.59	9.62	9.65
	21IW	7.66	7.84	7.68	7.56	7.53	7.48	NME	7.62	7.57	NMD	NMD	NMD	NMD	NMD	NMD

NM: not measured
NI: well not installed
NMD: not measured due to dye injection
NME: not measured due to equipment failure

Table 4-6: Groundwater pH in UVB Monitoring Wells, SIte 69, MCB Camp Lejeune

Location	Date	7/3/96	7/30/96	8/15/96	8/27/96	9/25/96	10/22/96	11/22/96					
	Well ID												Avg.
	15UW	6.14	6.29	7.83	6.10	6.57	6.15	6.12					6.51
SHALLOW	16UW	7.45	7.28	6.96	7.37	7.58	7.30	7.40					7.46
	17UW	7.13	7.47	7.38	6.99	7.00	6.85	6.98					7.86
	18UW	7.18	6.96	7.22	6.81	6.88	6.80	6.78					7.83
	19UW	9.04	7.03	9.12	7.08	8.42	7.05	7.10					9.24
	20UW	6.66	7.77	7.64	7.47	5.97	7.40	7.50					7.43
	21UW	7.27	6.80	7.09	6.77	7.27	6.69	6.78					7.13
	Date	7/3/96	7/30/96	8/15/96	8/27/96	9/25/96	10/22/96	11/22/96					Avg.
DEEP	2IW	6.37	7.35	7.39	7.11	6.69	7.10	7.15					7.26
	15IW	6.92	7.52	7.63	7.73	6.96	7.70	7.85					7.63
	16IW	8.01	9.15	8.59	8.46	8.81	8.45	8.55					8.63
	17IW	7.27	7.52	7.79	7.91	7.33	7.97	7.94					7.61
	18IW	NMD	NMD	NMD	NMD	NMD	NMD	NMD					7.93
	19IW	8.81	9.01	9.02	8.31	8.54	8.41	8.35					9.10
	20IW	9.75	8.85	7.39	9.37	9.79	9.35	9.20					9.64
	21IW	NMD	NMD	NMD	NMD	NMD	NMD	NMD					7.62

NM: not measured
NI: well not installed
NMD: not measured due to dye injection
NME: not measured due to equipment failure

Table 4-7: Groundwater Conductivity (omhos/sec) in UVB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Date	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96	6/12/96	6/19/96
	Well ID															
SHALLOW	15UW	1520	NM	1710	1720	349	1660	NME	1680	1630	1594	1429	NME	1056	1041	978
	16UW	290	1710	200	200	154	170	NME	136	126	121	185	NME	135	97	101
	17UW	450	440	330	330	343	360	NME	370	377	388	421	NME	299	290	296
	18UW	340	250	230	260	266	320	NME	363	392	416	498	NME	341	342	356
	19UW		230	230	260	282	270	NME	229	224	226	203	NME	148	144	156
	20UW	NI	NI	NI	NI	328	350	NME	317	325	335	316	NME	219	216	215
	21UW	140	110	90	110	108	120	NME	114	103	103	185	NME	NM	69	75
	Date	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96	6/12/96	6/19/96
DEEP	2IW	330	NM	320	340	327	340	NME	340	339	334	309	NME	NM	235	250
	15IW	380	NM	360	390	1768	420	NME	369	380	433	397	NME	268	268	250
	16IW	330	320	290	310	309	300	NME	305	300	297	261	NME	202	199	189
	17IW	NM	270	270	300	297	300	NME	303	300	298	297	NME	198	196	184
	18IW	280	290	240	270	275	270	NME	268	272	NMD	NMD	NMD	NMD	NMD	NMD
	19IW	780	200	120	150	140	130	NME	153	146	153	153	NME	115	116	189
	20IW	NI	NI	NI	NI	1280	1210	NME	269	300	273	265	NME	185	189	194
	21IW	330	270	300	320	324	320	NME	316	318	NMD	NMD	NMD	NMD	NMD	NMD

NM: not measured
NI: well not installed
NMD: not measured due to dye injection
NME: not measured due to equipment failure

Table 4-7: Groundwater Conductivity (omhos/sec) in UVB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Date	7/3/96	7/30/96	8/15/96	8/27/96	9/25/96	10/22/96	11/22/96					Avg.
	Well ID												
SHALLOW	15UW	1400	1630	318	1633	1528	1700	1800					1388
	16UW	150	199	161	142	134	145	150					235
	17UW	450	599	544	494	510	495	485					414
	18UW	399	556	557	500	496	510	550					397
	19UW	200	212	251	248	217	250	258					223
	20UW	300	341	335	320	318	325	340					306
	21UW	99	102	116	102	118	95	115					109
	Date	7/3/96	7/30/96	8/15/96	8/27/96	9/25/96	10/22/96	11/22/96					Avg.
DEEP	2IW	325	360	455	326	327	340	450					336
	15IW	400	482	520	490	559	510	200					465
	16IW	299	333	336	330	303	360	340					296
	17IW	295	316	309	290	297	295	310					280
	18IW	NMD	NMD	NMD	NMD	NMD	NMD	NMD					271
	19IW	150	192	227	187	199	196	189					194
	20IW	298	274	455	244	265	250	290					390
	21IW	NMD	NMD	NMD	NMD	NMD	NMD	NMD					312

NM: not measured
NI: well not installed
NMD: not measured due to dye injection
NME: not measured due to equipment failure

Table 4-8: UVB Air Parameters, Site 69, MCB Camp Lejeune								
Date	Neg.Pressure (mbars)	Influent (acfm)	Effluent (acfm)	Air:Water Ratio*	Temperature		Influent RH (%)	Effluent RH (%)
					Influent (°F)	Effluent (°F)		
3/14/96	45	11	84	4	69.2	78.5	26.8	41.3
3/22/96	56	23	62	8	48.4	70.0	34.6	68.8
4/5/96	45	71	110	26	72.3	91.6	41.2	43.8
4/11/96	46	82	95	30	61.0	100.0	28.0	25.3
4/25/96	55	87	86	32	67.0	103.0	40.0	26.0
5/2/96	55	99	94	36	74.8	109.9	44.8	24.0
5/10/96	55	104	101	38	85.3	118.2	52.7	24.4
5/15/96	55	123	205	45	63.0	97.7	50.6	30.2
5/21/96	55	96	117	35	83.5	118.4	65.5	27.2
5/31/96	55	115	186	42	66.7	101.8	42.0	29.2
6/5/96	55	115	139	42	81.1	114.8	65.3	27.3
6/12/96	55	100	121	36	80.4	114.0	78.5	31.6
6/19/96	55	75	185	27	77.4	91.0	91.1	46.7
7/3/96	54	96	151	35	76.5	111.8	85.9	34.3
8/15/96	53	85	179	31	76.0	113.3	70.1	30.3
8/27/96	56	95	120	35	82.0	114.0	72.0	31.1
9/30/96	55	98	229	36	85.7	116.3	40.6	38.7
10/22/96	55	87	129	32	73.0	108.1	74.1	32.0
11/14/96	56	84	150	31	58.5	92.8	62.4	36.2

** Based on a measured flow rate of 20 gp, and influent air flow*

Table 4-9: Groundwater Levels (cm) in KGB Monitoring Wells, Site 69, MCB Camp Lejeune											
Location	Date	Elevation	Elevation From	Elevation From	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96
	Well ID	TOC (ft)	Top Of KGB (ft)	Top Of KGB (cm)	Depth from Top of KGB Flange (cm)						
	22A	38.59	1.09	33.22	82.28		109.38	121.35	94.48	111.58	129.58
SHALLOW	23A	38.52	1.02	31.09	95.21		102.41	101.92	89.31	106.41	124.71
	24A	38.22	0.72	21.95	92.55		109.15	116.21	96.95	113.95	131.05
	25A	38.83	1.33	40.54	96.66		109.16	121.62	95.06	111.26	140.86
	KGB	37.50	0.00	0.00							
	22B	38.46	0.96	29.26	106.24		114.34	105.38	92.34	114.04	124.94
DEEP	23B	38.27	0.77	23.47	95.53		144.73	NM	131.03	146.93	180.43
	24B	38.02	0.52	15.85	121.75		108.85	183.60	129.25	144.15	168.25
	25B	38.28	0.78	23.77	93.53		107.63	NM	94.23	110.93	126.53

NM: not measured
NMD: not measured due to dye injection

Table 4-9: Groundwater Levels (cm) in KGB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Date	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96	6/12/96	6/19/96	7/3/96	7/30/96	8/15/96	8/27/96	9/25/96	10/22/96
	Well ID	Depth from Top of KGB Flange (cm)													
	22A	131.98	132.28	144.48	153.28	162.18	171.88	167.28	179.18	196.38	95.71	99.08	118.28	102.08	107.90
SHALLOW	23A	128.01	125.31	140.51	151.81	158.21	170.11	162.61	177.61	191.41	90.83	92.31	114.01	98.51	103.94
	24A	139.55	131.95	146.65	164.55	165.85	177.05	170.45	183.65	198.95	98.45	96.31	118.55	104.75	110.64
	25A	134.76	142.66	151.46	155.76	164.56	178.26	171.46	186.96	202.96	98.14	103.36	121.16	156.46	109.12
	22B	130.44	127.74	142.04	153.64	160.94	171.04	166.74	178.04	194.54	94.79	95.44	116.84	100.14	105.46
DEEP	23B	172.53	190.83	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
	24B	167.95	180.45	185.05	192.65	195.05	210.35	200.95	222.15	240.55	123.14	125.85	145.15	130.35	135.03
	25B	133.23	129.83	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD

NM: not measured
NMD: not measured due to dye injection

Table 4-9: Groundwater Levels (cm) in KGB Monitoring Wells, Site 69, MCB Camp Lejeune												
Location	Date	11/22/96									Avg.Off	Avg. On
	Well ID	Depth from Top of KGB Flange (cm)										
	22A	154.58									104.34	138.32
SHALLOW	23A	133.01									99.85	134.07
	24A	138.15									105.97	142.75
	25A	162.16									109.15	145.10
	22B	134.64									108.65	135.76
DEEP	23B	NMD									120.13	181.26
	24B	199.45									138.07	178.87
	25B	NMD									100.58	129.86

NM: not measured
NMD: not measured due to dye injection

Table 4-10: Dissolved Oxygen (ppm) in KGB Monitoring Wells, Site 69, MCB Camp Lejeune

	Date	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96	6/12/96	6/19/96
Location	**Well ID**															
	22A	NM	NM	0.80	NM	0.55	0.35	0.35	0.15	0.37	0.33	1.08	0.18	0.20	0.16	0.18
SHALLOW	**23A**	NM	NM	0.15	NM	0.40	0.15	0.20	0.13	0.18	0.20	0.60	0.26	0.20	0.15	0.20
	24A	NM	NM	0.20	NM	0.55	0.15	0.20	0.11	0.14	0.16	1.65	0.15	0.11	0.18	0.19
	25A	NM	NM	0.20	NM	0.75	0.30	0.30	0.16	0.20	0.13	NM	0.13	0.15	0.15	0.23
	Date	**2/21/96**	**3/6/96**	**3/14/96**	**3/21/96**	**4/5/96**	**4/11/96**	**4/19/96**	**4/25/96**	**5/2/96**	**5/15/96**	**5/22/96**	**5/31/96**	**6/6/96**	**6/12/96**	**6/19/96**
	22B	NM	NM	2.10	NM	0.55	0.30	0.20	0.10	0.21	0.15	0.43	0.15	0.18	0.18	0.19
DEEP	**23B**	NM	NM	0.53	NM	0.80	0.45	0.25	0.13	0.28	NMD	NMD	NMD	NMD	NMD	NMD
	24B	NM	NM	0.15	NM	0.65	0.20	0.20	0.13	0.15	0.15	2.45	0.18	0.25	0.18	0.20
	25B	NM	NM	0.25	NM	0.50	0.40	0.15	0.15	0.40	NMD	NMD	NMD	NMD	NMD	NMD

NM: not measured
NMD: not measured due to dye injection
NME: not measured due to equipment failure

Table 4-10: Dissolved Oxygen (ppm) in KGB Monitoring Wells, Site 69, MCB Camp Lejeune

	Date	7/3/96	7/30/96	8/15/96	8/27/96	9/25/96	10/22/96	11/22/96			AVG. OFF	AVG. ON	AVG.
Location	**Well ID**												
	22A	0.31	0.45	1.00	0.36	NME	0.90	0.35			**0.18**	**0.50**	**0.45**
SHALLOW	**23A**	0.25	0.20	0.50	0.33	NME	0.75	0.40			**0.23**	**0.33**	**0.29**
	24A	0.20	0.15	0.75	0.75	NME	0.30	0.30			**0.17**	**0.42**	**0.35**
	25A	0.16	0.50	0.95	0.40	NME	1.10	0.50			**0.18**	**0.45**	**0.37**
	Date	**7/3/96**	**7/30/96**	**8/15/96**	**8/27/96**	**9/25/96**	**10/22/96**	**11/22/96**					
	22B	0.55	0.45	0.80	0.50	NME	1.50	0.75			**0.17**	**0.50**	**0.52**
DEEP	**23B**	NMD	NMD	NMD	NMD	NMD	NMD	NMD			**0.13**	**0.38**	**0.41**
	24B	0.18	1.40	0.50	0.43	NME	1.20	0.28			**0.19**	**0.61**	**0.49**
	25B	NMD	NMD	NMD	NMD	NMD	NMD	NMD			**0.15**	**0.32**	**0.31**

NM: not measured
NMD: not measured due to dye injection
NME: not measured due to equipment failure

Table 4-11: Groundwater Temperatures (°F) in KGB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Date	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96
	Well ID													
	22A	NM	NM	52.30	NM	55.40	53.80	54.10	55.90	57.40	60.40	59.40	64.00	64.20
SHALLOW	23A	NM	NM	51.60	NM	53.60	52.70	53.80	55.90	58.60	59.90	61.70	66.00	62.60
	24A	NM	NM	53.40	NM	54.50	53.00	53.60	56.30	57.20	58.80	59.90	63.10	61.70
	25A	NM	NM	53.20	NM	55.80	53.60	54.10	55.90	56.70	57.70	NM	61.70	61.70
	Date	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96
	22B	NM	NM	51.60	NM	53.60	53.20	53.60	55.40	57.70	59.40	59.00	64.00	62.40
DEEP	23B	NM	NM	53.80	NM	57.60	53.20	54.10	55.00	58.10	NMD	NMD	NMD	NMD
	24B	NM	NM	54.50	NM	55.00	53.60	53.80	55.00	56.80	57.70	59.20	62.20	62.40
	25B	NM	NM	53.20	NM	53.60	53.20	54.10	55.80	57.00	NMD	NMD	NMD	NMD

NM: not measured NM NM

NMD: not measured due to dye injection

Table 4-11: Groundwater Temperatures (^oF) in KGB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Date	6/12/96	6/19/96	7/3/96	7/30/96	8/15/96	8/27/96	9/25/96	10/22/96	11/22/96
	Well ID									
	22A	62.80	69.40	67.80	67.80	71.60	73.22	75.20	68.54	65.30
SHALLOW	23A	64.60	66.60	68.50	73.00	74.30	71.96	74.66	68.36	64.40
	24A	65.10	67.10	65.30	69.60	72.50	71.78	75.20	68.00	65.30
	25A	62.20	63.50	66.00	66.00	71.20	71.42	74.84	68.00	65.30
	Date	6/12/96	6/19/96	7/3/96	7/30/96	8/15/96	8/27/96	9/25/96	10/22/96	11/22/96
	22B	63.70	69.80	69.10	72.30	73.40	73.04	74.84	68.18	64.04
DEEP	23B	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD
	24B	62.20	66.00	63.00	65.50	71.60	71.96	74.30	67.10	66.20
	25B	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD

NM: not measured
NMD: not measured due to dye injection

Table 4-12: Groundwater pH in KGB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Date	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96	6/12/96	6/19/96
	Well ID															
	22A	5.26	NM	5.00	NM	4.67	4.72	4.68	4.76	4.91	4.65	5.22	NM	5.28	4.66	4.68
SHALLOW	23A	5.73	NM	5.85	NM	5.42	5.59	5.27	5.20	5.54	5.56	5.87	NM	5.69	5.49	NM
	24A	6.24	NM	6.21	NM	5.62	5.94	5.56	5.56	5.90	6.08	6.47	NM	6.13	5.88	5.75
	25A	6.55	NM	6.45	NM	5.97	6.10	5.83	5.55	5.70	6.13	6.37	NM	5.92	6.00	5.67
	Date	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96	6/12/96	6/19/96
	22B	4.86	NM	4.52	NM	3.86	4.27	4.26	4.31	4.52	4.35	4.75	NM	4.79	4.38	4.38
DEEP	23B	4.88	NM	4.81	NM	4.32	4.51	4.41	4.47	4.84	NMD	NMD	NMD	NMD	NMD	NMD
	24B	5.50	NM	5.80	NM	5.40	5.60	5.26	5.26	5.65	5.79	6.03	NM	5.72	5.65	5.39
	25B	6.37	NM	6.80	NM	6.24	6.29	5.73	5.68	6.04	NMD	NMD	NMD	NMD	NMD	NMD

NM: not measured
NMD: not measured due to dye injection

Table 4-12: Groundwater pH in KGB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Date	7/3/96	7/30/96	8/15/96	8/27/96	9/25/96	10/22/96	11/22/96				
	Well ID											
	22A	4.92	5.12	5.08	4.74	6.09	5.34	5.43				
SHALLOW	23A	5.53	5.70	5.55	5.46	5.55	5.73	6.24				
	24A	5.80	6.05	6.48	6.12	5.90	5.77	6.24				
	25A	5.87	6.55	6.52	6.09	6.09	6.29	7.00				
	Date	7/3/96	7/30/96	8/15/96	8/27/96	9/25/96	10/22/96	11/22/96				
	22B	4.33	4.55	4.57	4.32	4.93	5.48	5.65				
DEEP	23B	NMD	NMD	NMD	NMD	NMD	NMD	NMD				
	24B	5.51	6.07	6.14	5.91	5.89	5.47	6.22				
	25B	NMD	NMD	NMD	NMD	NMD	NMD	NMD				

NM: not measured
NMD: not measured due to dye injection

Table 4-13: Groundwater Conductivity (umhos/sec) in KGB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Date / Well ID	2/21/96	3/6/96	3/14/96	3/21/96	4/5/96	4/11/96	4/19/96	4/25/96	5/2/96	5/15/96	5/22/96	5/31/96	6/6/96
	22A	160	NM	140	NM	169	170	176	175	164	156	163	NM	123
SHALLOW	23A	220	NM	260	NM	215	220	181	181	168	151	203	NM	118
	24A	560	NM	410	NM	392	410	389	378	383	392	507	NM	336
	25A	410	NM	490	NM	445	450	417	320	282	367	414	NM	258
	22B	170	NM	160	NM	233	180	188	188	183	186	429	NM	124
DEEP	23B	180	NM	170	NM	176	180	181	182	159	NMD	NMD	NMD	NMD
	24B	200	NM	220	NM	220	240	225	217	221	231	227	NM	162
	25B	360	NM	480	NM	488	410	350	331	335	NMD	NMD	NMD	NMD

NM: not measured
NMD: not measured due to dye injection

Table 4-13: Groundwater Conductivity (µmhos/sec) in KGB Monitoring Wells, Site 69, MCB Camp Lejeune

Location	Date	6/12/96	6/19/96	7/3/96	7/30/96	8/15/96	8/27/96	9/25/96	10/22/96	11/22/96			
	Well ID												
	22A	111	106	150	173	172	162	420	253	234			
SHALLOW	23A	108	NM	150	255	162	134	167	186	231			
	24A	297	275	400	416	572	520	533	462	575			
	25A	306	332	451	597	467	460	544	390	684			
	22B	125	138	155	193	201	187	263	241	307			
DEEP	23B	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD			
	24B	161	167	249	138	343	330	349	223	420			
	25B	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD	NMD			

NM: not measured
NMD: not measured due to dye injection

Table 4-14: KGB Air Parameters, Site 69, MCB Camp Lejeune							
Date	Pressure (psig)	Influent (acfm)	Effluent (acfm)	Bleed@ (acfm)	True Effluent* (acfm)	Effluent Temp*. (°F)	Effluent RH* (%)
4/5/96	3.5	1.5	186.0	82.5	103.5	88.3	27.7
4/11/96	4.0	1.5	120.0	50.5	69.5	78.5	18.5
4/25/96	4.0	1.5	22.6	18.2	4.4	97.5	18.2
5/2/96	5.0	1.6	55.5	28.0	27.5	100.7	21.3
5/10/96	6.0	2.2	50.5	28.7	21.8	113.1	25.9
5/15/96	7.0	2.5	64.0	34.8	29.2	82.4	31.5
5/21/96	5.0	1.8	64.0	27.7	36.3	107.7	33.5
5/31/96	7.0	2.5	71.5	41.4	30.1	87.3	28.7
6/5/96	7.0	2.5	69.5	28.5	41.0	105.3	29.5
6/12/96	7.0	2.2	65.5	30.0	35.5	104.3	38.5
6/19/96	4.5	2.8	57.5	32.9	24.6	103.5	45.7
7/3/96	5.0	2.6	97.0	35.1	61.9	100.2	48.1
8/15/96	5.2	2.1	80.5	46.5	34.0	98.2	40.9
8/27/96	18.0	1.7	40.5	16.8	23.7	110.0	32.6
9/30/96	28.0	1.0	33.3	25.5	7.8	107.5	24.7
10/22/96	30.0	1.0	35.4	20.0	15.4	101.8	30.6
11/14/96	20.0	2.0	111.0	39.3	71.7	79.3	20.2
11/26/96	12.0	2.0	102.0	39.2	62.8	90.8	31.3
Average		**1.9**	**73.7**	**34.8**	**38.9**		

@ atmospheric air is bled into the blower to reduce negative pressure effects
* measured after the blower, but before the GAC

Table 4-15: Movement of Fluorescein in UVB Monitoring Wells

Date Injected: 5/10/95	
Well Injected: 18IW	

Time After Dye Injection		Well ID															
Date	**Days**	**UVB**	**02IW**	**15IW**	**15UW**	**16IW**	**16UW**	**17IW**	**17UW**	**18IW**	**18UW**	**19IW**	**19UW**	**20IW**	**20UW**	**21IW**	**21UW**
5/10/96	0	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	NS	ND
5/22/96	12	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	NS	ND
6/5/96	27	ND	ND	1.07	ND	ND	ND	NQ*	ND	NS	ND	0.63	1.19	1.52	ND	NS	ND
6/18/96	40	2.09	ND	ND	0.69	NQ*	NQ*	0.54	7.86	NS	0.61	0.52	NQ*	0.86	0.51	NS	ND
7/2/96	55	4.42	ND	ND	ND	0.86	NQ*	0.39	3.36	NS	1.16	0.69	NQ*	0.69	ND	NS	ND
System OFF 7/12/96 to 7/26/96 (Hurricane Bertha)																	
7/30/96	83	ND	NQ*	ND	NQ*	1.28	ND	0.42	0.86	NS	ND	0.61	ND	1.76	ND	NS	ND
System OFF 8/1/96 to 8/13/96 (Hurricane Bertha)																	
8/15/96	100	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	NS	ND
8/26/96	111	ND	ND	ND	ND	0.36	ND	ND	ND	NS	ND	ND	ND	ND	ND	NS	ND
System OFF 9/5/96 to 9/18/96 (Hurricane Fran)																	
9/25/96	140	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	NS	ND
10/7/96	152	ND	ND	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	NS	ND

All concentrations are reported in ppb, NQ: flourescent peak detected but not quantified*

Table 4-16: Variation in Concentrations of Target VOCs in UVB Monitoring Wells
Site 69, MCB Camp Lejeune

Sampling Event	Time Zero																			
Date Sampled	2/23/96				3/8/96								4/10/96		3/8/96		2/23/96			
Well I.D.	UVB-S	UVB-D	15UW	15IW	16UW	16IW	17UW	17IW	18UW	18IW	19UW	19IW	20UW	20IW	21UW	21IW	2 IW	Avg	shallow Avg UW	deep Avg IW
Units	μg/L																			
Compound																				
Vinyl Chloride	NS	2	5900	380	2	2	1600	0.7	280	2	2	2	5	3	1	2	0.5	512	1113	44
1,2-DCE (total)	NS	110	170000	3600	1	2	21000	26	3900	4	26	9	320	130	6	0.3	25	12447	27893	434
TCE	NS	1	830	1100	1	0.3	1	0.2	19	0.4	6	18	30	1	0.5	1	0.9	126	127	125
PCE	NS	1	1	1	1	1	1	1	1	1	1	1	0.4	1	1	1	1	1	1	1
1,1,2,2-TCA	NS	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total COIs per Well	**0**	**115**	**176732**	**5082**	**6**	**6.3**	**22603**	**28.9**	**4201**	**8.4**	**36**	**31**	**356.4**	**136**	**9.5**	**5.3**	**28.4**			
Total Avg COIs																		**13087**	**29135**	**605**

Sampling Event	Two Months																			
Date Sampled	5/22/96									5/30/96	5/22/96						5/30/96			
Well I.D.	UVB-S	UVB-D	15UW	15IW	16UW	16IW	17UW	17IW	18UW	18IW	19UW	19IW	20UW	20IW	21UW	21IW	2 IW	Avg	shallow Avg UW	deep Avg IW
Units	μg/L																			
Compound																				
Vinyl Chloride	1	1	3800	240	1	1	600	1	1	1	1	1	4	7	14	1	1	275	553	28
1,2-DCE (total)	1	1	140000	3400	1	3	16000	73	7	1	72	11	280	560	190	1	24	9449	19569	453
TCE	1	1	1300	870	1	1	47	1	1	1	4	8	19	12	27	1	1	135	175	100
PCE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1,1,2,2-TCA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total COIs per Well	**5**	**5**	**145102**	**4512**	**5**	**7**	**16649**	**77**	**11**	**5**	**79**	**22**	**305**	**581**	**233**	**5**	**28**			
Total Avg COIs																		**9861**	**20299**	**582**

Table 4-16 (continued): Variation in Concentrations of Target VOCs in UVB Monitoring Wells
Site 69, MCB Camp Lejeune

Sampling Event	Four Months																			
Date Sampled	7/30/96																		shallow	deep
Well I.D.	UVB-S	UVB-D	15UW	15IW	16UW	16IW	17UW	17IW	18UW	18IW	19UW	19IW	20UW	20IW	21UW	21IW	2 IW	Avg	Avg UW	Avg IW
Units	µg/L																			
Compound																				
Vinyl Chloride	1	1	6300	310	1	1	420	1	1	1	1	1	1	1	10	1	1	415	842	35
1,2-DCE (total)	1	1	150000	4400	1	2	11000	110	2	1	71	4	110	45	110	1	17	9757	20162	509
TCE	1	1	2200	860	1	1	36	1	1	1	6	3	11	1	20	1	1	185	285	97
PCE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1,1,2,2-TCA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total COIs per Well	**5**	**5**	**158502**	**5572**	**5**	**6**	**11458**	**114**	**6**	**5**	**80**	**10**	**124**	**49**	**142**	**5**	**21**			
Total Avg COIs																		**10359**	**21290**	**643**

Sampling Event	Seven Months																			
Date Sampled	10/23/96																		shallow	deep
Well I.D.	UVB-S	UVB-D	15UW	15IW	16UW	16IW	17UW	17IW	18UW	18IW	19UW	19IW	20UW	20IW	21UW	21IW	2 IW	Avg	Avg UW	Avg IW
Units	µg/L																			
Compound																				
Vinyl Chloride	1	1	5000	430	1	1	590	3	1	1	1	1	1	7	31	6	0.5	357	703	50
1,2-DCE (total)	1	1	160000	5600	1	0.4	11000	220	0.9	1	65	26	82	250	250	41	20	10445	21425	684
TCE	1	1	1800	710	1	1	1	1	1	1	8	23	7	4	28	7	0.5	153	231	83
PCE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1,1,2,2-TCA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total COIs per Well	**5**	**5**	**166802**	**6742**	**5**	**4.4**	**11593**	**226**	**4.9**	**5**	**76**	**52**	**92**	**263**	**311**	**56**	**23**			
Total Avg COIs																		**10957**	**22361**	**820**

Table 4-16 (continued): Variation in Concentrations of Target VOCs in UVB Monitoring Wells
Site 69, MCB Camp Lejeune

Sampling Event	Nine Months																			
Date Sampled	1/3/97																		shallow	deep
Well I.D.	UVB-S	UVB-D	15UW	15IW	16UW	16IW	17UW	17IW	18UW	18IW	19UW	19IW	20UW	20IW	21UW	21IW	2 IW	Avg	Avg UW	Avg IW
Units	µg/L																			
Compound																				
Vinyl Chloride	1	1	7100	410	1	1	1000	1	10	2	1	1	1	1	43	4	1	505	1020	47
1,2-DCE (total)	1	1	170000	4700	1	1	14000	48	200	1	63	8	30	36	360	28	18	11147	23082	538
TCE	1	1	1700	530	1	1	1	1	1	1	7	10	2	1	44	4	0.5	136	220	61
PCE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1,1,2,2-TCA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Total COIs per Well	**5**	**5**	**178802**	**5642**	**5**	**5**	**15003**	**52**	**213**	**6**	**73**	**21**	**35**	**40**	**449**	**38**	**21.5**			
Total Avg COIs																		**11789**	**24323**	**648**

Note: values reported as "1" are detection limits for the compounds

Table 4-17: Concentration of Target VOCs in UVB Off-Gas (µg/L)												
Date Sampled	**4/5/96**				**5/23/96**				**10/22/96**		
	Influent	**Effluent**	**Difference**		**Influent**	**Effluent**	**Difference**		**Influent**	**Effluent**	**Difference**
Vinyl Chloride	0	0	0		0	0	0		0	0	0
trans-1,2-Dichloroethene	0	0	0		0	0	0		0	0	0
cis-1,2-Dichloroethene	0.62	0	0.62		0	0	0		0	0	0
Trichloroethene	0.26	0	0.26		0.58	0	0.58		0	0	0
1,1,2,2-Tetrachloroethane	0	0	0		0	0	0		0	0	0
Tetrachloroethene	0.28	0	0.28		3.22	0.34	2.88		0	0	0
Total Target CHCs	**1.16**	**0**	**1.16**		**3.8**	**0.34**	**3.46**		**0**	**0**	**0**
Effluent Air Flow (L/min)	**3113**				**3311**				**3205**		
Target VOCs Mass Flow (g/day)	**5.2**				**18.1**				**0**		

Table 4-18: Dilution Calculation for UVB Circulation Cell, Site 69 MCB Camp Lejeune

Zone	52 ft Radius	Estimated Cell
Stagnation Point, S	52	184
Bottom Capture, Bb (ft)	138	492
Top Capture, Bt (ft)	89	318
Saturated Thickness, H (ft)	35	35
Porosity, ♏	0.20	0.20
Volume (cubic feet)	43,270	546,331
Volume (L)	1,224,528	15,461,166
Concentration (ppb)	4,475	354

Table 4-19: Surveyed Elevations of UVB Monitoring Wells and UVB Screens Site 69, MCB Camp Lejeune				
Well ID	Elevation From Top Of UVB (cm)	Depth from TOC (cm)	Depth from UVB Flange(cm)	Depth from UVB Flange(ft)
Top of Top UVB Screen	-1167.38	NA	1167.38	38.29
15UW	-107.59	1148.00	1255.59	41.18
16UW	-29.87	1433.00	1462.87	47.98
17UW	-31.09	1473.00	1504.09	49.33
18UW	-57.91	1382.00	1439.91	47.23
19UW	-55.78	1450.00	1505.78	49.39
20UW	-95.40	1488.00	1583.40	51.94
21UW	-59.13	1422.00	1481.13	48.58
Bottom of Top UVB Screen	-2107.69	NA	2107.69	69.13
2IW	-122.53	1550	1672.53	54.86
15IW	-105.16	1859	1964.16	64.42
16IW	-17.68	2261	2278.68	74.74
17IW	-48.46	2323	2371.46	77.78
18IW	-56.69	2328	2384.69	78.22
19IW	-60.35	2311	2371.35	77.78
20IW	-91.14	2348	2439.14	80.00
21IW	-58.22	2358	2416.22	79.25

Table 4-20: Variation in Concentrations of Target VOCs in KGB Monitoring Wells
Site 69, MCB Camp Lejeune

Sampling Event	Time Zero											
Date Sampled	2/23/96										shallow	deep
Well I.D.	22A	22B	23A	23B	24A	24B	25A	25B	KGB	Avg.	Avg. A	Avg. B
Units of Measurement	µg/L											
Compound												
Vinyl Chloride	390	840	620	790	3900	750	580	330	190	932	1373	678
1,2-Dichloroethene (total)	2700	4500	1100	14000	7900	3300	4500	2100	3700	4867	4050	5975
Trichloroethene	530	240	130	12000	1100	990	2300	200	580	2008	1015	3358
Tetrachloroethylene	86	21	12	1100	250	80	340	12	250	239	172	303
1,1,2,2-Tetrachloroethane	6800	1200	1200	170000	250	9600	62000	2100	5500	28739	17563	45725
Total COIs per Well	**10506**	**6801**	**3062**	**197890**	**13400**	**14720**	**69720**	**4742**	**10220**			
Total Avg COIs										36785	24172	56038

Sampling Event	Two Months											
Date Sampled	5/30/96										shallow	deep
Well I.D.	22A	22B	23A	23B	24A	24B	25A	25B	KGB	Avg.	Avg. A	Avg. B
Units of Measurement	µg/L											
Compound												
Vinyl Chloride	380	1000	210	450	1900	250	250	120	NS	570	685	455
1,2-Dichloroethene (total)	3000	4500	51	4600	7800	13000	17000	690	NS	6330	6963	5698
Trichloroethene	540	240	24	4300	1800	2400	1700	42	NS	1381	1016	1746
Tetrachloroethylene	120	50	10	270	100	250	250	5	NS	132	120	144
1,1,2,2-Tetrachloroethane	6400	720	45	36000	2800	19000	27000	460	NS	11553	9061	14045
Total COI VOCs per Well	**10440**	**6510**	**340**	**45620**	**14400**	**34900**	**46200**	**1317**				
Total Avg COIs										19966	17845	22087

Table 4-20 (continued): Variation in Concentrations of Target VOCs in KGB Monitoring Wells
Site 69, MCB Camp Lejeune

Sampling Event	Four Months											
Date Sampled	7/30/96										shallow	deep
Well I.D.	22A	22B	23A	23B	24A	24B	25A	25B	KGB	Avg.	Avg. A	Avg. B
Units of Measurement	µg/L											
Compound												
Vinyl Chloride	410	1700	430	670	3100	630	590	270	NS	975	1133	818
1,2-Dichloroethene (total)	2300	8200	360	6200	8000	12000	24000	4700	NS	8220	8665	7775
Trichloroethene	370	350	25	4000	1400	1400	3000	210	NS	1344	1199	1490
Tetrachloroethylene	64	24	8	370	50	110	390	1	NS	127	128	126
1,1,2,2-Tetrachloroethane	5100	640	11	40000	85	14000	20000	510	NS	10043	6299	13788
Total COI VOCs per Well	8244	10914	834	51240	12635	28140	47980	5691				
Total Avg COIs										20710	17423	23996

Sampling Event	Seven Months											
Date Sampled	10/23/96										shallow	deep
Well I.D.	22A	22B	23A	23B	24A	24B	25A	25B	KGB	Avg.	Avg. A	Avg. B
Units of Measurement	µg/L											
Compound												
Vinyl Chloride	420	590	370	3400	3600	630	240	140	NS	1174	1158	1190
1,2-Dichloroethene (total)	2400	3200	38	110000	6900	12000	16000	1300	NS	18980	6335	31625
Trichloroethene	340	97	7	4400	54	430	890	74	NS	787	323	1250
Tetrachloroethylene	35	1	3	1	1	1	69	8	NS	15	27	3
1,1,2,2-Tetrachloroethane	4300	1	1	52000	1	6500	19000	360	NS	10270	5826	14715
Total COI VOCs per Well	7495	3889	419	169801	10556	19561	36199	1882				
Total Avg COIs										31225	13667	48783

Table 4-20 (continued): Variation in Concentrations of Target VOCs in KGB Monitoring Wells Site 69, MCB Camp Lejeune												
Sampling Event	Nine Months											
Date Sampled	1/3/97										shallow	deep
Well I.D.	22A	22B	23A	23B	24A	24B	25A	25B	KGB	Avg.	Avg. A	Avg. B
Units of Measurement	µg/L											
Compound												
Vinyl Chloride	620	2300	1300	590	5900	1100	820	260	NS	1611	2160	1063
1,2-Dichloroethene (total)	2700	6400	1100	3700	8500	8700	9200	630	NS	5116	5375	4858
Trichloroethene	310	220	86	2500	290	1100	1900	52	NS	807	647	968
Tetrachloroethylene	50	12	6	210	1	69	240	3	NS	74	74	74
1,1,2,2-Tetrachloroethane	3700	1	1	30000	190	11000	42000	470	NS	10920	11473	10368
Total COI VOCs per Well	7380	8933	2493	37000	14881	21969	54160	1415				
Total Avg COIs										18529	19729	17329

Note: values reported as "1" are detection limits for the compounds

Table 4-21: Concentration of Target VOCs in KGB Off-Gas (μg/L)

Date Sampled	4/5/96				5/23/96				10/22/96		
	Influent	Effluent	Difference		Influent	Effluent	Difference		Influent	Effluent	Difference
Vinyl Chloride	0.19	0	0.19		0.14	0	0.14		40.2	1.38	38.82
cis-1,2-Dichloroethene	0	0	0		0.5	0	0.5		107	0.5	106.5
trans-1,2-Dichloroethene	0	0	0		0.51	0	0.51		48.5	0.5	48
Trichloroethene	0	0	0		0.51	0.17	0.34		52	0	52
1,1,2,2-Tetrachloroethane	0	0	0		0.5	0	0.5		421	0.5	420.5
Tetrachloroethene	0.16	0	0.16		0	0	0		3.95	0.5	3.45
Total Target CHCs	**0.35**	**0**	**0.35**		**2.16**	**0.17**	**1.99**		**672.65**	**3.38**	**669.27**
Effluent Air Flow (L/min)	**5264**				**1811**				**57***		
Target VOCs Mass Flow (g/day)	**2.65**				**5.60**				**55.21***		

Table 4-21(continued): Concentration of Target VOCs in KGB Off-Gas (μg/L)

Date Sampled	1/3/97		
	Influent	Effluent	Difference
Vinyl Chloride	34.1	2.35	31.75
cis-1,2-Dichloroethene	39.1	0	39.1
trans-1,2-Dichloroethene	21.4	0	21.4
Trichloroethene	18.8	0	18.8
1,1,2,2-Tetrachloroethane	130	0	130
Tetrachloroethene	1.21	0	1.21
Total Target CHCs	**244.61**	**2.35**	**242.26**
Effluent Air Flow (L/min)	**57***		
Target VOCs Mass Flow (g/day)	**19.95***		

** Based on samples collected with the blower OFF*

Table 4-22: Concentration of Inorganic Constituents in Groundwater in UVB Monitoring Well 69GW-15UW (mg/L) Site 69, MCB Camp Lejeune

Parameter	Date Sampled / Method	2/23/96	10/26/96
Magnesium	SW846-6010	20.30	30.00
Manganese	SW846-6010	0.60	0.98
Sodium	SW846-6010	83.80	54.20
Potassium	SW846-6010	8.48	6.91
Calcium	SW846-6010	127.00	127.00
Chloride	SM407B	737.00	470.00
Sulfate	EPA375.3	ND	4.58
Total suspended Solids	SM209C	137.00	11.00
Total Dissolved Solids	SM209B	959.00	1475.00
Bicarbonate	SM	50.00	20.00
Iron (dissolved)	SW846-6010	22.60	71.80
Sulfide (dissolved)	SM	ND	ND
Carbon Dioxide (dissolved)	SM	35.20	158.00
Ryznar Index		**8.79**	**9.84**

Table 7-1: Design Parameters for the Phase II UVB-400 Site 69, MCB Camp Lejeune		
PARAMETER	VALUE	UNITS
Gradient, I	0.016	NA
Horizontal hydraulic conductivity, Kh	4.07E-06	m/s
Velocity, v	6.51E-08	m/s
Height of saturated zone being treate	10.98	m/s
Height of top screen, aT	1.98	m
Height of bottom screen, aB	1.3	m
Recirculation flow, Q	1.69	m^3/hr
a/H	0.15	NA
Q/(h2*v)	59.8	NA
For an anisotropy ratio of (Kh:Kv) 10		
Stagnation point, S	36.8	m
Maximum well spacing, D	77.7	m
Capture zone top width, Bt	40	m
Capture zone bottom width, Bb	106.4	m
Captured Flow, Qo	0.23	m^3/hr
Capture zone cross sectional area, A	976	m^2
Percentage recirculation	89%	NA

Table 8-1: KGB Operating Parameters: Phase II Treatability Study, Site 69, MCB Camp Lejeune				
Date	**Influent Air Flow, scfm**	**Effluent Air Flow, scfm**	**Bleed-in Air Flow, scfm**	**Compressor Pressure psig**
7/2/97	6.0	90.0	86.0	4.0
7/16/97	6.0	91.0	73.0	7.5
8/26/97	6.2	124.0	87.0	6.0
9/24/98	6.4	136.0	92.0	7.0
10/22/97	KGB System Shut Down			

Table 8-2: UVB 400 Operating Parameters: Phase II Treatability Study, Site 69, MCB Camp Lejeune				
Date	**Influent Air Flow, m^3/hr**	**Effluent Air Flow, m^3/hr**	**Vacuum mbar**	**Pumping Rate m^3/hr**
7/31/97	335.0	271.0	46.0	3.4
8/12/97	372.0	284.0	49.0	1.8
8/26/97	243.0	325.0	45.0	1.8
9/24/98	352.0	373.0	45.0	1.8
10/22/97	329.0	424.0	50.0	1.8
11/10/97	306.0	417.0	52.5	1.8
12/16/97	324.0	325.0	52.5	1.8

Table 8-3: Monitoring Well 17 IW Pressure Transducer Test: Phase II Treatability Study, Site 69, MCB Camp Lejeune				
Blower ON	**Blower OFF**	**Pump ON**	**Pump OFF**	**Pressure Head in feet of water**
	X		X	1.4256
	X	9:00 AM		1.4153
9:10 AM		9:10 AM		1.3514
	9:20 AM		9:20 AM	1.3341
	9:40 AM		9:40 AM	1.3772
10:00 AM		10:00 AM		1.3497
10:10 AM		10:10 AM		1.3169
11:30 AM		11:30 AM		1.3169
Note: Well 17 IW is 57 ft from the UVB. The transducer was held at 32 ft below TOC.				

Table 8-4: Monitoring Well 17 UW Pressure Transducer Test: Phase II Treatability Study, Site 69, MCB Camp Lejeune				
Blower ON	**Blower OFF**	**Pump ON**	**Pump OFF**	**Pressure Head in feet of water**
	X		X	1.6368
	X	9:00 AM		1.5887
9:10 AM		9:10 AM		1.5472
	9:20 AM		9:20 AM	1.5787
	9:40 AM		9:40 AM	1.6451
10:00 AM		10:00 AM		1.5837
10:10 AM		10:10 AM		1.5638
11:30 AM		11:30 AM		1.6103
Note: Well 17 UW is 51 ft from the UVB. The transducer was held at 32 ft below TOC. Test Conducted on 12/17/97.				

Table 8-5: Headspace Analysis for Groundwater Samples Collected from KGB Monitoring Wells: Phase II Treatability Study, Site 69, MCB Camp Lejeune

Date	Well	TCE	Unidentified VOCs	Total VOCs
7/2/97	22-A	8.5	29.6	38.1
	22-B	8.3	42.8	51.1
	23-B	1.5	24.1	25.6
	24-A	9.2	83.4	92.6
	24-B	17.0	94.0	111.0
	25-A	16.2	62.1	78.3
	KGB Well	**1.3**	**8.8**	10.1

Date	Well	TCE	Unidentified VOCs	Total VOCs
7/16/97	22-A	15.0	30.0	45.0
	22-B	12.7	49.7	62.4
	23-B	0.9	46.7	47.6
	24-A	18.3	94.7	113.0
	24-B	18.2	99.7	117.9
	25-A	21.0	47.8	68.8

All values are in ppmv

Table 8-6: KGB Off-gas Analysis for VOCs: Phase II Treatability Study, Site 69, MCB Camp Lejeune			
Date	TCE	Unidentified VOCs	Total VOCs
	All values are in ppmv		
7/2/97	0.99	2.91	3.9
7/16/97	0.49	1.31	1.8
9/24/97	0.04	0.25	0.29

Table 8-7: Headspace Analysis for Groundwater Samples Collected from UVB Monitoring Well MW15-IW:Phase II Treatability Study, Site 69, MCB Camp Lejeune							
Compound	7/2/97	8/26/97	9/24/97	10/22/97	11/10/97	12/16/97	% Change 7/2 to 11/10
	All Values in ppmv						
Vinyl Chloride	Coelution	13.93	12.66	11.65	11.94	15.08	-14.29
trans-1,2 DCE	8.07	5.44	4.99	4.53	4.45	4.84	-44.86
cis-1,2 DCE	31.49	27.94	24.70	29.23	22.79	27.70	-27.63
TCE	20.68	15.89	12.73	8.86	12.51	12.94	-39.51
Unidentified VOCs	8.01	2.80	1.41	1.43	1.80	1.83	-77.53
Total VOCs	**68.25**	**66.00**	**56.49**	**55.29**	**53.50**	**62.49**	**-21.61**

Table 8-8: Headspace Analysis for Groundwater Samples Collected from UVB Monitoring Well MW17-UW:Phase II Treatability Study, Site 69, MCB Camp Lejeune

Compound	7/2/97	8/26/97	9/24/97	10/22/97	11/10/97	12/16/97	% Change 7/2 to 11/10
	All Values in ppmv						
Vinyl Chloride	Coelution	11.58	10.05	12.50	11.72	13.42	1.20
trans-1,2 DCE	14.41	14.24	12.48	12.95	10.87	13.75	-24.57
cis-1,2 DCE	19.79	26.58	21.03	20.25	30.40	32.54	53.61
TCE	3.01	1.40	1.03	1.35	1.64	1.70	-45.52
Unidentified VOCs	5.37	1.70	0.72	1.51	1.95	1.31	-63.69
Total VOCs	**42.58**	**55.50**	**45.31**	**48.15**	**56.58**	**62.72**	**32.88**

Table 8-9: Headspace Analysis for Groundwater Samples Collected from UVB Monitoring Well MW17-IW:Phase II Treatability Study, Site 69, MCB Camp Lejeune							
	7/2/97	**8/26/97**	**9/24/97**	**10/22/97**	**11/10/97**	**12/16/97**	**% Change**
Compound	**All values in ppmv**						**7/2 to 11/10**
Vinyl Chloride	Coelution	2.59	1.55	3.34	1.48	1.75	-42.86
trans-1,2 DCE	4.32	0.17	0.19	1.16	0.21	0.10	-95.14
cis-1,2 DCE	3.60	0.14	0.16	0.82	0.16	0.37	-95.56
TCE	ND	ND	ND	ND	ND	0.03	NA
Unidentified VOCs	2.59	0.18	0.02	0.08	0.30	0.64	-88.42
Total VOCs	**10.51**	**3.08**	**1.92**	**5.56**	**2.16**	**2.89**	**-79.45**

Table 8-10: Headspace Analysis for Groundwater Samples Collected from UVB Monitoring Well MW20-UW:Phase II Treatability Study, Site 69, MCB Camp Lejeune

Compound	7/2/97	8/26/97	9/24/97	10/22/97	11/10/97	12/16/97	% Change 7/2 to 11/10
	All values in ppmv						
Vinyl Chloride	Coelution	0.61	0.99	1.31	0.94	2.72	54.01
trans-1,2 DCE	0.86	0.34	0.18	0.28	0.16	0.12	-81.4
cis-1,2 DCE	1.31	0.42	0.25	0.33	0.17	0.11	-87.02
TCE	0.42	0.02	0.01	0.01	0.01	ND	-97.62
Unidentified VOCs	1.23	1.09	0.09	0.66	0.76	0.61	-50.41
Total VOCs	**3.83**	**2.48**	**1.52**	**2.18**	**2.05**	**3.45**	**-46.48**

Table 8-11: Headspace Analysis for Groundwater Samples Collected from UVB Monitoring Well MW20-IW:Phase II Treatability Study, Site 69, MCB Camp Lejeune

Compound	7/2/97	8/26/97	9/24/97	10/22/97	11/10/97	12/16/97	% Change 7/2 to 11/10
	All values in ppmv						
Vinyl Chloride	Coelution	ND	ND	ND	ND	ND	NA
trans-1,2 DCE	0.88	0.14	0.26	0.37	0.11	0.20	-87.50
cis-1,2 DCE	1.59	0.17	0.19	0.41	0.16	0.14	-89.94
TCE	ND	ND	ND	ND	ND	ND	NA
Unidentified VOCs	0.82	0.06	0.20	0.03	ND	0.74	-100.00
Total VOCs	**3.29**	**0.37**	**0.65**	**0.84**	**0.27**	**1.08**	**-91.79**

Table 8-12: Headspace Analysis for Groundwater Samples Collected from UVB Monitoring Well MW21-UW:Phase II Treatability Study, Site 69, MCB Camp Lejeune							
	7/2/97	**8/26/97**	**9/24/97**	**10/22/97**	**11/10/97**	**12/16/97**	**% Change**
Compound	**All values in ppmv**						**7/2 to 11/10**
Vinyl Chloride	Coelution	ND	ND	ND	ND	ND	NA
trans-1,2 DCE	0.35	0.06	0.03	0.05	0.04	0.03	-88.57
cis-1,2 DCE	0.42	0.20	0.07	0.11	0.07	0.06	-83.33
TCE	0.04	0.01	0.01	0.01	0.01	ND	-75.00
Unidentified VOCs	0.29	0.02	ND	0.04	0.10	0.21	-65.52
Total VOCs	**1.10**	**0.29**	**0.11**	**0.18**	**0.22**	**0.30**	**-80.00**

Table 8-13: Water Level Measurements for UVB Monitoring Wells: Phase II Treatability Study, Site 69, MCB Camp Lejeune

Monitoring Well	7/2/97	8/26/97	9/24/97	10/22/97	11/10/97	12/16/97
	All Values in feet below TOC					
15 IW	30.40	30.52	30.64	30.07	29.36	28.44
17 IW	32.35	32.48	32.67	31.85	31.86	30.37
17 UW	32.25	32.36	32.50	31.88	30.99	30.24
20 IW	30.73	30.83	31.16	30.41	29.39	28.73
20 UW	30.59	30.68	31.00	30.24	29.49	28.57
21 UW	29.85	29.91	30.11	29.45	28.83	27.85

Table 8-14: Headspace Analysis of UVB Well Influent and Effluent Groundwater Samples: Phase II Treatability Study, Site 69, MCB Camp Lejeune							
Date	Location	TCE	Vinyl Chloride	trans-DCE	cis-DCE	Unidentified VOCs	Total VOCs
		All values in ppmv					
7/31/97	Influent	10.50	NM	NM	NM	74.20	84.70
	Effluent	NM	NM	NM	NM	NM	NM
8/12/97	Influent	3.70	NM	NM	NM	26.50	30.20
	Effluent	ND	NM	NM	NM	ND	ND
8/26/97	Influent	ND	ND	0.06	0.48	0.01	0.55
	Effluent	ND	ND	ND	ND	ND	ND
9/23/97	Influent	0.02	0.50	0.45	1.64	0.17	2.78
	Effluent	ND	ND	ND	0.02	ND	0.02
10/22/97	Influent	ND	ND	0.01	ND	0.17	0.18
	Effluent	ND	ND	ND	ND	ND	ND
11/10/97	Influent	ND	ND	ND	ND	ND	ND
	Effluent	ND	ND	ND	ND	ND	ND
12/16/97	Influent	ND	ND	ND	ND	ND	ND
12/16/97	Influent*	0.09	ND	0.08	0.19	ND	0.36
	Effluent*	ND	ND	ND	ND	ND	ND

*** Samples taken after the system was intentionally shut down for 12 hours**

Table 8-15: UVB Off-gas Analysis for VOCs: Phase II Treatability Study, Site 69, MCB Camp Lejeune					
Date	TCE	Unidentified VOCs	Total VOCs	Off-gas Air Flow	Mass Removed
	All values in ppmv			m^3/hr	lb VOCs/month
7/31/97	0.38	11	11.38	271	4.8
8/12/97	0.1	6.69	6.79	284	3.1
8/26/97	ND	ND	ND	325	0
9/24/97	0.03	0.72	0.733	373	0.4
10/22/97	ND	ND	ND	424	0
11/10/97	ND	ND	ND	417	0
12/16/97	ND	ND	ND	325	0

Table 8-16: Aqueous Concentration of Target Contaminants Determined from Laboratory Analysis: Phase II Treatability Study, Site 69, MCB Camp Lejeune									
Date Sampled	Compound	Sample Location							
		15IW	17UW	17IW	20UW	20IW	21UW	UVB-IN	UVB-OUT
		All Values in ppb							
8/25/97	Vinyl Chloride	660.0	1.0	5.0	1.0	1.0	1.0	1.0	1.0
	trans-1,2 DCE	1.0	880.0	1.0	2.0	1.0	1.0	1.0	0.7
	cis-1,2 DCE	8700.0	9800.0	4.0	12.0	5.0	3.0	3.0	0.8
	TCE	620.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Total VOCs	**9981.0**	**10682.0**	**11.0**	**16.0**	**8.0**	**6.0**	**6.0**	**3.5**
12/16/97	Vinyl Chloride	340.0	1.0	2.0	4.0	1.0	1.0	ND	ND
	trans-1,2 DCE	1.0	1000.0	2.0	0.8	0.8	0.3	ND	ND
	cis-1,2 DCE	7900.0	13000.0	6.0	4.0	5.0	3.0	ND	ND
	TCE	500.0	1.0	0.8	0.8	0.8	0.3	ND	ND
	Total VOCs	**8741.0**	**14002.0**	**10.8**	**9.6**	**7.6**	**4.6**	**ND**	**ND**

Table 8-17: Comparison of Laboratory Analytical Data to Extrapolation from Headspace Analysis for Monitoring Wells MW15-IW and MW17-UW: Phase II Treatability Study,Site 69, MCB Camp Lejeune					
		Laboratory Results		Extrapolated from Headspace	
Date	**Compound**	**15IW**	**17UW**	**15IW**	**17UW**
		All values in ppb			
8/25/97	VC	660.0	1.0	671.5	1.0
	t-1,2 DCE	1.0	880.0	1.0	370.0
	c-1,2 DCE	8700.0	9800.0	6594.0	6273.0
	TCE	620.0	1.0	318.0	1.0
	Total VOCs	**9981.0**	**10682.0**	**7584.5**	**6645.0**
12/16/97	VC	340.0	1.0	727.0	1.0
	t-1,2 DCE	1.0	1000.0	1.0	357.0
	c-1,2 DCE	7900.0	13000.0	6537.0	7680.0
	TCE	500.0	1.0	260.0	1.0
	Total VOCs	**8741.0**	**14002.0**	**7525.0**	**8039.0**

Table 8-18: Change in concentrations of target contaminants at well MW15-UW/UVB-400 during Phase I and Phase II: Site 69, MCB Camp Lejeune			
Date	**Status**	**Compound**	**ppb**
2/23/96	**Phase I /MW15-UW**	Vinyl chloride	5900
		total 1,2 DCE	170000
		TCE	830
		Total VOCs	**176730**
10/23/96	**Phase I /MW15-UW**	Vinyl chloride	5000
		total 1,2 DCE	160000
		TCE	1800
		Total VOCs	**166800**
8/25/97	**Phase II / UVB-400**	Vinyl chloride	962
		total 1,2 DCE	10925
		TCE	210
		Total VOCs	**12097**
12/16/97	**Phase II / UVB-400**	Vinyl chloride	nd
		total 1,2 DCE	68
		TCE	25
		Total VOCs	**93**

Table 8-19: First Order Rate Constants and Estimated Time to Treat Target Contaminats to 5 ppb at Well MW15 IW: Phase II Treatability Study, Site 69, MCB Camp Lejeune			
Compound	**Concentration on 12/16/97**	**First Order Rate Constant K1, day $^{-1}$**	**Estimated Treatment Time in Days**
TCE	500 ppb	5.68×10^{-3}	810
Vinyl Chloride	340 ppb	3.25×10^{-3}	340
t-1,2 DCE	NA	NA	NA
c-1,2 DCE	7900 ppb	2.86×10^{-3}	2575

Appendix A: Drilling and Well Development Logs

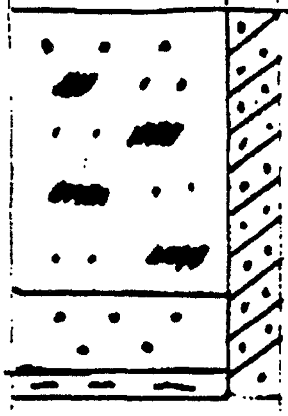
1/3

CAMP LEJEUNE
UVB-200 - SURFACE HOLE

PREPARED BY AA
DATE 2/11/96

LITHOLOGY

PORTLAND



+2.3' PVC - 18" CSG STICK-UP
0'-1' ROAD FABRIC WITH LIMESTONE COVER
0' GROUND LEVEL
0'-9.5' SAND (SM) VF-F GRAINED SAND W/ SOME SILT, MED. BROWN, LOOSE, MANY LARGE TREE ROOTS IN UPPER 4', 6'-9' ROOTS AND/OR DEMOLITION WIRE TANGLE - ALL FILL MATERIAL
WATER AT ~ 1'

16' PVC

9.5' 9.5'-11' SAND (SM) F-GR SAND, LITTLE SILT, LT. BRGY, LOOSE, WET.
11'
11.65' 11'-11.65' CLAY (CL) LT-MED GRAY, SOFT

NOTES: ROOT DEBRIS CREATED A MULCH LIKE MATERIAL, CLOGGING SUCTION + FLOW LINES, (AND TANGLING IN BIT). FLUIDS CARRIED A FOUL SULFER-LIKE ODOR. DRILL HELPER GOT ARM WET WHILE CLEANING SUCTION LINE AND EXPERIENCED ITCHING + SLIGHT REDNESS. HARSH ARGUMENT BROKE OUT BETWEEN DRILLER AND OTHER HELPER REGARDING SAFETY. HELPER (2ND DRILLER) THREATENED TO QUIT. FINISHED HOLE, BIT HAD TWO PIECES OF WHAT APPEARS TO BE DEMOLITION WIRE ATTACHED TO IT (SAVED).
CLAY LAYER VERIFIED BY SPLIT-SPOON SAMPLING.

I ALSO EXPERIENCED SHORT-TERM ITCHING + SLIGHT REDNESS ON ARM, ABOUT 1 HR. AFTER CLEAN-UP - POSSIBLY FROM MATERIAL ON SUIT OR GLOVES.

SAFETY NOTE: SIX (APPARENTLY) MINOR INCIDENTS OF HEALTH REACTION. IF NOTHING ELSE HAVE CAUSED VERY HIGH TENSION TO DRILLING CREW. ALL HAVE THREATENED TO PULL OFF JOB. PART TIME DRILLER AND OTHER HELPER HAVE HAD VERY HEATED CONFRONTATIONS WITH DRILLER/SUPERVISOR. BOTH THREATENED TO QUIT + LEAVE ON THE SPOT.

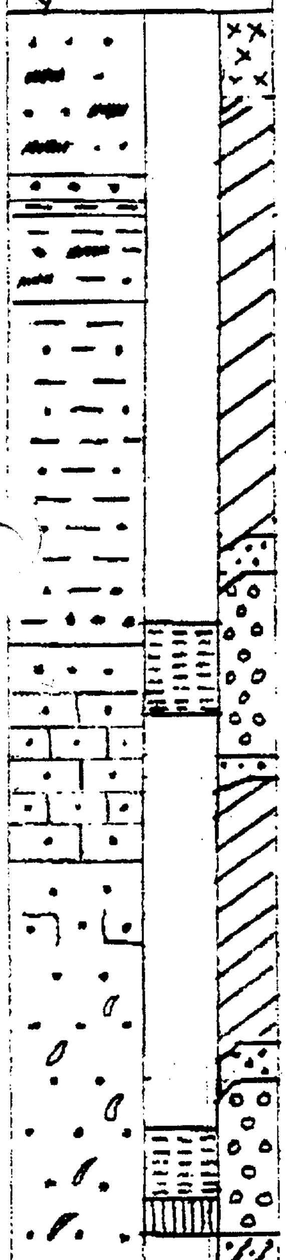
PAGE NO. 2/3

LOGGED BY [illegible]
DATE 2/13-14/96

CAMP LESEUNE
UVB-200 - SURFACE TO T.D.

LITHOLOGY | CASING | CSG. FILL

NOTES: SEE SURFACE HOLE DIAGRAM AND CASING DIAGRAM.
- HOLE SUSPECTED TO BE SOMEWHAT CROOKED AS BIT WALKED ON HARD COQUINA



0'

0'-11.65 SURFACE CASING 16.0" OD 14.9" I.D.
WELL CASING 10.7" OD 9.8" I.D.
BELLED COLLARS 11.5" OD 10.6" I.D.
FASTENERS - 3/4" - #12 SCREWS W/ FLAT WASHERS

11.65'

11.65'-17' CLAY AND SILT THAT APPEARS TO BE FILL MATERIAL W/ SOME ORGANIC DEBRIS

17'

17'-37' CLAY, SILTY CLAY, CLAYEY SILT, MED. GY, MOIST - VERY MOIST, INTERBEDDED AND MORE COARSELY GRADED DOWNWARD WITH CLAYEY SILT TO CLAYEY FINE SAND AT BASE

37'

37'-40' SAND, FINE GR, GNGY, WET

40'

40'-50' COQUINA + SILTY SAND W/ SOME CLAY, LT.-MED GY, SAND IS FINE GR, SHELLS AND SHELL FRAGMENTS W/ SOME MICRITE CEMENT, WET (HARD DRILLING)

50'

50'-74' SAND, FINE GRAINED, LT. GY, SCATTERED SHELLS AND SHELL FRAGMENTS

74'

74' VERY HARD ROCK - BIT REFUSAL

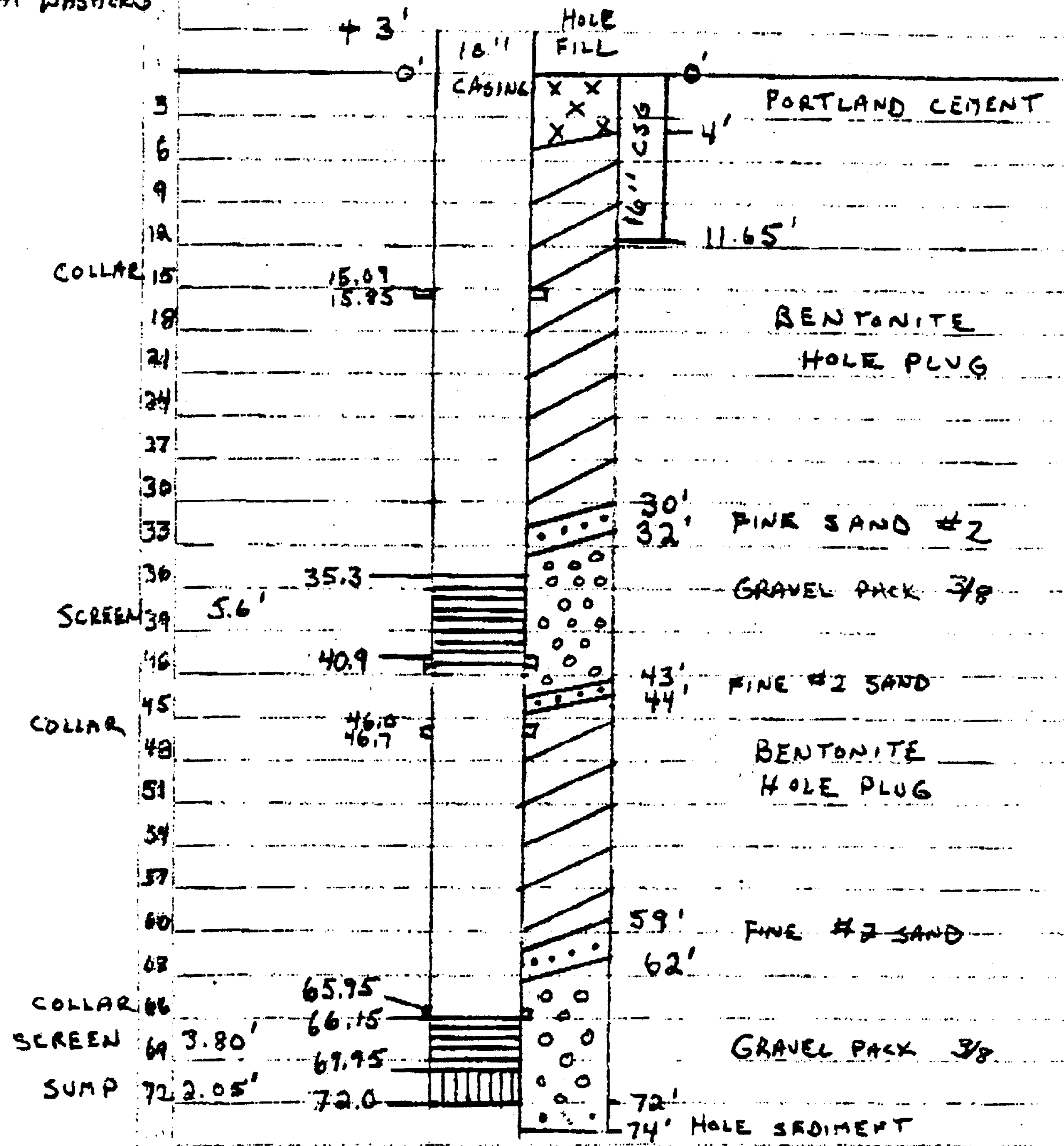
3/3

CAMP LEJEUNE
UVB - 200 CASING PROGRAM

2/13-14/96

NOTES: SURFACE CASING: 16" O.D. 14.9" I.D.
WELL CASING: 10.7" O.D. 9.8" I.D.
(BELL COLLARS) 11.5" O.D. 10.6" I.D.

FASTENERS
3/4" - #12 SCREWS
W/ FLAT WASHERS



CAMP LEJEUNE
WATER AND HOLE DEPTHS

AA
2/16/96

MEASUREMENTS: TO TOP OF PVC CASING

NOTES: - SOFT IN BOTTOM OF ALL CASINGS
- READINGS - 24 HRS. + AFTER DRILLING

WELL	TO WATER	DEPTH
UVB GROUP		
W-1 SHALLOW	8.44 m	14.22 m
W-1 DEEP	8.86 m	23.52 m
UVB-200	8.34 m	22.10 m
E-1 SHALLOW	9.22 m	14.90 m
E-1 DEEP	9.19 m	23.29 m
E-2 SHALLOW	8.90 m	13.87 m
E-2 DEEP	9.42 m	23.23 m
E-3 SHALLOW	9.19 m	14.72 m
E-3 DEEP	9.22 m	23.05 m
N-1 SHALLOW	*	**
N-1 DEEP	*	22.90 m
KGB GROUP		
SW-2 SHALLOW	1.30 m	3.59 m
SW-2 DEEP	1.48 m	4.40 m
SW-1 SHALLOW	1.31 m	3.46 m
SW-1 DEEP	1.48 m	4.45 m
KGB	1.02 m	4.48 m
SE-1 SHALLOW	1.32 m	3.59 m
SE-1 DEEP	1.39 m	4.43 m
SE-2 SHALLOW	1.29 m	3.55 m
SE-2 DEEP	1.49 m	4.45 m

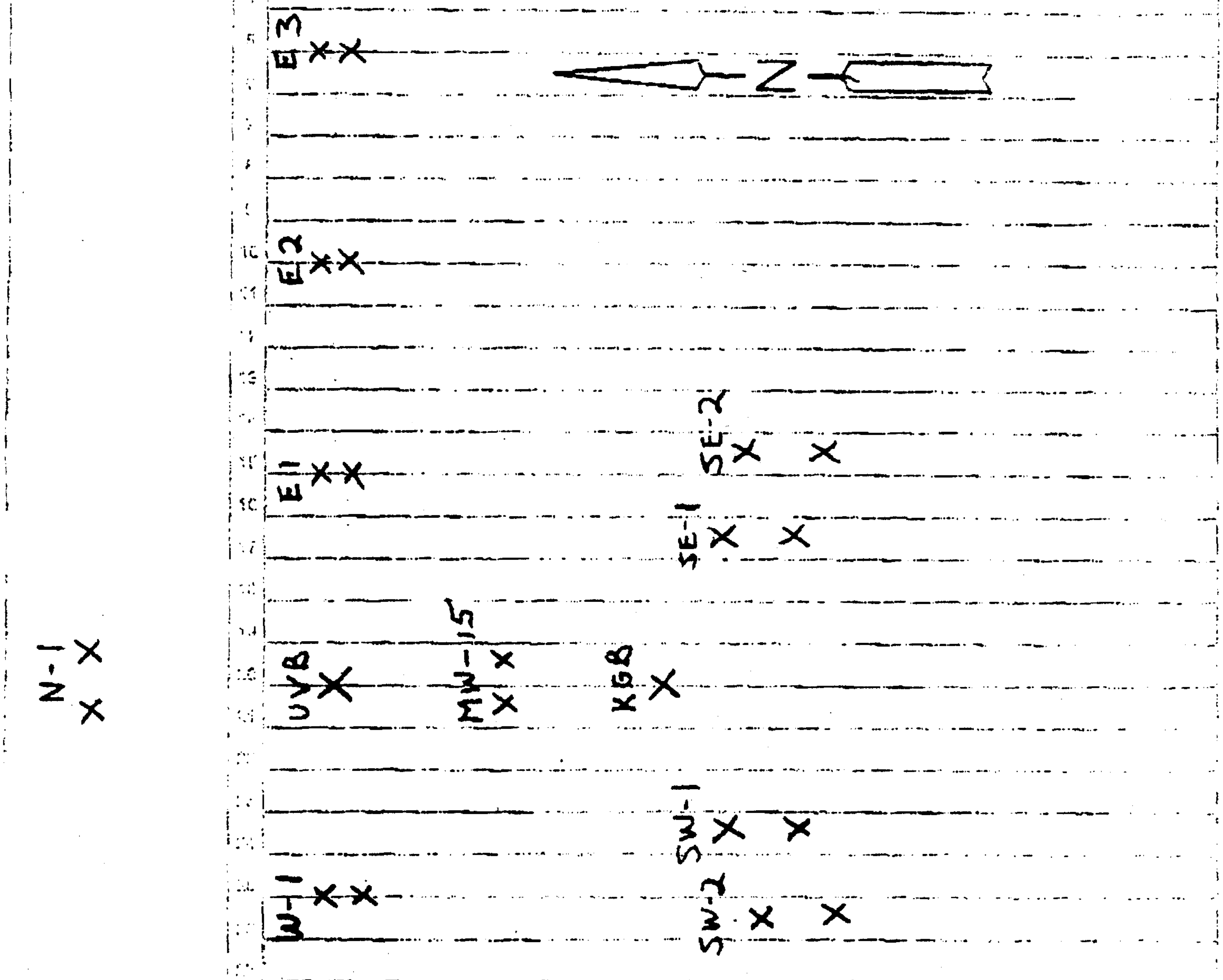
* WATER LEVEL NOT YET EQUALIZED

** DRILLED TO 46' - POURING SURFACE CONCRETE AND IMMEDIATELY UPON COMPLETION - DID NOT MEASURE

2/2

CAMP LEJEUNE
WATER AND HOLE DEPTHS MAP

PREPARED BY: AT
DATE: 2/16/96

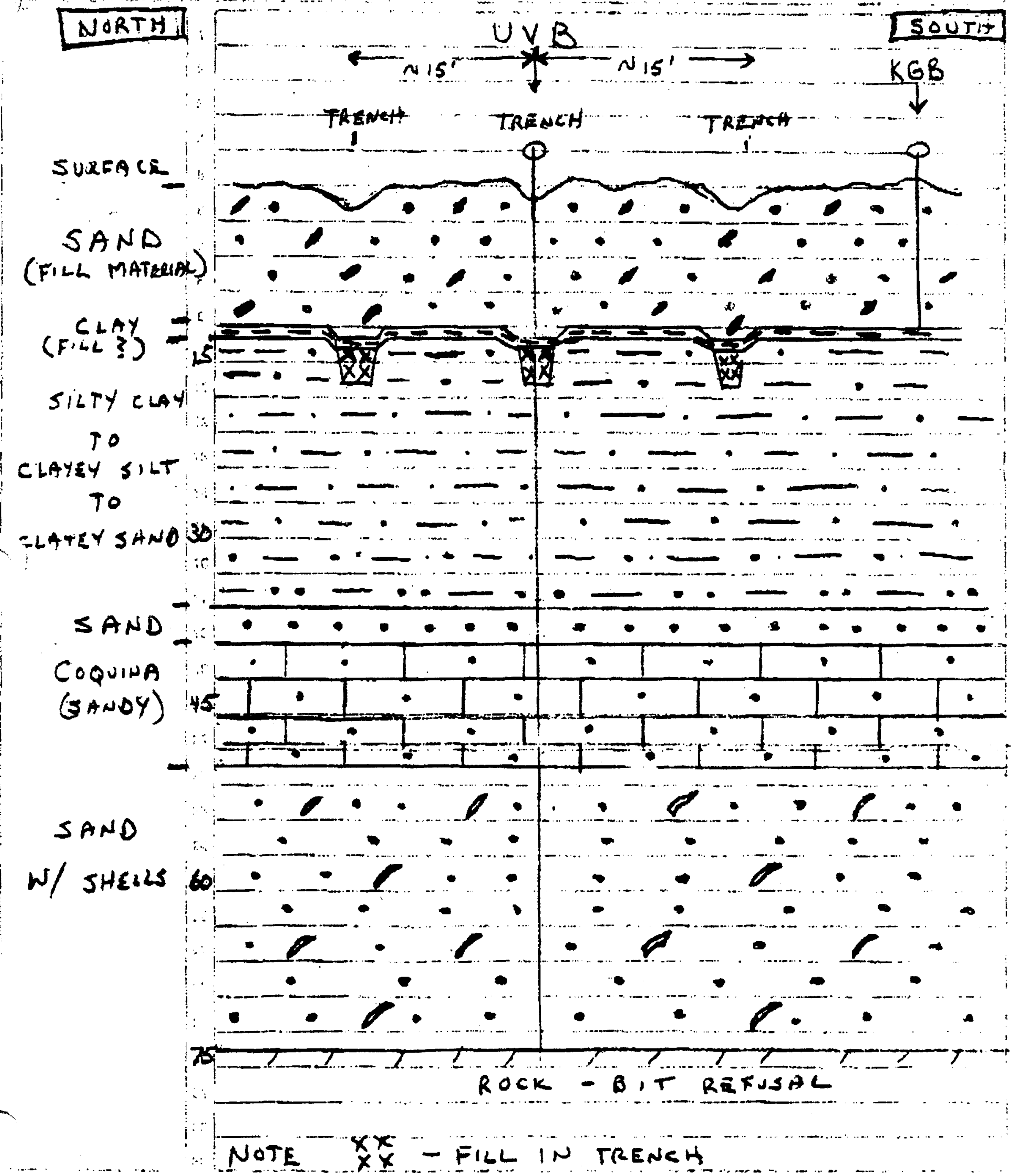


1/1

CAMP LEJEUNE

N-S CROSS SECTION (SCALE IS OFF)

AA 2/17/96



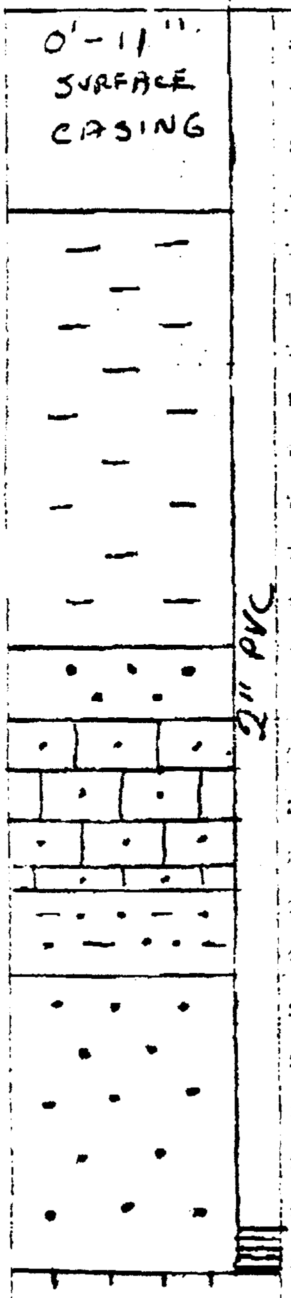
1/1

CAMP LEJEUNE

W-12 - DEEP MONITOR WELL - WEST OF UVB

AA 2/10/96

SAFETY NOTE: EXPOSED BARRELS ON NE + S SIDE OF WELLS W/ RUBBER WRAPPING



0'

11'

11-38' CLAY (CL) MED-DK GY, SOME SILT
CLAY MOSTLY EVIDENT, CERTAINLY SOME GOOD CONFINING BEDS W/ CLAYEY SILT ZONES TRAPPED BETWEEN.

38'

~~38'-42' SAND, FINE GRAINED, MED GRAY,~~

42'

42'-52' COQUINA + SILTY SAND, LT. GY, ABUNDANT WHOLE AND FRAGMENTED SHELLS, HARD + DIFFICULT TO DRILL, SOME COQUINA IS CEMENTED W/ CALCARIOUS CEMENT

52'

~~52'-57' SILT, LT-MED GY, SOME SD~~

57'

57'-75' SAND, FINE-MED. GR, SCATTERED SHELLS AND SHELL FRAGMENTS

SCREEN 72.5'-75'
WELL POINT - 75'

75'

75' VERY HARD - ROCK - LS? SOLID - PICKED UP WEIGHT OF RIG - BENT TEETH ON THE BIT.

1/1

CAMP LEJEUNE

W-11 - SHALLOW MONITOR WELL - W. SIDE OF UVB

PREPARED BY
DATE 2/10/96

SAFETY NOTE: EXPOSED BARRELS ON NE + S SIDE OF WELLS W/ RUBBER WRAPPING

0'

0'-11' SURFACE CASING

11'

11'-37' CLAY (CL) DK GY CLAY, W/ OCC. SILT, CLAY MOSTLY EVIDENT, THIN BR GY CLAY IMMEDIATELY BELOW CASING, LARGE ROOT (STAINED BUT NOT DETERIORATED) CAME FROM 17' - INDICATING FILL AREA — NOTE - EXCAVATION CUT THROUGH CONFINING LEVEL @ 12' AT LEAST TO 17'

2" PVC

37'

37'-47' COQUINA + SILTY SAND, LT. GY, ABUNDANT WHOLE + FRAGMENTED SHELLS, HARD + DIFFICULT TO DRILL, SOME COQUINA IS CEMENTED W/ CALCARIOUS CEMENT

47'

SCREEN 37' - 47'

WELL POINT - 47'

1/1

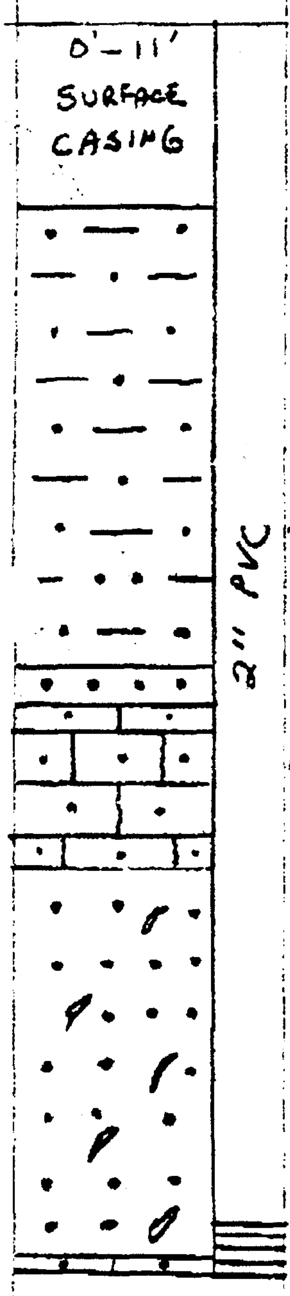
CAMP LEJUENE

E-1 DEEP MONITOR WELL EAST OF UW

AA

2/12/96

SAFETY NOTE: VERY STRONG ODOR (SULFEROUS) NEAR SURFACE - NOTICE WHILE DIGGING PROTECTIVE POST HOLES



0'

11'

15 11'-38' CLAY, SILTY CLAY, GRADES DOWNWARD TO SANDY CLAY, MED GY, SOME INTERBEDDING OF CLAY LAYERS, POSSIBLE CLAY FILL MATERIAL DOWN TO 17' OR 18'

30

38' SAND, FINE GR, LT-MED GRAY

40' 40'-50' COQUINA, SILTY TO SANDY W/ SOME MIXED CLAY, LT GY, SHELL FRAGMENTS - APPEAR FINER THAN IN OTHER WELLS TO WEST

45

50'

50'-73' SAND, FINE GR, LT. GY, SCATTERED SHELL FRAGMENTS

60

SCREEN - 71.5' - 74'

WELL POINT - 74'

73 SAND + SHELLS, MORE SHELL FRAGMENT % AOR, DENSE

74.5 ROCK, VERY HARD, BIT REFUSAL

FEB 18 '96 23:09 ANSTAR - AA

P.11

1/1

AF

2/12/96

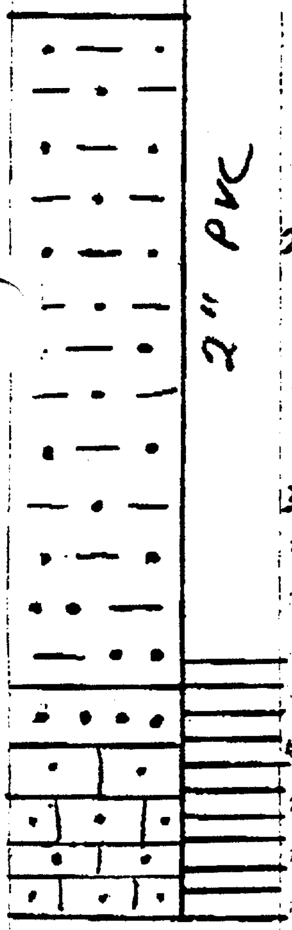
CAMP LESJUENE

E-1 SHALLOW MONITOR WELL E. OF UVR

NOTE: THIS MAY BE OUT OF THE DEEP TRENCH, WHILE DEEP WELL NEXT TO IT APPEARS TO BE IN IT.

0'

0'-11' SURFACE CASING



10

11'

11'-37' CLAY, SILTY + SANDY; CLAY MATRIX W/ INCLUSIONS GRADING FROM SILT DOWNWARD TO FINE SAND AT BASE, MED. GY, SOME INTERBEDDED CLAY ONLY LAYERS.

THIS APPEARS TO BE OUT OF THE DEEP TRENCH AREA

20

30

37' SAND, FINE GR, LT-MED GN GY.

40 40' COQUINA, SILTY TO VERY FINE SANDY, LT. GY, MICRITE MATRIX

46' SCREEN - 36' - 46'

WELL POINT - 46'

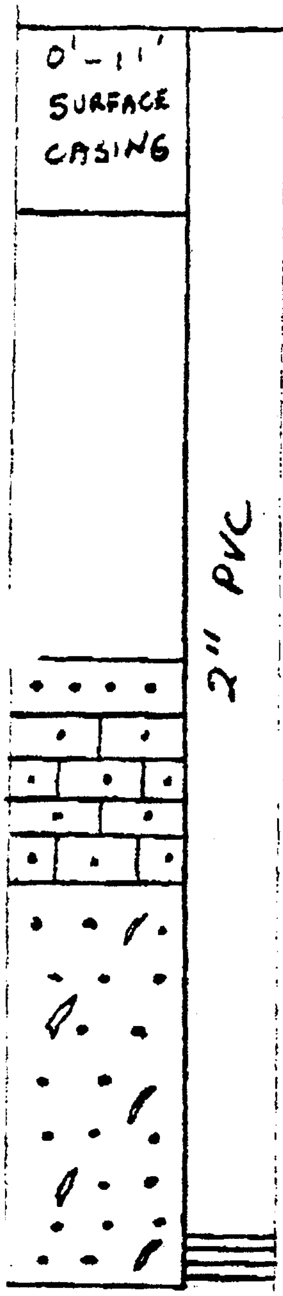
1/1

CAMP LESJUENE

E-2 DEEP MONITOR WELL E. OF UVB

AA

2/12/96



0'

11'

15 11'-37' CLAY, SILTY CLAY GRADING TO SANDY CLAY AT BASE, POSSIBLE CLAY FILL MATERIAL DOWN TO 17'

30

37'

SAND, FINE GR, GY

40'

40'-50' COQUINA, SANDY (APPEARS MORE SANDY GOING TO THE EAST), LT GY

45

50'

50'-74' SAND, VERY FINE-FINE GRAINED, LT GY, SCATTERED SHELL FRAGMENTS

60

SCREEN - 71' - 73.5'

WELL POINT - 73.5'

74'

ROCK, VERY HARD, BIT REFUSAL

1/1

CAMP LEJUENE

E-2 SHALLOW MONITOR WELL E. OF UVB

2/13/96

0'

0'-11' SURFACE CASING

11'

11'-37' - CLAY, SILTY TO SANDY CLAY BEING MORE COARSE TOWARD BASE, MED. GY

2" PVC

20

30

37

SAND, FINE GR, LT-MED GY

40

COQUINA, SANDY, LT GY (APPEARS MORE SANDY THAN TO THE WEST)

SCREEN - 37'-47'

47

WELL POINT - 47'

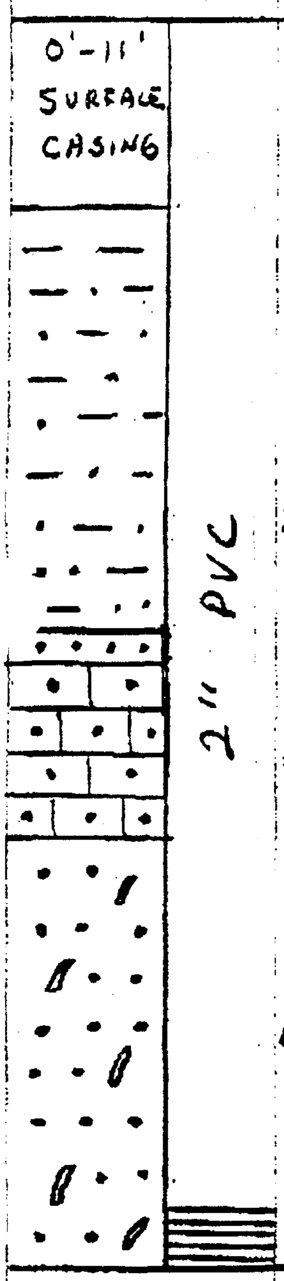
1/1

CAMP LEJUENE

E-3 DEEP MONITOR WELL E. OF UVB

AA 2/15/96

NOTE: TERRAIN UNEVEN THROUGHOUT



0'

11'

15 11'-36' CLAY, SILTY CLAY, SANDY CLAY, INCLUSIONS ARE MORE COARSE TOWARD BASE, MED GY
POSSIBLE TRENCH MATERIAL DOWN TO 16'-17'

30

36'

38' SAND, VF-F GR, LT MED GY

COQUINA, SILTY TO SANDY W/ SOME CL LT GY - MORE ~~SANDY THAN FARTHER~~ WEST

45

48

48'-73' SAND, FINE GR, LT GY. SCATTERED SHELL FRAGMENTS

60

SCREEN - 70.5'-73'

WELL POINT - 73'

73'

ROCK - HARD - BIT REFUSAL

1/1

CAMP LEJUENE

E-3 SHALLOW MONITOR WELL E. OF UV8

AA 2/15/96

0'

0'-11' SURFACE CASING

2" PVC

10

11'

11'-37' CLAY, SILTY CLAY, SANDY CLAY, MORE COARSE INCLUSIONS TOWARD BASE, MED GY

20

30

36'

SAND, FINE GR, LT-MED GY

38'

40

COQUINA, SANDY, LT GY (MORE SANDY THAN TO THE WEST)

SCREEN - 36' - 46'

WELL POINT - 46'

1/1

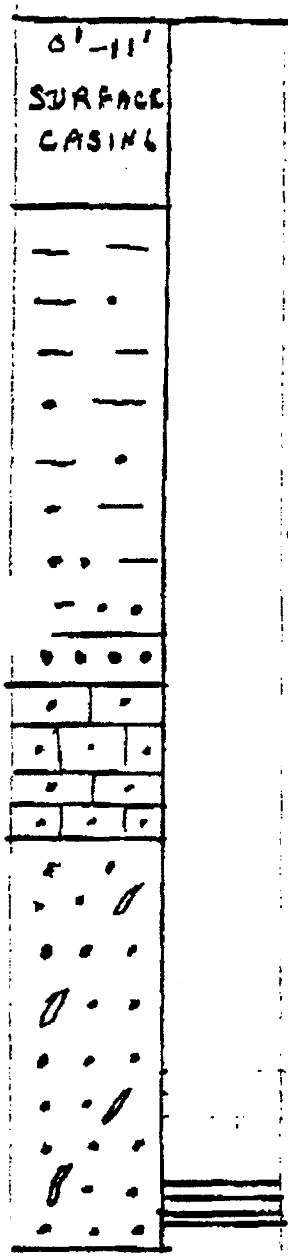
CAMP LEJUENE

N-1 DEEP MONITOR WELL N. OF UVB

AA 2/15/96

NOTE: NORTH OF MOST TRENCHES

0'



11'

15 11'-36' CLAY, SILTY + SANDY CLAY, GRADES MORE COARSE TOWARD BASE (STILL CLAYEY), MED GY

30

36'

SAND, VF-F GR, LT-MED GY

39'

COQUINA, SANDY W/ SOME CLAY

45 LT-MED GY, SD IS V FINE GR

48'

SAND, VF-FINE GR, LT. GY

SCATTERED SHELL FRAGMENTS

60

SCREEN - 68.5'-71'

WELL POINT - 71'

72

ROCK - BIT REFUSAL

1/1

CAMP LEJUENE
N-1 - SHALLOW MONITOR WELL

AA
2/16/96

0

0'-11' SURFACE CASING

10

11'

11'-36' CLAY, SILTY & SANDY CLAY, GRADES MORE COARSE TOWARD BASE (CLAYEY MATRIX), MED. GY

2" PVC

20

30

36'

SAND, FINE GR, LT-MED GY

38'

COQUINA, SANDY W/ SOME CLAY LT-MED GY (SAND IS V-FINE GR)

40

46'

SCREEN - 36' - 46'

WELL POINT - 46'

FIELD WELL DEVELOPMENT RECORD

SBP

PROJECT: Camp Lejeune Site 69 UVD Study

CTO NO.:

WELL NO.: KGS SE11

DATE: 1/29/96

GEOLOGIST/ENGINEER: Charles Taws

TIME START	
TIME FINISH	
INITIAL WATER LEVEL (FT)	3.64
TOTAL WELL DEPTH (TD)	11.98
WELL DIAMETER (INCHES)	2
CALCULATED WELL VOLUME	1.42
BOREHOLE DIAMETER (INCHES)	
BOREHOLE VOLUME	
AMOUNT OF WATER ADDED DURING DRILLING	
DEVELOPMENT METHOD	~~Bailer~~ purge
PUMP TYPE	Bailer
TOTAL TIME (A)	
AVERAGE FLOW (GPM)(B)	
TOTAL ESTIMATED WITHDRAWAL AxB=	
HNU/OVA READING	

DEVELOPMENT DATA

TIME	CUMULATIVE VOLUME (gallons)	pH	TEMP (°C)	SPEC. COND. (µmhos/cm)	TEMP (°C)	COLOR AND TURBIDITY
9:00	7.10 g	5.20		.17		
	purged					
1:00	6.5 g	5.4		.20		

FIELD WELL DEVELOPMENT RECORD

SBP

PROJECT: Camp Lejeune UVB Study

CTO NO.:

WELL NO.: UGB SE 1.2

DATE: 1/29/96

GEOLOGIST/ENGINEER: Charles Taus

TIME START	DEVELOPMENT DATA						
TIME FINISH	TIME	CUMULATIVE VOLUME (gallons)	pH	TEMP (°C)	SPEC. COND. (µmhos/cm)	TEMP (°C)	COLOR AND TURBIDITY
INITIAL WATER LEVEL (FT) 3.94	9:30	8.90g purged	5.10		.15		
TOTAL WELL DEPTH (TD) 14.23	1:45	9.0g	5.25		.18		
WELL DIAMETER (INCHES) 2							
CALCULATED WELL VOLUME 1.78g							
BOREHOLE DIAMETER (INCHES)							
BOREHOLE VOLUME							
AMOUNT OF WATER ADDED DURING DRILLING							
DEVELOPMENT METHOD Bailer purge							
PUMP TYPE Bailer							
TOTAL TIME (A)							
AVERAGE FLOW (GPM)(B)							
TOTAL ESTIMATED WITHDRAWAL AxB=							
HNU/OVA READING							

FIELD WELL DEVELOPMENT RECORD

SBP

PROJECT: Camp Lejeune UVB Study

CTO NO.: ____________ WELL NO.: SE 2,1 (KGB)

DATE: 1/29/96

GEOLOGIST/ENGINEER: Charles Tavis

TIME START	
TIME FINISH	
INITIAL WATER LEVEL (FT)	3.63
TOTAL WELL DEPTH (TD)	11.83
WELL DIAMETER (INCHES)	2
CALCULATED WELL VOLUME	1.396
BOREHOLE DIAMETER (INCHES)	
BOREHOLE VOLUME	
AMOUNT OF WATER ADDED DURING DRILLING	
DEVELOPMENT METHOD	~~Bailer~~ purge
PUMP TYPE	Bailer
TOTAL TIME (A)	
AVERAGE FLOW (GPM)(B)	
TOTAL ESTIMATED WITHDRAWAL AxB=	
HNU/OVA READING	

DEVELOPMENT DATA

TIME	CUMULATIVE VOLUME (gallons)	pH	TEMP (°C)	SPEC. COND. (µmhos/cm)	TEMP (°C)	COLOR AND TURBIDITY
11:00	6.95 g	6.32		.26		
	purged					
2:30	7.39	6.5		.24		

FIELD WELL DEVELOPMENT RECORD

SBP

PROJECT: Camp Lejeune UVB study

CTO NO.:

WELL NO.: SE 2,2 (KGB)

DATE: 1/29/96

GEOLOGIST/ENGINEER: Charles Taus

	DEVELOPMENT DATA						
TIME START							
TIME FINISH	TIME	CUMULATIVE VOLUME (gallons)	pH	TEMP (°C)	SPEC. COND. (µmhos/cm)	TEMP (°C)	COLOR AND TURBIDITY
INITIAL WATER LEVEL (FT) 4.16	12:00	9.05g	6.08		.33		
		purged					
TOTAL WELL DEPTH (TD) 14.79	3:30	9.35g	6.25		.31		
WELL DIAMETER (INCHES) 2							
CALCULATED WELL VOLUME 1.81g							
BOREHOLE DIAMETER (INCHES)							
BOREHOLE VOLUME							
AMOUNT OF WATER ADDED DURING DRILLING							
DEVELOPMENT METHOD ~~Bailer~~ purge							
PUMP TYPE Bailer							
TOTAL TIME (A)							
AVERAGE FLOW (GPM)(B)							
TOTAL ESTIMATED WITHDRAWAL AxB=							
HNU/OVA READING							

FIELD WELL DEVELOPMENT RECORD

SBP

PROJECT: Camp Lejeune UVB Study

CTO NO.:

WELL NO.: SW 1,1 (KGB)

DATE: 1/30/96

GEOLOGIST/ENGINEER: Charles Taws

- TIME START:
- TIME FINISH:
- INITIAL WATER LEVEL (FT): 3.72
- TOTAL WELL DEPTH (TD): 11.58
- WELL DIAMETER (INCHES): 2
- CALCULATED WELL VOLUME: 1.34g
- BOREHOLE DIAMETER (INCHES):
- BOREHOLE VOLUME:
- AMOUNT OF WATER ADDED DURING DRILLING:
- DEVELOPMENT METHOD: Purge
- PUMP TYPE: Bailer
- TOTAL TIME (A):
- AVERAGE FLOW (GPM)(B):
- TOTAL ESTIMATED WITHDRAWAL AxB=:
- HNU/OVA READING:

DEVELOPMENT DATA

TIME	CUMULATIVE VOLUME (gallons)	pH	TEMP (°C)	SPEC. COND. (umhos/cm)	TEMP (°C)	COLOR AND TURBIDITY
9:30	6.70g	5.83		.20		
	purged					
1:00	7.2g	5.99		.24		

FIELD WELL DEVELOPMENT RECORD

SBP

PROJECT: Camp Lejeune UVB study

CTO NO.:

WELL NO.: Sw 1, 2 (KGB)

DATE: 1/30/96

GEOLOGIST/ENGINEER: Charles Tows

TIME START	
TIME FINISH	
INITIAL WATER LEVEL (FT)	4.34
TOTAL WELL DEPTH (TD)	14.81
WELL DIAMETER (INCHES)	2
CALCULATED WELL VOLUME	1.61
BOREHOLE DIAMETER (INCHES)	
BOREHOLE VOLUME	
AMOUNT OF WATER ADDED DURING DRILLING	
DEVELOPMENT METHOD	
PUMP TYPE	Bailer
TOTAL TIME (A)	
AVERAGE FLOW (GPM)(B)	
TOTAL ESTIMATED WITHDRAWAL AxB=	
HNU/OVA READING	

DEVELOPMENT DATA

TIME	CUMULATIVE VOLUME (gallons)	pH	TEMP (°C)	SPEC. COND. (umhos/cm)	TEMP (°C)	COLOR AND TURBIDITY
10:00	8.05 g	5.47		.44		
	Purged					
1:45	7.98	5.80		.40		

FIELD WELL DEVELOPMENT RECORD

SBP

PROJECT: Camp Lejeune UUB Study

CTO NO.:

WELL NO.: SW 2,1 (KGB)

DATE: 1/30/96

GEOLOGIST/ENGINEER: Charles Taws

TIME START	
TIME FINISH	
INITIAL WATER LEVEL (FT)	3.62
TOTAL WELL DEPTH (TD)	11.92
WELL DIAMETER (INCHES)	2
CALCULATED WELL VOLUME	1.41
BOREHOLE DIAMETER (INCHES)	
BOREHOLE VOLUME	
AMOUNT OF WATER ADDED DURING DRILLING	
DEVELOPMENT METHOD	Purge
PUMP TYPE	Bailer
TOTAL TIME (A)	
AVERAGE FLOW (GPM)(B)	
TOTAL ESTIMATED WITHDRAWAL AxB=	
HNU/OVA READING	

DEVELOPMENT DATA

TIME	CUMULATIVE VOLUME (gallons)	pH	TEMP (°C)	SPEC. COND. (µmhos/cm)	TEMP (°C)	COLOR AND TURBIDITY
11:00	7.05 g	7.02		.85		
	purged					
2:30	6.5 g	7.25		.79		

FIELD WELL DEVELOPMENT RECORD

SBP

PROJECT: Camp Lejeune UVB Study

CTO NO.:

WELL NO.: SW 2.2 (KGB)

DATE: 1/30/96

GEOLOGIST/ENGINEER: Charles Taus

TIME START	**DEVELOPMENT DATA**						
TIME FINISH	TIME	CUMULATIVE VOLUME (gallons)	pH	TEMP (°C)	SPEC. COND. (umhos/cm)	TEMP (°C)	COLOR AND TURBIDITY
INITIAL WATER LEVEL (FT) 4.16	12:00	8.5g	6.41		.39		
		purged					
TOTAL WELL DEPTH (TD) 14.16	3:30	9.4g	6.62		.35		
WELL DIAMETER (INCHES) 2							
CALCULATED WELL VOLUME 1.70							
BOREHOLE DIAMETER (INCHES)							
BOREHOLE VOLUME							
AMOUNT OF WATER ADDED DURING DRILLING							
DEVELOPMENT METHOD Purge							
PUMP TYPE Bailer							
TOTAL TIME (A)							
AVERAGE FLOW (GPM)(B)							
TOTAL ESTIMATED WITHDRAWAL AxB=							
HNU/OVA READING							

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: FAYAZ LAKHWALA	DATE: 3-27-96
FROM: DAVID BREWSTER	RECIPIENT'S FAX #: (904)934-2420
PAGES: 2 (includes cover sheet)	W.O. #: 11100-003-001

COMMENTS:

THESE ARE ESTIMATED PURGE ~~WELL~~ VOLUMES (GALLONS) REMOVED FROM THE MENTIONED WELLS BASED ON THE FOLLOWING:

- BADGER'S WELL DEVELOPMENT
- VOLUMES PURGED DURING OUR FIRST SAMPLING ATTEMPT IN FEBRUARY (YOU, ME, AND GORDON R.)
- CONTINUED WELL DEVELOPMENT FROM WESTON ON MARCH 1, 2

LET ME KNOW IF YOU HAVE ANY QUESTIONS - DB

h:\wsew\faxcover.doc

3-6-96

Development

Volumes needed for developments vs-removed

Well ID	3-5 Saturated Volumes	Estimated Purge*
19IW	28-47	63
19VW	19-31	61.5
18IW	28-47	58.5
18VW	18-29	40
17IW	28-47	30
17VW	20-33	38
21IW	29-48	71
21VW	20-33	34
16IW	27-45	60
16VW	19-32	33

*based on development info. from F. Lakerala's field notes from this log

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: FAYAZ LAKHWALA	**DATE:** 6 May, 1996
FROM: DAVID BREWSTER	**RECIPIENT'S FAX #** (904)934-2420
PAGES: 2 (includes cover sheet)	**W.O. #:** 1100-003-001

COMMENTS:

Fayaz,

Here are the total depths for all UVB/KGB monitoring wells at site 69. Let me know if you need anything else.

--David

P.S. IF YOU END UP SHIPPING BLUE ICE, WILL YOU PLEASE INCLUDE A BOX OF GLOVES. ALSO, IF YOU SPEAK WITH GORDON R. COULD YOU PLEASE LET HIM KNOW THAT THE PLASTIC PURGE WATER TANKS ARE FULL ? THANKS!

- DAVID

k:\usrw\faxcover.doc

DVB:

WELL	TOTAL DEPTH (FT)	TOTAL DEPTH (CM)
15 IW	61.0	1859
15 UW	39.32	1198
16IW	74.19	2261
16 UW	47.01	1433
*17IW	76.20	2323
17UW	48.33	1473
18 IW	76.37	2328
18UW	45.35	1382
19 IW	75.83	2311
19 UW	47.58	1450
20IW	77.03	2348
20UW	48.82	1488
21IW	77.35	2358
21UW	46.65	1422
Ø2IW	50.86	1550

* BAILER STUCK IN WELL. TOTAL DEPTH WAS TAKEN BEFORE BAILER WAS LOST DOWN WELL.

KGB:

WELL	TD (FT)	TD (CM)	WELL	TD (FT)	TD (CM)
22A	14.[illegible]	451.4	24A	14.81	451.4
22B	~~3.78~~ 11.58	353.0	24B	11.85	361.2
23A	14.71	448.4	25A	11.98	365.2
23B	11.98	365.2	25B	14.39	438.6

Note: All depths are from the top of casing

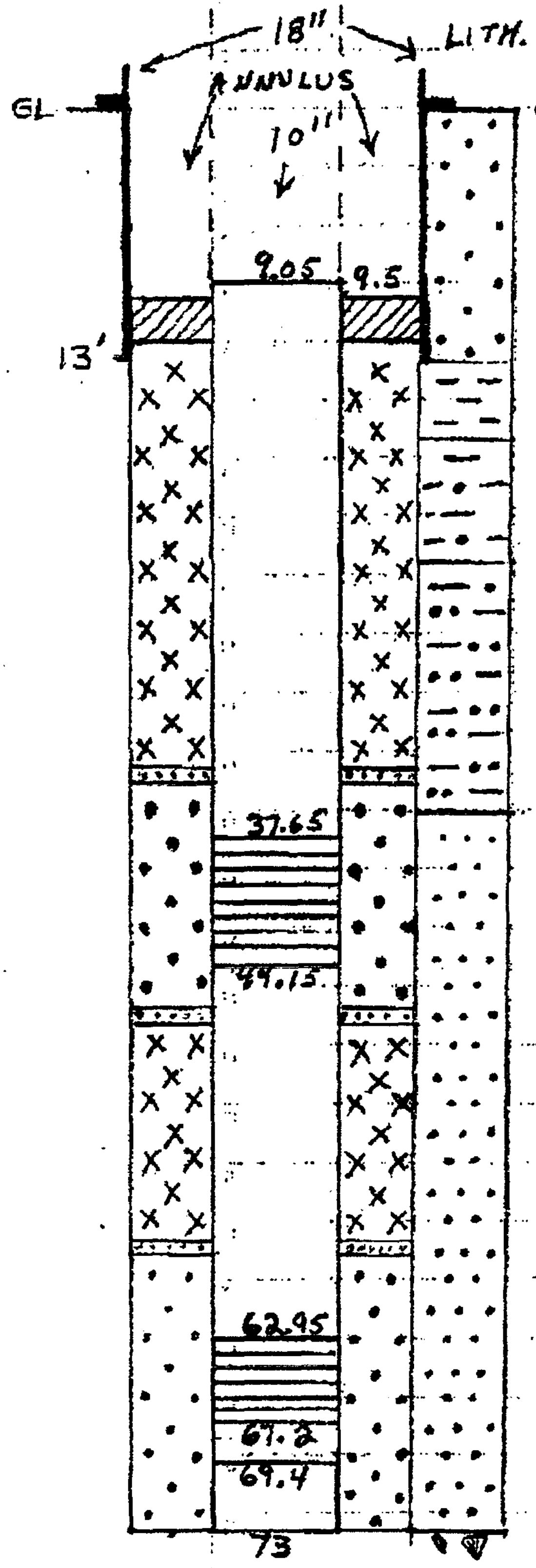
Appendix A

Phase II UVB-400 Drilling Logs

	6/27/97
15UW - UVB	

CAMP LEJEUNE – 6/23-27/97

WELL DESIGN



18" STICK UP +
CONCRETE PAD

LITH - SAND 0'-13'

10" CSG TOP @ 9.05'

GROUT 9.5'-12'

18" CSG SET @ 13' bgs CLAY
GROUTED TO SURFACE

BENTONITE 12'-34.5'

LITH - CLAY 13'-17'
CLAY + SILT 17'-23'
SILT 23'-36'
SAND - 36'-73'

FINE (#1) SAND 34.5'-35'
COARSE (#3) SAND 35'-46.5'
FINE (#1) SAND 46.5'-47'

SCREEN - 37.65'-44.15' - WIRE WRAP (.025)

BENTONITE - 47'-58'
FINE SAND (#1) 58'-58.5'
MED SAND (#2) 58.5'-67'
FORMATION SAND FILL 67'-73'

SCREEN - 62.95'-67.2' - WIREWRAP (.04)

SUMP - 67.2'-69.4'

LITH - SCATTERED SHELLS 36'-73'
LIMESTONE, SAND, SILT'S - VERY HARD @ 73'

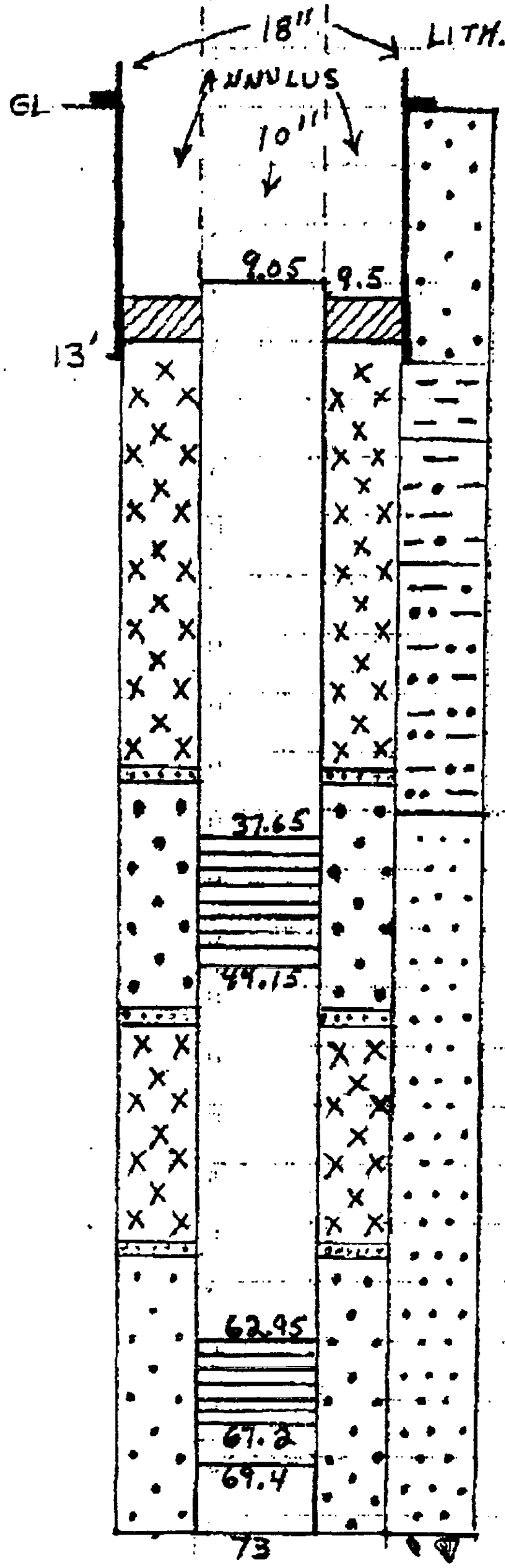
T.D. 73'

CAMBRIDGE

	6/27/97
15UW - UVB	

CAMP LEJEUNE - 6/23-27/97

WELL DESIGN



18" STICK UP +
CONCRETE PAD

LITH - SAND 0'-13'

10" CSG TOP @ 9.05'

GROUT 9.5'-12'

18" CSG SET @ 13' bgs CLAY
GROUTED TO SURFACE

BENTONITE 12'-34.5'

LITH - CLAY 13'-17'
CLAY+SILT 17'-23'
SILT 23'-36'
SAND - 36'-73'

FINE (#1) SAND 34.5'-35'
COARSE (#3) SAND 35'-46.5'
FINE (#1) SAND 46.5'-47'

SCREEN - 37.65'-44.15' - WIRE WRAP (.025)

BENTONITE - 47'-58'
FINE SAND (#1) 58'-58.5'
MED SAND (#2) 58.5'-67'
FORMATION SAND FILL 67'-73'

SCREEN - 62.95'-67.2' - WIREWRAP (.04)

SUMP - 67.2'-69.4'

LITH - SCATTERED SHELLS 36'-73'
LIMESTONE, SAND, SILT - VERY HARD @ 73'

T.D. 73'

CAMBRIDGE

Appendix B: Field Monitoring Data Sheets

WESTON MANAGERS DESIGNERS/CONSULTANTS

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: Fayaz Lakhwala	DATE: 11-22-96
FROM: Rhoda Wilks	RECIPIENT'S FAX # (904) 934-2420
PAGES: (includes cover sheet) 6	W.O. #:

COMMENTS:

The following pages are data from 11-14-96 on the KGB System and 11-21-96 data from the UVB/KGB monitoring. Both of the systems are running properly. I am scheduled to go back out 11-26-96.

11-14-96 RJW.

Sunny ~49°F.

1200 Arrived on-site System appears to be running properly. Will do air monitoring on KGB system.

Blower status - on

Water in knock out tank 0 cm

Compressor status on

compressor air pressure 20 psig

Compressor air flow rate 2.0 scfm

KGB effluent air velocity 5100 fpm

flow rate 111

temperature 79.3

relative humidity 20.2 %

Effluent GAC air velocity 3390

flow rate 72.0

KGB Bleed valve Air velocity 1800

flow rate 39.3

1225 Cut off blower and began collecting air samples

1240 Began collecting dye packets.

1325 Stopped air samples. Prepped to mix dyes.

1345 Rhodamine WT was introduced into MW-23B. One gallon of DI water was poured into following dye.

1420 Introduced Flourescein into MW-25B. Followed by two gallons of distilled H_2O.

1500 Dye packets were placed into the KGB wells

1530 Departed site.

RJW Ellis

11/21/96

RW

1100 Arrived on-site. Prep to monitor UVB/KGB System's.
1120 UVB system. (See check list attached).
1140 KGB system.
Blower status: on
Water in Knockout tank ∅ cm
Compressor status on
air pressure 20 psig
flow rate 2.∅ scfm
KGB effluent air velocity 336∅ fpm
flow rate 73.5 cfpm
temperature 80.3 °F
relative humidity 35.4 %
Effluent GAG air velocity 341∅
flow rate 74.5
KGB Bleed valve air velocity 196∅
flow rate 42.7
1210 Began collecting dye packet samples
1300 Began monitoring on the KGB system.
1410 Completed KGB system began monitoring UVB System
1620 Completed UVB. Began clean up of site
1700 Departed site.

R Willis

(B) GROUNDWATER PARAMETERS

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (μMHOS/SEC)	
22A	187.8	.35	18.5	5.43	234 μS	1220
22B	163.9	.75	17.8	5.65	307 μS	1215
24A	160.1	.30	18.5	6.24	575 μS	1225
24B	215.3	.28	19.0	6.22	420 μS	1230
23A	164.1	.40	18.0	6.24	2.31 mS	1235
23B						
25A	202.7	18.5	.50	7.00	1368 mS	1210
25B	DNR					

Special Remarks:

1340 Completed monitoring

Site: Camp Lejeune, Site 69

System: UVB-250

Date: 11-21-96

Time: 1400

Local Weather: Sunny, 58°F

Field Technician: Rhoda J. Willis

(A) GROUNDWATER PARAMETERS

1. **Pump status:**
2. **UVB well water level:** ________ cm

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (μMHOS/SEC)
17UW	939.0	0.30	17.5	6.98	485
17IW	943.2	0.40	17.5	7.94	310
18UW	931.4	0.45	17.8	6.78	550
18IW					
19UW	939.4	0.50	17.8	7.10	258
19IW	936.2	0.50	17.5	8.35	189
15UW	880.0	0.30	17.0	6.12	1800
15IW	883.1	0.49	18.0	7.85	200
2IW	851.6	.15	18.0	7.15	450
21UW	851.2	0.30	17.5	6.78	115
21IW					
16UW	~~938~~ 962.1	0.55	17.9	7.40	150
16IW	982.5	0.50	18.0	8.55	340
20UW	887.3	0.30	17.3	7.5	340
20IW	891.7	0.35	17.5	9.20	290

DNR

Special Remarks:

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: ɸ cm
3. Inlet pipe stick up: ________ cm
4. Inlet air velocity: 388ɸ fpm
5. Inlet air temperature: 58.5 °F
6. relative humidity: 62.4 % saturation
7. VOC's (PID): — ppm
8. flow rate: 47.6* acfm
9. Effluent air velocity(sample port): 18ɸɸ fpm
10. flow rate: ~~22.1~~ 8ω acfm 150
11. temperature: 72.8 °F
12 relative humidity: 36.2 % saturation
13. VOC's (PID): — ppm
14. Effluent GAC 1 VOCs (PID): — ppm
15. Effluent GAC 1 air velocity 172ɸ fpm
16. Effluent GAC 1 flow rate 37.6 acfm
17. Effluent GAC2 VOCs (PID): — ppm
18. Effluent GAC 2 air velocity 2170 fpm
19. Effluent GAC 2 flow rate 47.3 acfm
20. Well head vacuum: -56 mbars
21. UVB Well Bleed Valve air velocity closed fpm
22. UVB well bleed valve air flow ↓ acfm

Special Remarks:

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: FAYAZ LAKHWALA	DATE: 10-30-96
FROM: RHODA WILLIS	RECIPIENT'S FAX # (904) 934-2420
PAGES: 5 (includes cover sheet)	W.O. #:

COMMENTS:

Providing quality environmental management and consulting engineering services for over 40 years in the areas of:

Analytical Testing/Characterization	Life Sciences
Air Quality	Strategic Environmental Management
Water quality/Wastewater	Information Management
Hazardous, Solid, Radioactive Wast	Construction/Remediation
Health and Safety	Geosciences

55 Offices Worldwide

KGB FIELD MONITORING SHEET

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 10/22/96 **Day:** Tuesday

Time: 1400

Local Weather: 70°F Sunny

Field Technician: Rhoda Willis Doug Lincoln

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 34 cm
3. Compressor status: ON
4. Compressor air pressure +30 psig
5. Compressor air flow rate 10 or less cfm
6. KGB effluent air velocity(sample port): 1620 fpm
7. flow rate: ~~1620~~ acfm 35.4
8. temperature: 101.8 °F
9. relative humidity: 30.6 % saturation
10. VOC's (PID): — ppm
11. Effluent GAC 1 VOCs (PID): — ppm
12. Effluent GAC 1 air velocity 1980 fpm
13. Effluent GAC 1 flow rate 43.2 acfm
14. KGB Bleed Valve Air Velocity 110 fpm
15. KGB bleed valve air flow 20 acfm

(B) GROUNDWATER PARAMETERS

MW I.D.	WATER LEVEL ~~(CM)~~ (FT)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
22A	4.63	Ø.9Ø	2Ø.3	5.34	253
22B	4.42	1.5Ø	2Ø.1	5.48	241
24A	4.35	Ø.3Ø	2Ø.Ø	5.77	462
24B	4.95	1.2Ø	19.5	5.47	223Ø
23A	4.43	Ø.75	2Ø.2	5.73	1836
23B	DNR →				
25A	4.91	1.1	2Ø.Ø	6.29	39Ø
25B	DNR →				

Special Remarks:

10/23/96
0900

(B) AIR PARAMETERS

1. Blower status: on
2. Water in knock out tank: ___ϕ___ cm
3. Inlet pipe stick up: 2' 11 3/4" cm
4. Inlet air velocity: 4010 fpm
5. Inlet air temperature: 73.ϕ °F
6. relative humidity: 74.6 % saturation
7. VOC's (PID): — ppm
8. flow rate: 219 acfm
9. Effluent air velocity(sample port): 263ϕ fpm
10. flow rate: 129 acfm
11. temperature: 108.1 °F
12. relative humidity: 32.ϕ % saturation
13. VOC's (PID): — ppm
14. Effluent GAC 1 VOCs (PID): — ppm
15. Effluent GAC 1 air velocity 158ϕ fpm
16. Effluent GAC 1 flow rate 75.5 acfm
17. Effluent GAC2 VOCs (PID): — ppm
18. Effluent GAC 2 air velocity 128ϕ fpm
19. Effluent GAC 2 flow rate 63.ϕ acfm
20. Well head vacuum: -55 mbars
21. UVB Well Bleed Valve air velocity closed fpm
22. UVB well bleed valve air flow ↓ acfm

Special Remarks:

Site: Camp Lejeune, Site 69

System: UVB-250

Date: 10-23-96

Time: 0900

Local Weather: 70°F Sunny

Field Technician: DL/RW

(A) GROUNDWATER PARAMETERS

1. **Pump status:** on
2. **UVB well water level:** NM cm

MW I.D.	WATER LEVEL ~~(CM)~~ ft	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
17UW	28.83	* 0.20			
17IW	29.0	0.10			
18UW	(cm) 869.5 ~~26.950~~	0.25			
18IW	DNR				
19UW	878.1 (cm)	0.34			
19IW	878.0 (cm)	0.53			
15UW	26.79	*			
15IW	27.00	1.0			
2IW	26.05	0.25			
21UW	25.86	0.34			
21IW	DNR				
16UW	29.57	2.00			
16IW	30.18	0.2			
20UW	27.15	0.0			
20IW	27.34	0.10			

Special Remarks:

* DO meter jumps around. Believed to have a short in the wire

1. **Pump status:** on

2. **UVB well water level:** NM cm

MW I.D.	WATER LEVEL ~~(CM)~~ ft	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
17UW	28.83	* 0.2ø	17.2	6.85	495
17IW	29.ø	ø.1ø	17.2	7.91	295
18UW	(cm) 8[illegible].5 ~~26.95ø~~	ø.25	17.1	6.80	510
18IW	DNR	→	→	→	→
19UW	878.1(cm)	0.34	17.ø	7.05	250
19IW	878.0(cm)	0.53	17.ø	8.41	196
15UW	26.79	*	16.9	6.15	1700
15IW	27.øø	1.ø	17.3	7.70	510
2IW	26.ø5	ø.25	17.1	7.10	340
21UW	25.86	ø.34	17.3	6.69	95
21IW	DNR	→	→	→	→
16UW	29.57	2.øø	17.3	7.30	145
16IW	3ø.18	ø.2	17.5	8.45	360
20UW	27.15	ø.ø	17.1	7.40	325
20IW	27.34	ø.1ø	17.2	9.35	250

Special Remarks:

* DO meter jumps around. Believed to have a Short in the wire

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: FAYAZ LAKHWALA	DATE: 9-30-96
FROM: R. WILLIS	RECIPIENT'S FAX # (904) 934-2420
PAGES: 5 (includes cover sheet)	W.O. #: 11100-001-001-0001

COMMENTS:

9/25/96 O+M sheets.

h:\msw\faxcover.doc

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: Ø cm
3. Inlet pipe stick up: ______ cm
4. Inlet air velocity: 451Ø fpm 2" ID (98.4 acfm)
5. Inlet air temperature: 85.7 °F
6. relative humidity: 40.6 % saturation
7. VOC's (PID): Ø ppm
8. flow rate: 24.6* acfm
9. Effluent air velocity(sample port): ~~1990~~ 3630 fpm 4" ID
10. flow rate: ~~174~~ 316 acfm
11. temperature: 116.3 °F
12. relative humidity: 38.7 % saturation
13. VOC's (PID): NM ppm
14. Effluent GAC 1 VOCs (PID): NM ppm
15. Effluent GAC 1 air velocity 175Ø fpm
16. Effluent GAC 1 flow rate 38.1 acfm
17. Effluent GAC2 VOCs (PID): NM ppm
18. Effluent GAC 2 air velocity 2210 fpm
19. Effluent GAC 2 flow rate 48.3 acfm
20. Well head vacuum: -55 mbars
21. UVB Well Bleed Valve air velocity Closed fpm
22. UVB well bleed valve air flow ↓ acfm

Special Remarks:

OVM needs calibration gases.

Site: Camp Lejeune, Site 69

System: UVB-250

Date: 9-25-96

Time: 1600

Local Weather: High of 80°F, Sunny

Field Technician: Rhoda J. Willis

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON
2. **UVB well water level:** NM cm unable to use W.L. meter down well

MW I.D.	WATER LEVEL (CM)	D.O. (PPM) *	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
17UW	862.6	NM	17.5	7.00	510
17IW	868.6		17.3	7.33	297
18UW	854.3		17.4	6.88	496
18IW	—		—	—	—
19UW	863.5		17.8	8.42	217
19IW	863.5		17.8	8.54	199
15UW	811.2		17.7	6.57	1528
15IW	806.3		17.3	~~6.69~~ 6.96	~~327~~ 559
2IW	779.Ø		18Ø	6.69	327
21UW	772.2		17.6	7.27	118
21IW	—		—	—	118
16UW	883.8		17.8	7.58	134
16IW	992.3		17.5	8.81	303
20UW	812.6		17.5	5.97	318
20IW	818.6		17.5	9.29	265

Special Remarks:

* DO meter not functioning properly.

KGB FIELD MONITORING SHEET

1/2

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 9-25-96 **Day:** Wed.

Time: 1225

Local Weather: 80°F, Sunny

Field Technician: Rhoda Willis

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: ϕ cm
3. Compressor status: ON
4. Compressor air pressure 28 psig
5. Compressor air flow rate 1.0 Scfm
6. KGB effluent air velocity(sample port): 1530 fpm 2" ID
7. flow rate: 33.3 acfm
8. temperature: 107.5 °F
9. relative humidity: 24.7 % saturation
10. VOC's (PID): NM ppm
11. Effluent GAC 1 VOCs (PID): NM ppm
12. Effluent GAC 1 air velocity 1450 fpm 2" ID
13. Effluent GAC 1 flow rate 31.7 acfm
14. KGB Bleed Valve Air Velocity 1170 fpm 1.5" ID
15. KGB bleed valve air flow 25.5 acfm

(B) GROUNDWATER PARAMETERS

9-25-96

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. ~~(°F)~~ °C	pH	CONDUCTIVITY (µMHOS/SEC)
22A	135.3	* NM	24.0	6.09	420
22B	129.4		13.8	4.93	263
24A	126.7		24.0	5.40	533
24B	146.2		23.5	5.89	349
23A	~~197.0~~ 129.6		23.7	5.55	167
23B	DNR				
25A	197.0		23.8	6.09	1088
25B	DNR				

Special Remarks:

* Do meter would not calibrate. Was left without protective casing on probe. Temperature seems to be accurate. Will use only temp from readings.

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: FAYAZ LAKHWALA	DATE: 9/4/96
FROM: DAVID BREWSTER	RECIPIENT'S FAX # 904-934-2420
PAGES: 5 (includes cover sheet)	W.O. #: 11100-003-001

COMMENTS:

Providing quality environmental management and consulting engineering services for over 40 years in the areas of:

Analytical Testing/Characterization	Life Sciences
Air Quality	Strategic Environmental Management
Water quality/Wastewater	Information Management
Hazardous, Solid, Radioactive Wast	Construction/Remediation
Health and Safety	Geosciences

55 Offices Worldwide

h:\msw\faxcover.doc

Site: Camp Lejeune, Site 89

System: KGB-standard

Date: 8/27/96 **Day:** ______

Time: 1315,1459

Local Weather: PARTLY SUNNY, 90s

Field Technician: D. BREWSTER

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Compressor status: ON
4. Compressor air pressure 18 psig
5. Compressor air flow rate 1.7 cfm

2" 6. KGB effluent air velocity(sample port): 1860 fpm

7. flow rate: 40.5 acfm
8. temperature: 110 °F
9. relative humidity: 32.6 % saturation
10. VOC's (PID): 0 ppm

2" 11. Effluent GAC 1 VOCs (PID): 0 ppm

12. Effluent GAC 1 air velocity 1820 fpm
13. Effluent GAC 1 flow rate 39.7 acfm

1.5" 14. KGB Bleed Valve Air Velocity 1370 fpm

15. KGB bleed valve air flow 16.8 acfm

(B) GROUNDWATER PARAMETERS

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
22A	151.5	0.36	22.9	4.74	162
22B	146.1	0.50	22.8	4.32	187
24A	140.5	0.75	22.1	6.12	520
24B	161.0	0.43	22.2	5.91	330
23A	145.1	0.33	22.2	5.46	134
~~23B~~	—	—	—	—	—
25A	161.7	0.40	21.9	6.09	460
~~25B~~	—	—	—	—	—

Special Remarks:

AIR PARAMETERS MEASURED @ 1335

GW PARAMETERS @ 1459

23B, 25B ARE DYE INJECTED WELLS

Site: Camp Lejeune, Site 69

System: UVB-250

Date: 8/26/96, 8/27/96

Time: 1410

Local Weather: OVERCAST, 90

Field Technician: D. BREWSTER

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON
2. **UVB well water level:** NM cm

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. ~~(°F)~~ °C	pH	CONDUCTIVITY (µMHOS/SEC)
17UW	[illegible] ~~929.8~~	0.45	17.4	6.99	494
17IW	942.4	0.25	17.3	7.91	290
18UW	929.8	0.55	17.5	6.81	500
~~18IW~~				~~6.99~~	~~494~~
19UW	938.0	0.42	17.6	7.08	248
19IW	937.5	0.49	17.5	8.31	187
15UW	875.7	0.25	17.3	6.10	1633
15IW	881.7	0.30	17.2	7.73	490
2IW	851.6	1.78	17.3	7.11	326
21UW	850.0	0.25	17.2	6.77	102
~~21IW~~					
16UW	963.0	0.45	17.4	7.37	142
16IW	982.1	0.45 ~~[illegible]~~	17.5	8.46	330
20UW	886.2	0.20	17.1	7.47	320
20IW	891.7	0.35	17.2	9.37	244

DB

Special Remarks:

18IW, 21IW NOT MEASURED. THEY ARE THE DYE INJECTED WELLS.

NM - NOT MEASURED

UVB FIELD MONITORING SHEET

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Inlet pipe stick up: 102.24 cm
4. Inlet air velocity: 4360 fpm
5. Inlet air temperature: 82 °F
6. relative humidity: 72 % saturation
7. VOC's (PID): 0 ppm
4" 8. flow rate: 95.0 acfm
9. Effluent air velocity(sample port): 1380 fpm
10. flow rate: 120 acfm
11. temperature: 114 °F
12. relative humidity: 31 % saturation
13. VOC's (PID): 0 ppm
2" 14. Effluent GAC 1 VOCs (PID): 0 ppm
15. Effluent GAC 1 air velocity 1420 fpm
16. Effluent GAC 1 flow rate 31.1 acfm
2" 17. Effluent GAC2 VOCs (PID): 0 ppm
18. Effluent GAC 2 air velocity 1920 fpm
19. Effluent GAC 2 flow rate 42.0 acfm
20. Well head vacuum: 56 mbars
21. UVB Well Bleed Valve air velocity CLOSED fpm
22. UVB well bleed valve air flow ↓ acfm

Special Remarks:

~~1410~~ 1325 - AIR PARAMETERS MEASURED (8/27)

Roy F. Weston, Inc.
Suite E
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE

TO: FAYAZ LAKHWALA	DATE: 8-20-96
	RECIPIENT'S FAX # 3420
	1100-003-001

COMMENTS:

FAYAZ,

HERE ARE THE FIELD DATA SHEETS FROM THE AUG 15 TRIP TO THE SITE. VOC AIR SAMPLES WERE COLLECTED FROM BOTH SYSTEMS. NOMENCLATURE LISTED BELOW:

1-9VGB-AIR-VOC-0-3 - INFLUENT } SAME FOR UVB.
[illegible]-AIR-VOC-1-3 - EFFLUENT

SAMPLE FROM WELL 14, SHALLOW TAKEN

VOC GROUNDWATER SAMPLES COLLECTED FROM UVB. THOSE WERE LISTED ON THE CHAIN OF CUSTODY AS:

UVB-1 EFFLUENT/SHALLOW (SAMPLE AFTER STRIPPING PLATE)
UVB-2 INFLUENT/DEEP (SAMPLE PRIOR TO PLATE).

[illegible] ANY QUESTIONS (919) 462-6926.

Analytical Testing/Characterization | **Life Sciences**
Air Quality | **Strategic Environmental Management**
Water quality/Wastewater | **Information Management**

[illegible] confidential, privileged or proprietary

[illegible] telephone immediately so that we can arrange for the retrieval of the original documents at no [illegible]. Thank you for your assistance.

Site: Camp Lejeune, Site 89

System: KGB-standard

Date: 8-15-96 **Day:** ______

Time: 1100

Local Weather: Showers 80° Humid

Field Technician: R. Willis

(A) AIR PARAMETERS

1. Blower status: On
2. Water in knock out tank: ∅ cm
3. Compressor status: On
4. Compressor air pressure 5.2 psig
5. Compressor air flow rate 1.0 cfm * Adjusted to 2.1 cfm
6. KGB effluent air velocity(sample port): 3690 fpm
7. flow rate: 80.5 acfm
8. temperature: 98.2 °F
9. relative humidity: 40.9 % saturation
10. VOC's (PID): ∅ ppm
11. Effluent GAC 1 VOCs (PID): ∅ ppm
12. Effluent GAC 1 air velocity 2650 fpm
13. Effluent GAC 1 flow rate 58.0 acfm
14. KGB Bleed Valve Air Velocity ~~2090~~ fpm ~~closed~~ Apw 2090
15. KGB bleed valve air flow ~~46.5~~ acfm Apw 46.5

(B) GROUNDWATER PARAMETERS

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
22A	4.34	1.00	22.0	5.08	172
22B	4.09	0.80	23.0	4.57	201
24A	3.88	0.75	22.5	6.48	572
24B	4.65	0.50	22.0	6.14	343
23A	4.05	0.50	23.5	5.55	162
23B					
25A	4.72	0.95	22.2	6.52	467
25B					

Special Remarks:

Site: Camp Lejeune, Site 88

System: UVB-250

Date: 8-15-96

Time: 1200

Local Weather: 85°F, Humid

Field Technician: Rhoda J. Willis

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON
2. **UVB well water level:** NM cm NOT MEASURED

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
17UW	30.17	2.00	17.8	7.38	544
17IW	30.35	3.50	17.5	7.79	309
18UW	29.86	6.50	17.5	7.22	557
18IW					
19UW	30.14	0.82	18.2	9.12	251
19IW	30.14	0.80	17.9	9.02	227
15UW	28.15	0.30	17.8	7.83	318
15IW	28.35	0.50	17.5	763	520
2IW	27.35	1.35	18.7	7.39	455
21UW	27.37	1.00	17.2	7.09	116
21IW					
16UW	30.99	0.90	17.8	6.96	161
16IW	31.60	1.00	17.9	8.59	336
20UW	28.60	0.28	17.6	7.64	335
20IW	28.70	0.30	17.8	7.39	455

Special Remarks:

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: Ø cm
3. Inlet pipe stick up: 101 cm
4. Inlet air velocity: 391Ø fpm
5. Inlet air temperature: 76.Ø °F
6. relative humidity: 70.6 % saturation
7. VOC's (PID): Ø ppm
8. flow rate: 48.Ø scfm
9. Effluent air velocity(sample port): 205Ø fpm
10. flow rate: 179 scfm
11. temperature: 113.3 °F
12. relative humidity: 30.3 % saturation
13. VOC's (PID): Ø ppm
14. Effluent GAC 1 VOCs (PID): Ø ppm
15. Effluent GAC 1 air velocity 166Ø fpm
16. Effluent GAC 1 flow rate 36.2 acfm
17. Effluent GAC2 VOCs (PID): Ø ppm
18. Effluent GAC 2 air velocity 1080 fpm
19. Effluent GAC 2 flow rate 23.5 acfm
20. Well head vacuum: 3 mbars
21. UVB Well Bleed Valve air velocity closed fpm
22. UVB well bleed valve air flow ↓ acfm

Special Remarks:

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO:	**FAYAZ LAKHWALA**	**DATE:**	**1 August, 1996**
FROM:	**DAVID BREWSTER**	**RECIPIENT'S FAX #**	**(904)934-2420**
PAGES:	**4 (includes cover sheet)**	**W.O. #:**	**11100-003-001**

COMMENTS:

Fayaz,

Enclosed are the groundwater monitoring sheets (air is not included due to power outage at the site) and the "Project Health and Safety Plan" sign-off sheet of the technician that accompanied me this week. The pump to the UVB was checked with the generator we had on-site and it was operational. It doesn't appear that any damage has been done to the equipment.

I spoke with someone from Baker over by their trailers and they told me that site 69 did have power last week but thunderstorms had moved through the area since then and its possible that power could have been knocked out since then. I will leave the generator rental ($106) issue to you and Mike Walker.

There are a few downed trees, one nearly lying on the 16 cluster wells and one across the path between the UVB and KGB systems. Do you expect those to be removed in the near future? Let me know if you have any other questions regarding the site visit.

--David

1/1

Site: Camp Lejeune, Site 69

System: UVB-250

Date: ~~7-30~~ 31-96

Time: ______

Local Weather: SUNNY, 90's

Field Technician: DAVID BREWSTER, DOUG LINCOLN

(A) GROUNDWATER PARAMETERS

1. **Pump status:** OFF
2. **UVB well water level:** ___—___ cm

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. ~~(°F)~~ °C	pH	CONDUCTIVITY (µMHOS/SEC)
30.22 17UW	921.11	0.15	17.6	7.47	599
30.34 17IW	924.76	0.20	17.8	7.52	316
29.89 18UW	911.05	0.35	17.9	6.96	556
18IW	DNR →				
30.19 19UW	920.19	0.25	17.8	7.03	212
30.18 19IW	919.89	0.15	17.8	9.01	192
28.14 15UW	857.71	0.50	17.3	6.29	1630
28.37 15IW	864.72	0.15	17.8	7.52	482
27.35 2IW	833.63	0.30	17.7	7.35	360
27.31 21UW	832.41	0.43	17.5	6.80	102
21IW	DNR →				
30.98 16UW	944.27	0.21	17.5	7.28	199
31.67 16IW	965.30	0.30	17.8	9.15	333
28.47 20UW	867.77	0.15	17.3	7.77	341
28.64 20IW	872.95	0.30	17.4	8.85	274

Special Remarks:

DNR - DID NOT RECORD; 18IW, 21IW ARE DYE INJECTED WELLS

ELECTRICAL POWER, SUPPLIED TO THE SITE, WAS DOWN

KGB, SITE 69 - CAMP LEJEUNE ~~2/2~~ DB 1/1

(B) GROUNDWATER PARAMETERS 7-31, 8-1-96

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. ~~(°F)~~ °C	pH	CONDUCTIVITY (μMHOS/SEC)
4.23' 22A	128.93	0.45	19.9	5.12	173
4.07' 22B	124.05	0.45	22.4	4.55	193
3.95 24A	120.40	0.15	20.9	6.05	416
4.56 24B	138.99	1.40	18.6	6.07	138
4.00 23A	121.92	0.20	22.8	5.70	255
23B	DNR				
4.55 25A	138.68	0.50	18.9	6.55	597
25B	DNR				

Special Remarks:

DNR - DID NOT RECORD. 23B, 25B ARE DYE INJECTED WELLS.

WESTON
MANAGERS DESIGNERS/CONSULTANTS
Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: FAYAZ LAKHWALA	DATE: 7-3-96
FROM: DAVID BREWSTER	RECIPIENT'S FAX # (904)934-2420
PAGES: 5 (includes cover sheet)	W.O. #: 11100-003-001

COMMENTS:

FAYAZ,

HERE ARE THE DATA SHEETS FROM MY VISIT THIS WEEK. SAMPLING IS SCHEDULED FOR NEXT WEEK. COULD YOU HAVE THE 4 SUMMA CANISTERS AND 2-4 REGULATORS/CRITICAL ORIFICES SENT TO HAMPTON INN IF THEY ARE NOT ALREADY ENROUTE TO RALEIGH? COULD YOU ALSO SHIP THE PH/COND. METER IF IT HASN'T BEEN SHIPPED TO RALEIGH? THANKS.

474 WESTERN BLVD, JACKSONVILLE, NC 28540, 910-347-650

- DAVID

h:\msw\faxcover.doc

(B) GROUNDWATER PARAMETERS

MONITOR ORDER	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F) °C	pH	CONDUCTIVITY ~~(µMHOS/SEC)~~ APPROXIMATE	PPM
1	22A	229.6	0.31	67.8 19.9	4.92	~150	124
2	22B	223.8	0.55	69.1 20.6	4.33	~155	126
6	24A	220.9	0.20	65.3 18.5	5.80	~400	274
5	24B	256.4	0.18	63.0 17.2	5.51	~249	163
4	23A	222.5	0.25	68.5 20.3	5.53	~150	118
	23B	DNR →					
3	25A	243.5	0.16	66.0 18.9	5.87	~451	295
	25B	DNR →					

Special Remarks:

1315 COMPRESSOR ADJUSTED FROM 0.6 cfm, 2.0 psi TO 2.6 cfm, 5 psi
1630- AIR PARAMETERS MEASURED
1640- GW PARAMETERS MEASURED

KGB FIELD MONITORING SHEET

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 7-2-96 **Day:** ______

Time: 1620

Local Weather: CLOUDY ~~RAIN~~, 90's

Field Technician: DAVID BREWSTER

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Compressor status: ON
4. Compressor air pressure 5 psig
5. Compressor air flow rate 2.6 cfm
6. KGB effluent air velocity(sample port): 4440 fpm 2"
7. flow rate: 97.0 acfm
8. temperature: 100.2 °F
9. relative humidity: 48.1 % saturation
10. VOC's (PID): ______ ppm
11. Effluent GAC 1 VOCs (PID): ______ ppm 2"
12. Effluent GAC 1 air velocity 2730 fpm
13. Effluent GAC 1 flow rate 59.5 acfm
14. KGB Bleed Valve Air Velocity 2860 fpm 1.5"
15. KGB bleed valve air flow 35.1 acfm

Site: Camp Lejeune, Site 69

System: UVB-250

Date: 7-3-96

Time: 0920 0945

Local Weather: PARTLY CLOUDY, 90's

Field Technician: DAVID BREWSTER

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON
2. **UVB well water level:** DNR cm

MONITOR ORDER	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F) °C	pH	CONDUCTIVITY ~~σ~~ (µMHOS/SEC) APPROXIMATE	PPM
7	17UW	1026.2	0.80	64.0 17.8	7.13	~450	294
8	17IW	1030.0	0.25	63.5 17.5	7.27	~295	212
6	18UW	1014.9	0.30	64.0 17.8	7.18	~399	333
	18IW	DNR →					
4	19UW	1022.6	0.25	64.0 17.8	9.04	~200	142
5	19IW	1022.3	0.20	64.0 17.8	8.81	~~~200~~ ~150	113
	15UW	965.3	0.20	63.5 17.5	6.14	~1400	985
12	15IW	970.8	~~0.3~~ 1.53	63.1 17.3	6.92	~400	279
1	2IW	944.8	~~2.73~~ [illegible]	63.5 17.5	6.37	~325	226
11	21UW	942.8	0.25	63.1 17.3	7.27	~99	76
	21IW	DNR →					
10	16UW	1051.1	0.20	63.7 17.6	7.45	~150	96
9	16IW	1070.0	0.20	63.7 17.6	8.01	~299	202
2	20UW	979.3	0.28	63.1 17.3	6.66	~300	225
3	20IW	985.4	0.30	63.1 17.3	9.75	~298	198

Special Remarks:

DNR - DID NOT RECORD; 18IW, 21I ARE DYE INJECTED WELLS

0945 - BEGIN GW PARAMETERS

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm ~~40.25"~~ DB
3. Inlet pipe stick up: 102.24 cm 40.25"
4. Inlet air velocity: 4400 fpm 2"
5. Inlet air temperature: 76.5 °F
6. relative humidity: 85.9 % saturation
7. VOC's (PID): 0 ppm
8. flow rate: 960 acfm 1730
9. Effluent air velocity(sample port): ~~4630~~ DB fpm 4"
10. flow rate: 151 acfm
11. temperature: 111.8 °F
12. relative humidity: 34.3 % saturation
13. VOC's (PID): 0 ppm
14. Effluent GAC 1 VOCs (PID): 0 ppm 2"
15. Effluent GAC 1 air velocity 1610 fpm
16. Effluent GAC 1 flow rate 35.1 acfm
17. Effluent GAC2 VOCs (PID): 0 ppm 2"
18. Effluent GAC 2 air velocity 1260 fpm
19. Effluent GAC 2 flow rate 27.5 acfm
20. Well head vacuum: -54 mbars
21. UVB Well Bleed Valve air velocity CLOSED fpm
22. UVB well bleed valve air flow ↓ acfm

Special Remarks:

0920 - BEGIN AIR PARAMETERS

6/18- 6/19

Site: Camp Lejeune, Site 69
System: UVB-250
Date: 6-19-96
Time: 0825-1030
Local Weather: 87°, Cloudy, Rain
Field Technician: Rhoda Willis

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON
2. **UVB well water level:** DNR cm

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. ~~(°F)~~ °C	pH	CONDUCTIVITY ~~(µMHOS/SEC)~~ PPM
17UW	1002.3	1.0	18.1	7.57	296
17IW	1009.8	0.15	17.9	7.38	184
18UW	995.4	0.20	17.9	7.01	356
18IW	DNR				
19UW	1004.7	0.75	17.8	9.04	156
19IW	1004.3	0.20	17.8	5.65	189
15UW	941.2	0.20	17.8	6.20	978
15IW	950.7	0.20	17.2	7.00	250
2IW	920.5	1.25	17.3	6.58	250
21UW	924.9	0.20	17.3	7.15	75
21IW	DNR				
16UW	1027.1	0.20	17.8	7.45	101
16IW	1048.9	0.20	17.4	8.26	189
20UW	949.9	0.15	17.5	7.04	215
20IW	961.4	0.22	17.3	9.65	194

828

3. Special Remarks:

UVB FIELD MONITORING SHEET

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Inlet pipe stick up: ______ cm
4. Inlet air velocity: 3420 fpm
5. Inlet air temperature: 77.4 °F
6. relative humidity: 91.1 % saturation
7. VOC's (PID): 0 ppm
8. flow rate: 77.5 acfm
9. Effluent air velocity(sample port): 2120 fpm
10. flow rate: 105 acfm
11. temperature: 91.0 °F
12. relative humidity: 46.7 % saturation
13. VOC's (PID): 0 ppm
14. Effluent GAC 1 VOCs (PID): 0 ppm
15. Effluent GAC 1 air velocity 2130 fpm
16. Effluent GAC 1 flow rate 46.4 acfm
17. Effluent GAC2 VOCs (PID): 0 ppm
18. Effluent GAC 2 air velocity 1470 fpm
19. Effluent GAC 2 flow rate 32.4 acfm
20. Well head vacuum: -55 mbars
21. UVB Well Bleed Valve air velocity CLOSED fpm
22. UVB well bleed valve air flow ↓ acfm

Special Remarks:

(B) GROUNDWATER PARAMETERS

	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. ~~(°F)~~ °C	pH	CONDUCTIVITY ~~(µMHOS/SEC)~~ PPM
3	22A	212.4	Ø.18	2Ø.8	4.68	106
2	22B	207.3	Ø.19	21.Ø	4.38	138
5	24A	2Ø5.6	Ø.19	19.5	5.75	275
4	24B	238.Ø	0.2Ø	18.9	5.39	167
6	23A	208.7	Ø.2Ø	19.2		
	23B	DNR →				
1	25A	227.5	Ø.23	17.5	5.67	332
	25B	DNR →				

Special Remarks:

DNR - DID NOT RECORD - 23B, 25B ARE DYE INJECTED WELLS.

KGB FIELD MONITORING SHEET

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 6-18-96 **Day:** ______

Time: 1440

Local Weather: 90°, Sunny Humid

Field Technician: D. Willis

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: Ø cm
3. Compressor status: on
4. Compressor air pressure 4.5 psig 4-6 psi
5. Compressor air flow rate 2.8 cfm 2-3.5 cfm
6. KGB effluent air velocity(sample port): 2630 fpm
7. flow rate: 57.5 acfm
8. temperature: 103.5 °F
9. relative humidity: 45.7 % saturation
10. VOC's (PID): Ø ppm
11. Effluent GAC 1 VOCs (PID): Ø ppm
12. Effluent GAC 1 air velocity 2490 fpm
13. Effluent GAC 1 flow rate 54.5 acfm
14. KGB Bleed Valve Air Velocity 1740 fpm
15. KGB bleed valve air flow 32.9 acfm

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: FAYAZ LAKHWALA	DATE: 14 June, 1996
FROM: DAVID BREWSTER	RECIPIENT'S FAX # (904)934-2420
PAGES: 5 (includes cover sheet)	W.O. #: 11100-003-001

COMMENTS:

Fayaz,

Attached are the field monitoring sheets from June 12, 1996 site visit. I gave a copy to Al Anderson, IEG, at his request. We attached the flow meter to the UVB pump and removed sand from the KGB system. Let me know if you have any questions.

–David

h:\msw\fmcover.doc

Site: Camp Lejeune, Site 69
System: UVB-250
Date: 6/12/96
Time: 1027, 1050
Local Weather: PARTLY CLOUDY, 80s
Field Technician: DAVID BREWSTER

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON!
2. **UVB well water level:** DNR cm

MONITOR ORDER	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F) °C	pH	CONDUCTIVITY (μMHOS/SEC) PPM
7	17UW	997.1	1.13	63.5 17.5	7.21	290
8	17IW	1001.1	0.13	63.5 17.5	7.37	196
6	18UW	986.1	0.15	63.7 17.6	7.07	342
	18IW	DNR →				
4	19UW	995.0	0.60	64.0 17.8	9.17	144
5	19IW	994.9	0.15	63.7 17.6	9.05	116
13	15UW	936.4	0.15	63.1 17.3	6.20	1041
12	15IW	941.4	0.15	63.1 17.3	7.07	268
1	2IW	913.0	1.30	63.5 17.5	6.62	235
11	21UW	918.9	0.15	63.1 17.3	7.18	69
	21IW	DNR	—			
10	16UW	1022.1	0.15	63.5 17.5	7.47	97
9	16IW	1040.8	0.15	63.9 17.7	8.26	199
2	20UW	946.9	0.15	63.1 17.3	7.06	216
3	20IW	951.4	0.20	63.5 17.5	9.62	189

Special Remarks:

1050 BEGIN GW PARAMETERS - UVB

DNR INJECTION WELLS, 18IW, 21IW = DID NOT RECORD

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Inlet pipe stick up: 97.79 cm 38.5"
4. Inlet air velocity: 4570 fpm 2"
5. Inlet air temperature: 80.4 °F
6. relative humidity: 78.5 % saturation
7. VOC's (PID): 0 ppm
8. flow rate: 99.5 acfm
9. Effluent air velocity(sample port): 1390 fpm 4"
10. flow rate: 121 acfm
11. temperature: 114 °F
12. relative humidity: 31.6 % saturation
13. VOC's (PID): 0 ppm
14. Effluent GAC 1 VOCs (PID): 0 ppm
15. Effluent GAC 1 air velocity 1500 fpm 2"
16. Effluent GAC 1 flow rate 32.7 acfm
17. Effluent GAC2 VOCs (PID): 0 ppm
18. Effluent GAC 2 air velocity 1490 fpm
19. Effluent GAC 2 flow rate 32.5 acfm
20. Well head vacuum: -55 mbars
21. UVB Well Bleed Valve air velocity CLOSED fpm
22. UVB well bleed valve air flow ↓ acfm

Special Remarks:

1027 BEGIN RECORDING AIR PARAMETERS — UVB

KGB FIELD MONITORING SHEET

1/K

Site: Camp Lejeune, Site 69
System: KGB-standard
Date: 6/12/96 **Day:** ______
Time: 1535,1545
Local Weather: PARTLY CLOUDY 80'S
Field Technician: DAVID BREWSTER

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Compressor status: ON.
4. Compressor air pressure 7 psig
5. Compressor air flow rate 2.2 cfm
6. KGB effluent air velocity(sample port): 3000 fpm 2"
7. flow rate: 65.5 acfm
8. temperature: 104.3 °F
9. relative humidity: 38.5 % saturation
10. VOC's (PID): 0 ppm
11. Effluent GAC 1 VOCs (PID): 0 ppm
12. Effluent GAC 1 air velocity 2760 fpm 2"
13. Effluent GAC 1 flow rate 60.0 acfm
14. KGB Bleed Valve Air Velocity 2440 fpm 1.5
15. KGB bleed valve air flow 30.0 acfm

(B) GROUNDWATER PARAMETERS

MONITOR ORDER	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F) °C	pH	CONDUCTIVITY (µMHOS/SEC) PPM
1	22A	200.5	0.16	62.8 17.1	4.66	111
2	22B	196.0	0.18	63.7 17.6	4.38	125
5	24A	192.4	0.18	65.1 18.4	5.88	297
	24B	216.8	0.18	62.2 16.8	5.65	161
4	23A	193.7	0.15	64.6 18.1	5.49	108
	23B	DNR →				
3	25A	212.0	0.15	62.2 16.8	6.00	306
	25B	DNR →				

Special Remarks:

1535 - KGB AIR PARAMETERS
1545 - KGB GW PARAMETERS
DNR - DID NOT RECORD. 23B & 25B ARE DYE INJECTED WELLS

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO:	FAYAZ LAKWHALA	DATE:	7 June, 1996
FROM:	DAVID BREWSTER	RECIPIENT'S FAX #	(904)934-2420
PAGES: 6 (includes cover sheet)		W.O. #:	11100-003-001

COMMENTS:

Fayaz,

Please find data monitoring sheets from Site 69 visit 5,6 June. Sorry I didn't get these out to you today; I was looking for a conversion between TDS (ppm) and Micromhos. The conversion chart you were referring to looks to be the calibration curves for Myron L.'s meters. It isn't very precise. I've included it in this fax so you can take a look at it. I recorded the TDS reading under the "Conductivity" columns on the data sheet in the lower right hand corner with the intention of converting the data when I returned to the office. I haven't found one yet but will continue to look.

Here's some interesting news: 17 IW is no longer alone. 16 UW now has a bailer down its well also. I attempted to retrieve it both days I was out there and had no luck. I was hoping that it would be easier since it is in a shallow well. I will continue my attempts to retrieve the bailer on my weekly visits. The charcoal sampler was removed before the bailer was lost and a fresh sampler was placed down the well and probably sitting above the bailer. If you will recall, the well screen is 10'. The bailers are about 1.5'-2' maximum, so this should not present a major problem. Let me know if you have any questions or comments.

--David

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 6-5-96 **Day:** ______

Time: 1540, 1620

Local Weather: SUNNY, 80s

Field Technician: DAVID BREWSTER

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Compressor status: ON
4. Compressor air pressure ~~2.5~~ 7 psig
5. Compressor air flow rate 2.5 cfm
6. KGB effluent air velocity(sample port): 3180 fpm 2"
7. flow rate: 69.5 acfm
8. temperature: 105.3 °F
9. relative humidity: 29.5 % saturation
10. VOC's (PID): 0 ppm
11. Effluent GAC 1 VOCs (PID): 0 ppm
12. Effluent GAC 1 air velocity 2560 fpm 2"
13. Effluent GAC 1 flow rate 56.0 acfm
14. KGB Bleed Valve Air Velocity 2320 fpm 1.5"
15. KGB bleed valve air flow 28.5 acfm

(B) GROUNDWATER PARAMETERS

MONITORING ORDER	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F) °C	pH	CONDUCTIVITY (µMHOS/SEC) PPM
1	22A	205.1	0.20	64.2 17.9	5.28	123
2	22B	200.3	0.18	62.4 16.9	4.79	124
5	24A	199.0	0.11	61.7 16.5	6.13	336
4	24B	226.2	0.25	62.4 16.9	5.72	162
6	23A	201.2	0.20	62.6 17.0	5.69	118
	23B	DNR →				~~162~~
3	25A	218.8	0.15	61.7 16.5	5.92	258
	25B	DNR →				

Special Remarks:

AIR MONITORING BEGUN @ 1540
DNR - DID NOT RECORD, INJECTION WELLS.

GW MONITORING BEGUN @ 1620

Site: Camp Lejeune, Site 69

System: UVB-250

Date: 6-6-96

Time: 1000, 1020

Local Weather: SUNNY, 80s

Field Technician: DAVID BREWSTER

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON
2. **UVB well water level:** DNR cm

MONITOR ORDER	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F) °C	pH	CONDUCTIVITY (µMHOS/SEC) ppm
7	17UW	993.0	0.53	63.7 17.6	7.32	299
8	17IW	998.2	0.13	63.7 17.6	7.44	198
6	18UW	982.1	0.10	64.0 17.8	7.28	841
	18IW	DNR →				
4	19UW	990.9	0.55	64.2 17.9	9.27	148
5	19IW	990.6	0.10	64.0 17.8	9.09	115
13	15UW	931.5	0.10	63.3 17.4	6.42	1056
12	15IW	935.1	0.15	63.5 17.6	7.39	268
~~1020~~	2IW	909.2	0.63	64.2 17.9	6.21	220
11	21UW	914.7	0.10	63.5 17.5	7.68	10
	21IW	DNR →				
10	16UW	1019	1.40	64.0 17.8	7.92	135
9	16IW	1037	~~0.130~~ 0.10	64.0 17.8	8.09	202
3	20UW	942.1	0.10	63.1 17.3	7.89	219
2	20IW	947.3	0.08	63.3 17.4	9.59	185

Special Remarks:

- DNR - DID NOT RECORD
- 1000 - AIR PARAMETERS RECORDED
- 1020 - GW PARAMETERS RECORDED
- BAILER PRESENTLY DOWN IN 16UW. CHARCOAL SAMPLER PLACED ON TOP OF BAILER. I WILL CONTINUE TO ATTEMPT BAILER RETRIEVAL

UVB FIELD MONITORING SHEET

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Inlet pipe stick up: 101.6 cm
4. Inlet air velocity: 5250 fpm
5. Inlet air temperature: 81.1 °F
6. relative humidity: 65.3 % saturation
7. VOC's (PID): 0 ppm
8. flow rate: 115 * acfm
9. Effluent air velocity(sample port): 1600 fpm
10. flow rate: 35.0 acfm
11. temperature: 114.8 °F
12. relative humidity: 27.3 % saturation
13. VOC's (PID): 0 ppm
14. Effluent GAC 1 VOCs (PID): 0 ppm
15. Effluent GAC 1 air velocity 2020 fpm
16. Effluent GAC 1 flow rate 44.1 acfm
17. Effluent GAC2 VOCs (PID): 0 ppm
18. Effluent GAC 2 air velocity 1860 fpm
19. Effluent GAC 2 flow rate 40.6 acfm
20. Well head vacuum: -55 mbars
21. UVB Well Bleed Valve air velocity CLOSED fpm
22. UVB well bleed valve air flow CLOSED acfm

Special Remarks:

WESTON MANAGERS DESIGNERS/CONSULTANTS

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO:	FAYAZ LAKHWALA	DATE:	3 June, 1996
FROM:	DAVID BREWSTER	RECIPIENT'S FAX #	(904)934-2420
PAGES:	5 (includes cover sheet)	W.O. #:	11100-003-001

COMMENTS:

Fayaz,

Attached are the field monitoring sheets from 5-30,31 visit. ~~Eye~~ VOCs samples were shipped via FedEx, priority overnight, on Thursday. I requested that the lab include the results with the sampling event from the previous week. The pH/Conductivity meter could not be calibrated during the last visit. I called MYRON L. (the manufacturer) and they said it sounds like a bad sensor. However, they suggest that the meter be returned to them for an inspection and/or repair if needed. I'll need a another meter for this week's monitoring in the mean time. I plan on traveling to Jacksonville on Wednesday. Call if you have any questions.

--David

h:\msw\faxcover.doc

Site: Camp Lejeune, Site 69

System: UVB-250

Date: 5-31-96

Time: 0856,1140

Local Weather: SUNNY, 70s

Field Technician: DAVID BREWSTER

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON
2. **UVB well water level:** DNR cm

MONITOR ORDER	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
10	17UW	984.8	0.15	64.0	DNR	DNR
11	17IW	988.8	0.15	64.0		
Ø9	18UW	974.1	0.10	64.0		
	18IW	DNR				
Ø4	19UW	983.3	0.15	64.0		
Ø5	19IW	983.0	0.15	64.0		
12	15UW	922.6	0.13	63.1		
13	15IW	928.7	0.15	63.5		
Ø1	2IW	900.1	0.91	63.7		
Ø8	21UW	907.1	0.10	63.5		
	21IW	DNR				
Ø7	16UW	1011	0.13	63.1		
Ø6	16IW	1029	0.20	63.1		
Ø2	20UW	933.3	0.15	63.5		
Ø3	20IW	930.2	0.10	63.1		

Special Remarks:

DNR - DID NOT RECORD
18 IW, 21 IW, DYE INJECTION WELLS

pH/COND METER WILL NOT ZERO - MANUFACTURER CALLED AND SAID IT COULD BE A BAD SENSOR.

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Inlet pipe stick up: 101.6 cm 40"
4. Inlet air velocity: 5250 fpm 2"
5. Inlet air temperature: 66.7 °F
6. relative humidity: 42.0 % saturation
7. VOC's (PID): 0 ppm
8. flow rate: 114 acfm
9. Effluent air velocity(sample port): 2130 fpm 4"
10. flow rate: 186 acfm
11. temperature: ~~66.7~~ 101.8
12. relative humidity: ~~42.0~~ % saturation ~~30.3~~ 29.2
13. VOC's (PID): 0 ppm
14. Effluent GAC 1 VOCs (PID): 0 ppm
15. Effluent GAC 1 air velocity 1690 fpm 2"
16. Effluent GAC 1 flow rate 36.9 acfm
17. Effluent GAC2 VOCs (PID): 0 ppm 2"
18. Effluent GAC 2 air velocity 1830 fpm
19. Effluent GAC 2 flow rate 39.8 acfm
20. Well head vacuum: -55 mbars
21. UVB Well Bleed Valve air velocity CLOSED fpm
22. UVB well bleed valve air flow ________ acfm

Special Remarks:

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 5-31-96 **Day:** ________

Time: 0840, 0920

Local Weather: SUNNY, 70s

Field Technician: DAVID BREWSTER

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Compressor status: ON
4. Compressor air pressure 7 psig
5. Compressor air flow rate 2.5 cfm
6. KGB effluent air velocity(sample port): 3280 fpm 2"
7. flow rate: 71.5 acfm
8. temperature: 87.3 °F
9. relative humidity: 28.7 % saturation
10. VOC's (PID): ________ ppm
11. Effluent GAC 1 VOCs (PID): ~~1720~~ DB ppm 2"
12. Effluent GAC 1 air velocity 1720 fpm
13. Effluent GAC 1 flow rate 37.4 acfm
14. KGB Bleed Valve Air Velocity 3370 fpm 1.5"
15. KGB bleed valve air flow 41.4 acfm

(B) GROUNDWATER PARAMETERS

MONITOR ORDER	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
Ø1	22A	195.4	0.18	64.0	DNR	DNR
Ø2	22B	190.2	0.15	64.0		
Ø5	24A	187.8	0.15	63.1		
Ø6	24B	210.9	0.18	62.2		
Ø4 ~~Ø3~~	23A	189.3	0.26	66.0		
	23B	DNR				
Ø3	25A	205.1	0.13	61.7		
	25B	DNR				

Special Remarks:

DNR - DID NOT RECORD
- 23B INJECTION WELL
- 25B INJECTION WELL

PH / COND METER WILL NOT ZERO - MANUFACTURERS SAY IT COULD BE A BAD SENSOR

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO:	FAYAZ LAKHWALA	DATE:	24 May, 1996
FROM:	DAVID BREWSTER	RECIPIENT'S FAX #	(904)934-2420
PAGES:	5 (includes cover sheet)	W.O. #:	11100-003-001

COMMENTS:

Fayaz,

Please find the following transmittals: air and groundwater parameters of UVB/KGB systems performed May 21-23.

VOC samples were not collected from the injection wells. VOC samples were attempted from 18 IW but the dye reacted with the preservative in the sample vial. We didn't have any unpreserved bottles. The dye concentration in 18 IW was still very high based on the observed purge water when hand bailing the well. Also, the circuits began tripping when the Grundfos pump and controller were used on the second day of sampling (after about five wells). OHM was on-site at the circuit boxes Tuesday and Wednesday mornings. I'm not sure whether there was anything wrong with the power supply or if OHM was performing routine maintenance but I thought they might know if anything was wrong.

Finally, the charcoal samplers and their accompanied water samples were shipped via FedEx Thursday morning and the VOC air and water samples were shipped FedEx also on Thursday afternoon. I will try to call you at your office with a few minor questions and any comments you may have about this past sampling event.

--David

h:\msw\faxcover.doc

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: Ø cm
3. Inlet pipe stick up: 40" cm
4. Inlet air velocity: 4420 fpm 2"
5. Inlet air temperature: 83.5 °F
6. relative humidity: 65.5 % saturation
7. VOC's (PID): Ø ppm
8. flow rate: 96.5 acfm
9. Effluent air velocity(sample port): 134Ø fpm 4"
10. flow rate: 117 acfm
11. temperature: 118.4 °F
12. relative humidity: 27.2 % saturation
13. VOC's (PID): 0 ppm
14. Effluent GAC 1 VOCs (PID): 0 ppm
15. Effluent GAC 1 air velocity 174Ø fpm 2"
16. Effluent GAC 1 flow rate 38.Ø acfm
17. Effluent GAC2 VOCs (PID): 0 ppm
18. Effluent GAC 2 air velocity ~~[illegible]~~ 135Ø fpm 2"
19. Effluent GAC 2 flow rate 29.4 acfm
20. Well head vacuum: 55 mbars
21. UVB Well Bleed Valve air velocity CLOSED fpm
22. UVB well bleed valve air flow Closed acfm

Special Remarks:

AIR PARAMETERS MEASURED ON 5-21-96

Site: Camp Lejeune, Site 88

System: UVB-250

Date: 5-21-96, 5-22

Time: LISTED BELOW

Local Weather: SUNNY, 90s

Field Technician: DAVID BREWSTER

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON
2. **UVB well water level:** DNM cm

TIME	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)	DATE
0913	17UW	975.1	0.52	64.2	7.40	421	5-22
0916	17IW	981.5	2.1	66.0	7.69	297	5-22
0911	18UW	964.4	0.65	64.8	7.20	498	5-22
	INJ. WELL 18IW	DNR →					
1410	19UW	972.3	0.15	64.2	8.95	203	5-21
1413	19IW	974.4	0.52	68.4	9.74	153	5-21
0929	15UW	912.89	0.53	63.5	6.32	1429	5-22
0926	15IW	918.4	0.25	63.9	7.27	397	5-22
1310	2IW	899.2	1.60	71.2	7.90	309	5-21
0924	21UW	913.8	1.33	64.0	7.06	185	5-22
	INJ. WELL 21IW	DNR →					
0918	16UW	1000	0.30 ~~1.59~~	64.~~4~~0	7.27	185	5-22
0920	16IW	1019	1.59	64.4	8.84	261	5-22
1400	20UW	922.3	0.75	66.6	7.94	316	5-21
1355	20IW	926.3	0.95	64.4	8.61	265	5-21

Special Remarks:

1. DNM - DID NOT MEASURE
2. DNR - DID NOT RECORD
3. EACH PARAMETER WAS MEASURED PRIOR TO OR IMMEDIATELY AFTER SAMPLE COLLECTION

KGB FIELD MONITORING SHEET

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 5-21-96, 5-22 **Day:** ________

Time: 1120

Local Weather: SUNNY, 90s

Field Technician: DAVID BREWSTER

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Compressor status: ON
4. Compressor air pressure 5 psig
5. Compressor air flow rate 1.8 cfm 2940
6. KGB effluent air velocity(sample port): ~~1960~~ fpm 2"
7. flow rate: ~~42.8~~ acfm 64.0
8. temperature: 107.7 °F
9. relative humidity: 33.5 % saturation
10. VOC's (PID): ∅ ppm
11. Effluent GAC 1 VOCs (PID): ∅ ppm
12. Effluent GAC 1 air velocity 2230 fpm
13. Effluent GAC 1 flow rate 48.7 acfm 2"
14. KGB Bleed Valve Air Velocity 2250 fpm 1.5"
15. KGB bleed valve air flow 27.7 acfm

(B) GROUNDWATER PARAMETERS

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (μMHOS/SEC)
22A	186.5	1.08	59.4	5.~~40~~ 32 DB	~~187~~ DB 163
22B	182.9	0.43	59.0	4.75	429
24A	186.5	1.65	59.9	6.47	507
24B	208.5	2.45	59.2	6.03	227
23A	182.9	0.60	61.7	5.87	203
INJECTION WELL 23B	DNR	→			→
25A	196.3	DNR	DNR	6.37	414
INJECTION WELL 25B	DNR	→			→

Special Remarks:

1. COMPRESSOR ADJUSTED TO 7 psig, 2.7 cfm 5-21-96
2. AIR PARAMETERS MEASURED 5-21-96
3. GROUNDWATER PARAMETERS & SAMPLING PERFORMED ON 5-22-96, EXCEPT 22B - PERFORMED 5-23
4. DNR - DID NOT RECORD

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO:	**FAYAZ LAKHWALA**	**DATE:**	**17 May, 1996**
FROM:	**DAVID BREWSTER**	**RECIPIENT'S FAX #**	**(904)934-2420**
PAGES:	**8 (includes cover sheet)**	**W.O. #:**	**11100-003-001**

COMMENTS:

Fayaz,

This transmittal contains the following information: monitoring sheets from May 10 and 15, signed health and safety plan from additional personnel on site May 10.

The Baker purge water tanks were still full of water the last time I was on site. I called this morning and left a message for Gordon explaining that the tanks needed to either be emptied or arrange for an additional tank to be brought on site. Also, I spoke with Tom Aley last week about cross contamination minimization options during monitoring and sampling. He suggests using a separate D.O. and water meter for the injection wells. You may want to give him a call at your earliest convenience and get back to me for the final procedure. Sampling is tentatively set for Tues. - Thurs. (May 21-23) whether or not we end up using additional equipment or not, I plan on sampling all injection wells last.

If you haven't sent the summa canisters to Raleigh yet, you can ship those to Holiday Inn. If they're in route already, don't worry about it. There is a slim possibility that I will not be in the office on Monday. If I am not in, I will call you to make sure everything is ready to go. Welcome back from your vacation!! I hope everything went well!!!

h:\msw\faxcover.doc

Site: Camp Lejeune, Site 89

System: UVB-250

Date: 5-15-96

Time: 0955, 1015

Local Weather: OVERCAST, 60s

Field Technician: DAVID BREWSTER

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON
2. **UVB well water level:** DNR cm

	MW I.D.	WATER LEVEL (CM)	D.O. (PPM) mg/L	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
10	17UW	967.7	0.15 ~~0.13~~	63.7 17.6	7.56	388
9	17IW	972.3	0.15	64.0 17.8	7.57	298
12	18UW	957.1	0.20	64.0 17.8	7.31	416
11	18IW	DNR				
1246	19UW	967.1	0.18	64.2 17.9	9.94	~~0~~ 226
1255	19IW	966.5	0.15	64.0 17.8	9.67	153
4	15UW	904.3	0.15	63.1 17.5	6.26	1594
5	15IW	911.7	0.19	63.1 17.3	7.72	433
1	2IW	882.7	0.15 ~~0.29~~	63.5	7.43	334
6	21UW	887.9	0.05	63.1 17.3	6.94	103
7	21IW	DNR				
8	16UW	493.3	0.25 ~~0.45~~	17.5	6.[illegible]	121
7	16IW	1012	0.16	63.7 17.6	8.97	297
2	20UW	916.2	0.20	~~47.3~~ 63.[illegible]	7.62	335
3	20IW	919.6	0.20	63.1 17.5	10.09	213

Special Remarks:

1015 BEGIN GW PARAMETERS ON UVB

DNR - DID NOT RECORD. DYE INJECTED WELLS. 18IW, 21IW

TIME OR NUMBER TO THE LEFT OF MWID. COLUMN DENOTES TIME OR ORDER THE WELL WAS MONITORED.

5-15-96

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Inlet pipe stick up: 101.6 cm
4. Inlet air velocity: 5650 fpm 2"
5. Inlet air temperature: 63.0 °F
6. relative humidity: 50.6 % saturation
7. VOC's (PID): 0 ppm
8. flow rate: 123 acfm
9. Effluent air velocity(sample port): 1320 fpm 4"
10. flow rate: 115 acfm
11. temperature: 97.7 °F
12. relative humidity: 30.2 % saturation
13. VOC's (PID): 0 ppm
14. Effluent GAC 1 VOCs (PID): 0 ppm
15. Effluent GAC 1 air velocity 2350 fpm 2
16. Effluent GAC 1 flow rate 51.5 acfm
17. Effluent GAC2 VOCs (PID): 0 ppm 2
18. Effluent GAC 2 air velocity 1870 fpm
19. Effluent GAC 2 flow rate 40.9 acfm
20. Well head vacuum: -55 mbars
21. UVB Well Bleed Valve air velocity CLOSED fpm
22. UVB well bleed valve air flow CLOSED acfm

Special Remarks:

0955 BEGIN AIR PARAMETERS ON UVB

KGB FIELD MONITORING SHEET

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 5-15-96 **Day:** ______

Time: 0930, 1505

Local Weather: OVERCAST, 60s

Field Technician: DAVID BREWSTER

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Compressor status: ON
4. Compressor air pressure 7 psig
5. Compressor air flow rate 2.5 cfm
6. KGB effluent air velocity(sample port): 2940 fpm 2"
7. flow rate: 64.0 acfm
8. temperature: 82.4 °F
9. relative humidity: 31.5 % saturation
10. VOC's (PID): 0 ppm
11. Effluent GAC 1 VOCs (PID): 0 ppm 2"
12. Effluent GAC 1 air velocity 3230 fpm
13. Effluent GAC 1 flow rate 70.5 acfm
14. KGB Bleed Valve Air Velocity 2830 fpm 1.5
15. KGB bleed valve air flow 34.8 acfm

5-15-96

(B) GROUNDWATER PARAMETERS

	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
1505	22A	177.7	0.33	60.4 15.8	4.65	156
1537	22B	171.3	0.15	59.4 15.2	4.35	186
1630	24A	168.6	0.16	58.8 14.9	6.08	392
1615	24B	200.4	0.15	57.7 14.3	5.79	231
1647	23A	171.6	0.20	59.9 15.5	5.56	151
	23B	DNR				
1554	25A	192.0	0.13	57.7 14.3	6.13	367
	25B	DNR				

Special Remarks:

0930 - AIR PARAMETERS MEASURED (KGB)

1505 - GW PARAMETERS MEASURED (KGB)

TIMES TO THE LEFT OF MW I.D. COLUMN DENOTE TIME PARAMETERS MEASURED.

DNR - DID NOT RECORD - DYE INJECTED WELLS

5-10-96

(B) AIR PARAMETERS

1. Blower status: ON , PUMP STATUS : ON
2. Water in knock out tank: 0 cm
3. Inlet pipe stick up: 101.6 cm
4. Inlet air velocity: 4760 fpm
5. Inlet air temperature: 85.3 °F
6. relative humidity: 52.7 % saturation
7. VOC's (PID): 0 ppm
8. flow rate: 104 acfm
9. Effluent air velocity(sample port): 1160 fpm
10. flow rate: 101 acfm
11. temperature: 118.2 °F
12. relative humidity: 24.4 % saturation
13. VOC's (PID): 0 ppm
14. Effluent GAC 1 VOCs (PID): 0 ppm
15. Effluent GAC 1 air velocity 1800 fpm
16. Effluent GAC 1 flow rate 39.3 acfm
17. Effluent GAC2 VOCs (PID): 0 ppm
18. Effluent GAC 2 air velocity 1600 fpm
19. Effluent GAC 2 flow rate 34.9 acfm
20. Well head vacuum: 55 mbars
21. UVB Well Bleed Valve air velocity CLOSED fpm
22. UVB well bleed valve air flow CLOSED acfm

Special Remarks:

1250 BEGIN UVB AIR PARAMETERS

KGB FIELD MONITORING SHEET

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 5-10-96 **Day:** ______

Time: 1230

Local Weather: SUNNY, 80s

Field Technician: DAVID BREWSTER

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Compressor status: ON
4. Compressor air pressure 6 psig
5. Compressor air flow rate 2.2 cfm
6. KGB effluent air velocity(sample port): 2320 fpm
7. flow rate: 50.5 acfm
8. temperature: 113.1 °F
9. relative humidity: 25.9 % saturation
10. VOC's (PID): 0 ppm
11. Effluent GAC 1 VOCs (PID): 0 ppm
12. Effluent GAC 1 air velocity 3080 fpm
13. Effluent GAC 1 flow rate 67.5 acfm
14. KGB Bleed Valve Air Velocity 2340 fpm
15. KGB bleed valve air flow 28.7 acfm

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO:	FAYAZ LAKHWALA	DATE:	6 May, 1996
FROM:	DAVID BREWSTER	RECIPIENT'S FAX #	(904)934-2420
PAGES:	6 (includes cover sheet)	W.O. #:	1100-003-001

COMMENTS:

The following transmittal contains monitoring data from May 2-3, 1996:

- UVB & KGB monitoring sheets from May 2-3, 1996.
- Sketch of Site 69 showing location of UVB/KGB monitoring wells from there respective systems.
- Revised well distances of 02 IW, 20 IW & UW, 21 IW & UW located on the UVB data sheet.

--David

Site: Camp Lejeune, Site 69

System: UVB-250

Date: 5-2-96

Time: 1318, 1510

Local Weather: SUNNY, 80s

Field Technician: DAVID BREWSTER

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON
2. **UVB well water level:** ~ 17.14? cm

	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
	17UW	964.0	0.10	63.5	7.72	377
	17IW	980.5	0.10	63.5	7.60	300
	18UW	943.7	0.15	64.0	7.38	392
	18IW	988.5	0.15	64.0	7.50	272
	19UW	953.1	0.15	64.4	9.76	224
	19IW	952.8	0.16	64.4	9.30	146
	15UW	890.3	0.10	63.5	6.17	1630
	15IW	897.6	0.15	63.1	7.88	380
171'7"	2IW	867.8	0.15	63.7	7.62	339
59'4"	21UW	874.5	0.13	63.1	6.75	103
60'8"	21IW	954.0	0.13	62.8	7.57	318
	16UW	979.0	0.11	63.7	6.73	126
	16IW	997.3	0.11	63.7	8.90	300
95'3"	20UW	902.8	0.15	63.1	7.73	325
96'0"	20IW	905.9	0.13	63.5	10.13	300

Special Remarks:

1510 BEGIN GW PARAMETERS

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Inlet pipe stick up: 101.6 cm 40"
4. Inlet air velocity: 4550 fpm 2"
5. Inlet air temperature: 74.8 °F
6. relative humidity: 44.8 % saturation
7. VOC's (PID): 0 ppm
8. flow rate: 99.5 acfm
9. Effluent air velocity(sample port): 1080 fpm 4"
10. flow rate: 94.0 acfm
11. temperature: 109.9 °F
12. relative humidity: 24.0 % saturation
13. VOC's (PID): 0 ppm
14. Effluent GAC 1 VOCs (PID): 0 ppm 2"
15. Effluent GAC 1 air velocity 2280 fpm
16. Effluent GAC 1 flow rate 49.8 acfm
17. Effluent GAC2 VOCs (PID): 0 ppm
18. Effluent GAC 2 air velocity 1260 fpm
19. Effluent GAC 2 flow rate 27.5 acfm
20. Well head vacuum: -55 mbars
21. UVB Well Bleed Valve air velocity CLOSED fpm
22. UVB well bleed valve air flow CLOSED acfm

Special Remarks:

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 5-2,3-96 **Day:** ______

Time: 1340, 453

Local Weather: SUNNY, 80s

Field Technician: DAVID BREWSTER

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Compressor status: ON
4. Compressor air pressure 5 psig
5. Compressor air flow rate 1.6 cfm
6. KGB effluent air velocity(sample port): 2530 fpm 2"
7. flow rate: 55.5 acfm
8. temperature: 100.7 °F
9. relative humidity: 21.3 % saturation
10. VOC's (PID): 0 ppm
11. Effluent GAC 1 VOCs (PID): 0 ppm
12. Effluent GAC 1 air velocity 3010 fpm 2"
13. Effluent GAC 1 flow rate 65.5 acfm
14. KGB Bleed Valve Air Velocity 2280 fpm 1.5"
15. KGB bleed valve air flow 28.0 acfm

(B) GROUNDWATER PARAMETERS

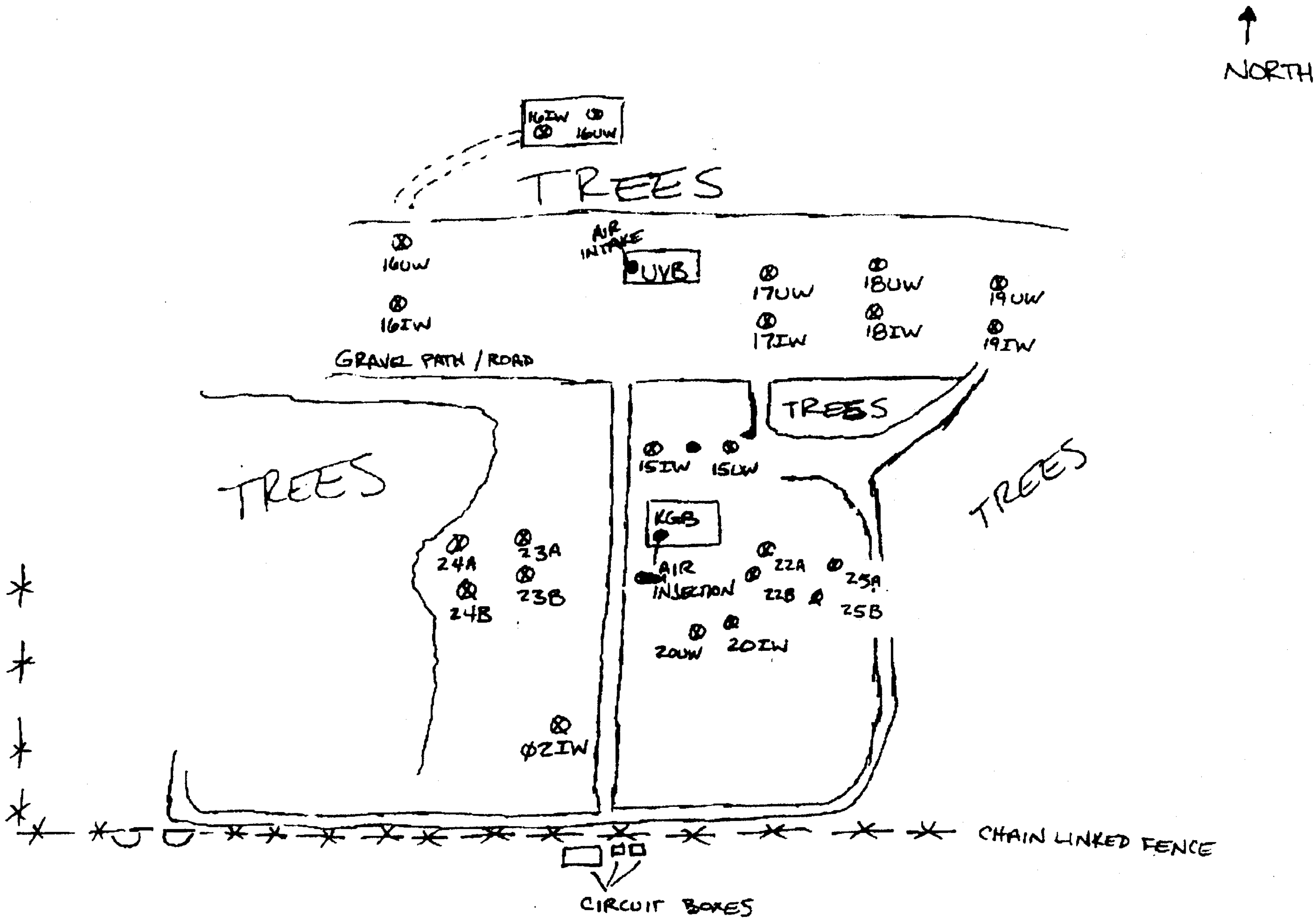
MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
22A	165.5	0.37	~~58.8~~ 57.4	4.91	164
22B	157.0	0.21	57.7	4.52	183
24A	153.9	0.14	57.2	5.90	383
24B	196.3	0.15	56.8	5.65	221
23A	156.4	0.18	58.6	5.54	168
23B	214.3	0.28	58.1	4.84	159
25A	183.2	0.20	56.7	5.70	282
25B	153.6	0.40	57.0	6.04	335

Special Remarks:

1) BUTTERFLY VALVE ON COMPRESSOR ADJUSTED TO INCREASE AIR PRESSURE TO 6psig AND 2 cfm. (5-2-96)

2) GROUNDWATER PARAMETERS MEASURED 5-3-96 STARTING AT 1153.

3) BUTTERFLY VALVE ADJUSTED: AIR PRESSURE 7psig; 2.2 cfm (5-3-96)


NORTH
16IW
16UW
TREES
16UW
16IW
AIR INTAKE
UVB
17UW
17IW
18UW
18IW
19UW
19IW
GRAVEL PATH / ROAD
TREES
TREES
15IW
15UW
TREES
KGB
AIR INJECTION
24A
24B
23A
23B
22A
22B
25A
25B
20UW
20IW
02IW
CHAIN LINKED FENCE
CIRCUIT BOXES

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: FAYAZ LAKHWALA	DATE: 26 April, 1996
FROM: DAVID BREWSTER	RECIPIENT'S FAX # (904)934-2420
PAGES: 6 (includes cover sheet)	W.O. #: 1100-003-001

COMMENTS:

The following transmittal contains monitoring data from April 25:

- UVB & KGB monitoring sheets from April 25, 1996
- Sketch of Site 69 showing location of UVB/KGB monitoring wells from there respective systems.

Fayaz,

The well distances from the point of air injection are listed on the proper monitoring sheets. I didn't get the layout of the KGB monitoring wells but their distances are included. I'll obtain their arrangement when I'm on-site next week. The directional layout of the site (north, south, east, west) was taken from a LANTDIV map from the treatability study. Let me know if you have any questions.

–David

h:\rnsw\faxcover.doc

Site: Camp Lejeune, Site 89

System: KGB-standard

Date: 4-25-96 **Day:** ________

Time: 1048/1550

Local Weather: SUNNY, 70s

Field Technician: DAVID BREWSTER

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Compressor status: ON
4. Compressor air pressure 4 psig
5. Compressor air flow rate 1.5 cfm
6. KGB effluent air velocity(sample port): 1030 fpm 2"
7. flow rate: 22.6 acfm
8. temperature: 97.5 °F
9. relative humidity: 18.2 % saturation
10. VOC's (PID): 0.0 ppm
11. Effluent GAC 1 VOCs (PID): 0.0 ppm
12. Effluent GAC 1 air velocity 1990 fpm 2"
13. Effluent GAC 1 flow rate 43.4 acfm
14. KGB Bleed Valve Air Velocity 1490 fpm 1.5"
15. KGB bleed valve air flow 18.2 acfm

1048 · BEGIN AIR MONITORING

1100-BUTTERFLY VALVE OPENED - COMPRESSOR NOW @ 6psi & 2cfm

(B) GROUNDWATER PARAMETERS

	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (μMHOS/SEC)
21'6"	22A	165.2	0.15	55.9	4.76	175
22'9"	22B	159.7	0.10	55.4	4.31	188
30'9"	24A	161.5	0.11	56.3	5.56	378
29'7"	24B	183.8	0.13	55.0	5.26	217
17'11"	23A	159.1	0.13	55.9	5.20	181
19'9"	23B	196.0	0.13	55.0	4.47	182
30'2"	25A	175.3	0.16	55.9	5.55	320
27'6"	25B	157.0	0.15	55.8	5.68	331

Special Remarks:

GW PARAMETER MEASUREMENTS STARTED @ 1550

TO THE LEFT OF THE "MW I.D." COLUMN ARE THE APPROXIMATE DISTANCES EACH WELL IS LOCATED FROM KGB TREATMENT WELL (POINT OF AIR INJECTION).

Site: Camp Lejeune, Site 69

System: UVB-250

Date: 4-25-96

Time: 1015 / 1121

Local Weather: SUNNY, 70s

Field Technician: DAVID BREWSTER

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON
2. **UVB well water level:** 0 cm

	MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
52'4"	17UW	947.9	0.15	63.7	8.05	370
52'4"	17IW	949.8	0.15	64.0	7.60	303
90'10"	18UW	937.6	0.15	64.2	7.57	363
94'3"	18IW	943.1	0.15	63.7	7.53	268
171'9"	19UW	947.9	0.11	64.2	10.02	229
170'5"	19IW	947.6	0.15	64.2	9.56	153
47'	15UW	884.5	0.18	63.1	6.00	1680
37'6"	15IW	891.2	0.15	64.2	7.93	369
170'6"	2IW	861.7	0.18	64.2	7.30	340
59'2"	21UW	867.5	0.15	63.9	6.98	114
60'4"	21IW	945.2	0.15	63.1	7.62	316
54'6"	16UW	972.0	0.10	63.5	6.86	136
53'7"	16IW	990.6	0.10	63.9	8.92	305
42'2"	20UW	896.1	0.15	63.1	7.70	317
43'2"	20IW	748.0	0.13	63.5	10.04	269

Special Remarks:

1121 BEGIN GW MONITORING

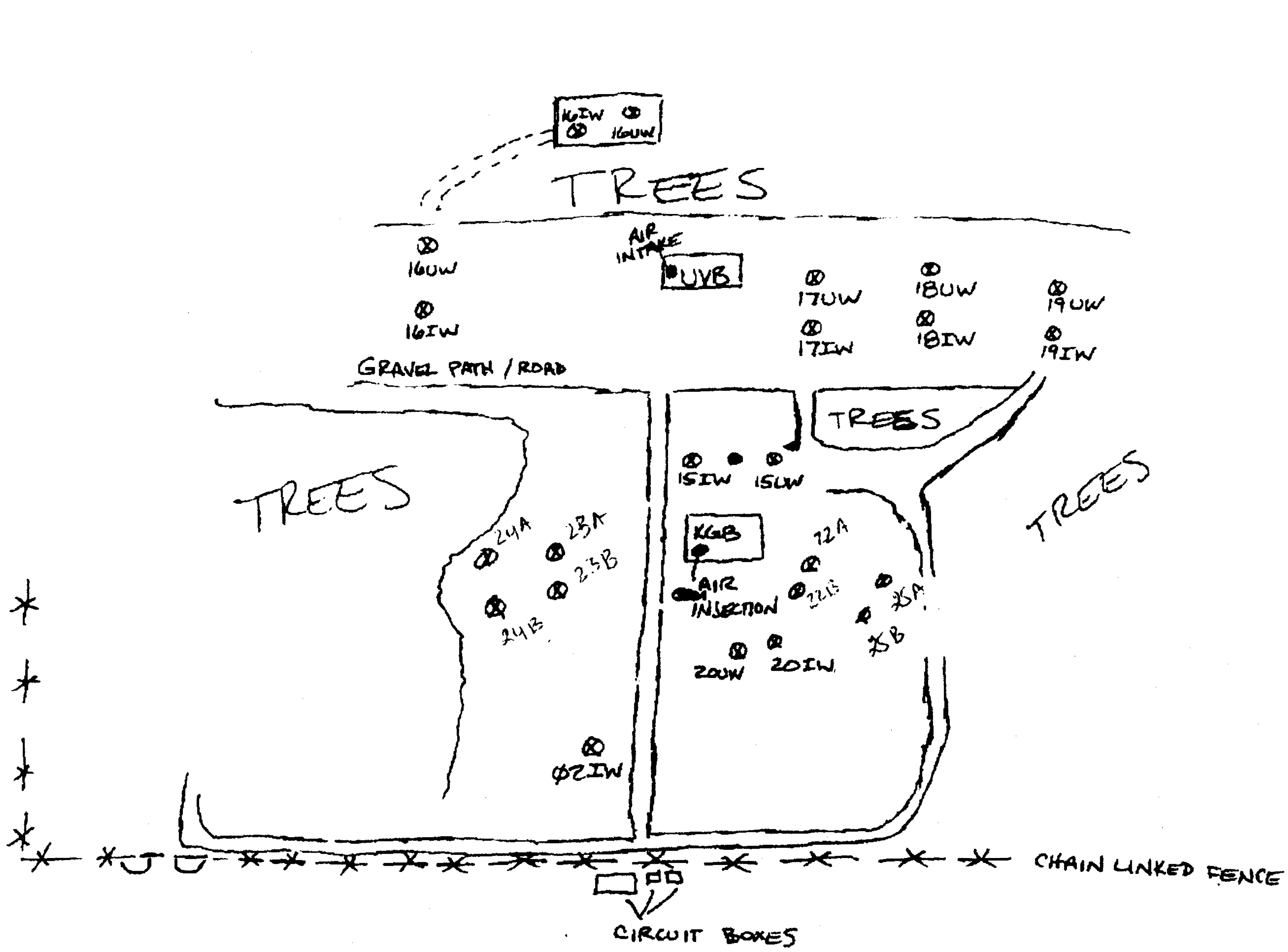
TO THE LEFT OF "MW I.D." COLUMN ARE THE APPROXIMATE DISTANCES EACH WELL IS FROM UVB TREATMENT WELL.

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Inlet pipe stick up: 101.6 cm 2.54/40"
4. Inlet air velocity: 3990 fpm 2" 10.160
5. Inlet air temperature: 67.0 °F
6. relative humidity: 40.0 % saturation
7. VOC's (PID): 0.0 ppm
8. flow rate: 87.0 acfm
9. Effluent air velocity(sample port): 990 fpm 6" 4"
10. flow rate: 86.0 acfm
11. temperature: 102.9 °F
12 relative humidity: 26.0 % saturation
13. VOC's (PID): 0.00 ppm
14. Effluent GAC 1 VOCs (PID): 0.00 ppm 2"
15. Effluent GAC 1 air velocity 1950 fpm
16. Effluent GAC 1 flow rate ~~45.2~~ 42.5 PB acfm
17. Effluent GAC2 VOCs (PID): 0.00 ppm
18. Effluent GAC 2 air velocity 1220 fpm
19. Effluent GAC 2 flow rate 26.7 acfm
20. Well head vacuum: -55 mbars
21. UVB Well Bleed Valve air velocity CLOSED fpm
22. UVB well bleed valve air flow ________ acfm

Special Remarks:

1015 - BEGIN AIR MONITORING


NORTH
16IW
16UW
TREES
AIR INTAKE
UVB
16UW
16IW
17UW
17IW
18UW
18IW
19UW
19IW
GRAVEL PATH / ROAD
TREES
TREES
15IW
15UW
TREES
24A
23A
23B
24B
KGB
AIR INJECTION
22A
22B
25A
25B
20UW
20IW
Ø2IW
CHAIN LINKED FENCE
CIRCUIT BOXES

SENT BY:WESTON

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: FAYAZ LAKHWALA	DATE: 22 April, 1996
FROM: DAVID BREWSTER	RECIPIENT'S FAX # 904-934-2420
PAGES: 6 (includes cover sheet)	W.O. #:11100-003-001

COMMENTS:

The following transmittal contains monitoring data from April 18, 19:

- Groundwater parameters of the KGB system with the blower on
- Groundwater parameters of UVB and KGB system with the blowers and pumps off

Let me know if you have any questions, Fayaz. I should be in the office through Wednesday.

--David

h:\msw\faxcover.doc

(B) GROUNDWATER PARAMETERS

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
22A	162.8	0.35	54.1	4.68	176
22B	154.2	0.20	53.6	4.26	188
24A	153.0	0.20	53.6	5.56	389
24B	184.1	0.20	53.8	5.26	2250
23A	155.8	0.20	53.8	5.27	181
23B	203.9	0.25	54.1	4.41	181
25A	181.4	0.30	54.1	5.83	417
25B	150.3	0.15	54.1	5.73	350

Special Remarks:

MONITORED FROM 1800- 1910 4-18-96 SYSTEM IS RUNNING. AIR PARAMETERS WERE NOT CHECKED AT THIS TIME. AIR PARAMETERS WILL BE MEASURED 4-19-96 IN THE MORNING.

(Correct conductivities)

SENT BY:RESTON

Site: Camp Lejeune, Site 69

System: UVB-250

Date: 4-19-96

Time: 1115

Local Weather: SUNNY, CLEAR, 80°

Field Technician: DAVID BREWSTER

(A) GROUNDWATER PARAMETERS

1. **Pump status:**
2. **UVB well water level:** ________ cm

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
17UW	935.1	0.28	63.5		
17IW	940.3	0.18	64.0		
18UW	924.5	0.20	64.0		
18IW	948.8	0.15	63.5		
19UW	934.5	0.20	64.4		
19IW	934.8	0.18	64.2		
15UW	871.7	0.15	63.5		
15IW	878.4	0.20	63.4		
2IW	850.4	0.15	63.5		
21UW	855.3	0.33	63.5		
21IW	931.8	0.18	63.1		
16UW	959.2	0.15	64.0		
16IW	977.2	0.20	64.0		
20UW	884.5	0.30	63.5		
20IW	887.9	0.25	63.5		

Special Remarks:

① D.O. & TEMP & DTW RECORDED WITHOUT CHARCOAL PACKETS IN WELLS.

② SYSTEM HAS BEEN OFF 3 HOURS PRIOR TO DATA COLLECTION.

(B) AIR PARAMETERS

1. Blower status: OFF
2. Water in knock out tank: ________ cm
3. Inlet pipe stick up: ________ cm
4. Inlet air velocity: ________ fpm
5. Inlet air temperature: ________ °F
6. relative humidity: ________ % saturation
7. VOC's (PID): ________ ppm
8. flow rate: ________ acfm
9. Effluent air velocity(sample port): ________ fpm
10. flow rate: ________ acfm
11. temperature: ________ °F
12. relative humidity: ________ % saturation
13. VOC's (PID): ________ ppm
14. Effluent GAC 1 VOCs (PID): ________ ppm
15. Effluent GAC 1 air velocity ________ fpm
16. Effluent GAC 1 flow rate ________ acfm
17. Effluent GAC2 VOCs (PID): ________ ppm
18. Effluent GAC 2 air velocity ________ fpm
19. Effluent GAC 2 flow rate ________ acfm
20. Well head vacuum: ________ mbars
21. UVB Well Bleed Valve air velocity ________ fpm
22. UVB well bleed valve air flow ________ acfm

Special Remarks:

KGB FIELD MONITORING SHEET

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 4-19-96 **Day:** ______

Time: 1405

Local Weather: SUNNY, 80s

Field Technician: DAVID BREWSTER

(A) AIR PARAMETERS

1. Blower status: OFF
2. Water in knock out tank: ________ cm
3. Compressor status: ________
4. Compressor air pressure ________ psig
5. Compressor air flow rate ________ cfm
6. KGB effluent air velocity(sample port): ________ fpm
7. flow rate: ________ acfm
8. temperature: ________ °F
9. relative humidity: ________ % saturation
10. VOC's (PID): ________ ppm
11. Effluent GAC 1 VOCs (PID): ________ ppm
12. Effluent GAC 1 air velocity ________ fpm
13. Effluent GAC 1 flow rate ________ acfm
14. KGB Bleed Valve Air Velocity ________ fpm
15. KGB bleed valve air flow ________ acfm

(B) GROUNDWATER PARAMETERS

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
22A	160.9	0.26	54.1		
22B	155.1	0.23	53.8		
24A	154.2	0.24	53.8		
24B	185.6	0.23	54.5		
23A	156.7	0.26	54.1		
23B	201.8	0.31	54.1		
25A	171.9	0.20	54.5		
25B	151.5	0.20	54.1		

Special Remarks:

DATA RECORDED 4-19-96 STARTING AT 1405

~5.8 AFTER SYSTEM (BLOWER) WAS SHUT DOWN.

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO:	FAYAZ LAKHWALA	DATE:	15 April, 1996
FROM:	DAVID BREWSTER	RECIPIENT'S FAX #	904-934-2420
PAGES:	7 (includes cover sheet)	W.O. #:	11100-003-001

COMMENTS:

- Monitoring sheets from April 11, 1996
- Unit changes to April 5, 1996 monitoring sheets

h:\msw\faxcover.doc

Site: Camp Lejeune, Site 69
System: UVB-250
Date: 4-11-96
Time: 0945
Local Weather: SUNNY, 65°, CALM
Field Technician: DAVID BREWSTER

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON
2. **UVB well water level:** ________ cm

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY ~~μ~~mS MHOS/SEC) 20mS scale (10²/2 For μMHO.
17UW	920.2	0.18	64.0	8.61	0.36
*17IW	934.8	0.15	63.5	7.56	0.30
18UW	911.4	0.18	64.0	8.71	0.32
18IW	930.2	0.20	64.2	7.60	0.27
19UW	919.9	0.10	64.0	10.62	0.27
19IW	913.8	0.20	64.0	9.40	0.13
15UW	865.6	0.20	64.0	5.97	1.66
15IW	865.0	0.20	63.1	7.98	0.42
2IW	835.2	0.20	64.0	7.47	0.34
21UW	841.2	0.73	63.5	6.82	0.12
21IW	915.9	0.10	63.5	7.48	0.32
16UW	945.2	0.15	63.5	6.80	0.17
16IW	963.2	0.13	63.9	8.91	0.30
20UW	869.9	0.60	63.1	7.84	0.35
20IW	873.9	0.18	63.5	11.31	1.21

Special Remarks: * BAILER STILL IN WELL

20 IW, TD = 77.03, DTW = 28.67, ΔH = 48.36', V(1) = .16 (48.36) = 7.74 gal
V(3x) = 23.2, V(5x) = 38.7

20UW, TD = 48.82, DTW = 28.54, ΔH = 20.28', V(1x) = .16 (20.28) = 3.24 gal
V(3x) = 9.7 gal, V(5x) = 16.2 gal

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: NONE cm
3. Inlet pipe stick up: 101.6 cm
4. Inlet air velocity: 3770 fpm 2" 4 reading average
5. Inlet air temperature: 61.0 °F
6. relative humidity: 28.0 % saturation
7. VOC's (PID): 0 ppm
8. flow rate: 82.5 acfm 4 reading average
9. Effluent air velocity(sample port): 1090 fpm 3" 6 reading average
10. flow rate: 53.5 acfm 6 reading average
11. temperature: 100.0 °F
12. relative humidity: 25.3 % saturation
13. VOC's (PID): 0 ppm
14. Effluent GAC 1 VOCs (PID): 0 ppm
15. Effluent GAC 1 air velocity 1410 fpm 2" - 3 reading average
16. Effluent GAC 1 flow rate 30.7 acfm 3 reading average
17. Effluent GAC2 VOCs (PID): 0 ppm
18. Effluent GAC 2 air velocity 1020 fpm 3 reading average
19. Effluent GAC 2 flow rate 22.1 acfm 3 reading average
20. Well head vacuum: 46 mbars
21. UVB Well Bleed Valve air velocity N/A fpm } VALVE IS CLOSED
22. UVB well bleed valve air flow N/A acfm

Special Remarks:

PID METER TESTED WITH PERMANENT MARKER - THERE WAS A RESPONSE

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 4-11-96 **Day:** ______

Time: 1022

Local Weather: SUNNY, CALM, 65°

Field Technician: DAVID BREWSTER

(A) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 0 cm
3. Compressor status: ON
4. Compressor air pressure 4 psig
5. Compressor air flow rate 1.5 cfm
6. KGB effluent air velocity(sample port): 5500 fpm 2.0" 3 reading average
7. flow rate: 120 acfm 3 reading average
8. temperature: 78.5 °F
9. relative humidity: 18.5 % saturation
10. VOC's (PID): 0 ppm
11. Effluent GAC 1 VOCs (PID): 0 ppm
12. Effluent GAC 1 air velocity 3840 fpm 2.0" 4 reading average
13. Effluent GAC 1 flow rate 83.5 acfm 4 reading average
14. KGB Bleed Valve Air Velocity 4130 fpm 1.5" 3 reading average
15. KGB bleed valve air flow ~~120 DB~~ 50.5 acfm 3 reading average

(B) GROUNDWATER PARAMETERS

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
22A	144.8	0.35	53.8	4.72	0.17
22B	143.3	0.30	53.2	4.27	0.18
24A	135.9	0.15	53.~~62~~ 8	~~4.72~~ 5.94	0.41
24B	160.0	0.20	53.6	5.60	0.24
23A	137.5	0.15	52.7	5.59	0.22
23B	170.4	0.45	53.2	4.51	0.18
25A	151.8	0.30	53.6	6.10	0.45
25B	134.7	0.40	53.2	6.29	0.41

Special Remarks:

1700 - BEGIN COLLECTING DATA

SENT BY:WESTON ; 4- 8-96 ; 11:06AM ;

WESTON MANAGERS DESIGNERS/CONSULTANTS

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: Fayaz Lakhwala	**DATE:** 4/8/96
FROM: Lori Cahill	**RECIPIENT'S FAX #** (904) 934-~~3240~~ 2420
PAGES: 5 **(includes cover sheet)**	**W.O. #:** 11100-003-001

COMMENTS:

Attached are the UVB and KGB monitoring sheets from 4/5/96. Summa canistering sampling was completed at the KGB, but VOA sampling at the UVB was not completed since water could not be pumped from one of the sampling lines.

If you have any questions, please call David Brewste or myself.

Providing quality environmental management and consulting engineering services for over 40 years in the areas of:

Analytical Testing/Characterization	**Life Sciences**
Air Quality	**Strategic Environmental Management**
Water quality/Wastewater	**Information Management**
Hazardous, Solid, Radioactive Wast	**Construction/Remediation**
Health and Safety	**Geosciences**

55 Offices Worldwide

h:\wpw\faxcover.doc

Site: Camp Lejeune, Site 69

System: UVB-250

Date: 4/5/96

Time: 1015

Local Weather: Sunny 60s °F

Field Technician: LM Cahill

(A) GROUNDWATER PARAMETERS

1. **Pump status:** ON
2. **UVB well water level:** ________ cm

MW I.D.	WATER LEVEL ~~(CM)~~ ft (IN)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (uMHOS/SEC)
17UW	29.79	0.30	17.8	9.29	343
17IW	~~29.77~~ 30.49 gfc	0.25	17.8	7.30	297
18UW	29.46	0.35	17.0	~~266~~ 9.23 gfc	266
18IW	30.13	0.65	17.8	7.46	275
19UW	29.79	0.45	18.2	10.56	282
19IW	30.02	0.90	20.0	9.32	140 (2000 µS scale)
15UW	~~31~~ gfc 27.99	0.60	17.8	9.58	349
15IW	27.75	0.45	17.7	6.19	1768
2IW	27.10	0.10	17.5	7.90	327
21UW	27.77	0.50	18.0	6.96	108
21IW	29.85	0.45	17.5	7.53	324
16UW	30.67	~~0.35~~ 0.45 gfc	~~17.8~~ 17.9 gfc	6.71	154
16IW	31.27	0.35	17.8	8.96	309
20UW	28.15	0.40	17.5	7.63	328
20IW	28.27	0.40	17.8	11.50	1280

Special Remarks:

(B) AIR PARAMETERS

1. Blower status: On
2. Water in knock out tank: None cm
3. Inlet pipe stick up: ~~38~~ 39 7/8" cm to 1st large black cylinder
4. Inlet air velocity: 3250 fpm
5. Inlet air temperature: 72.3 °F
6. relative humidity: 41.2 % saturation
7. VOC's (PID): 0.0 ppm
8. flow rate: 79.5 acfm
9. Effluent air velocity(sample port): 2250 fpm
10. flow rate: 10.20 acfm
11. temperature: 91.6 °F
12. relative humidity: 43.8 % saturation
13. VOC's (PID): 0.0 ppm
14. Effluent GAC 1 VOCs (PID): 0.0 ppm
15. Effluent GAC 1 air velocity 1610 fpm
16. Effluent GAC 1 flow rate 36.6 acfm
17. Effluent GAC2 VOCs (PID): 0.0 ppm
18. Effluent GAC 2 air velocity 1180 fpm
19. Effluent GAC 2 flow rate 29.4 acfm
20. Well head vacuum: 45 mbars
21. UVB Well Bleed Valve air velocity 6100 fpm
22. UVB well bleed valve air flow 35.3 acfm

Special Remarks:

GAC-1 and GAC-2 are now labeled (GAC-2 is to the left of concrete pad, facing away from entrance).

SENT BY: RESTOR

Site: Camp Lejeune, Site 89
System: KGB-standard
Date: 4/5/96 **Day:** Friday
Time: 0950
Local Weather: Sunny - 60°Ps
Field Technician: LM Cahill

(A) AIR PARAMETERS

1. Blower status: On
2. Water in knock out tank: Ø cm
3. Compressor status: On
4. Compressor air pressure 3.5 psig
5. Compressor air flow rate 1.5 cfm typically 2 cfm
6. KGB effluent air velocity(sample port): ~~7950~~ 9450 fpm
7. flow rate: 186 acfm
8. temperature: 88.3 °F
9. relative humidity: 27.7 % saturation
10. VOC's (PID): Ø.Ø ppm
11. Effluent GAC 1 VOCs (PID): Ø.Ø ppm
12. Effluent GAC 1 air velocity 5750 fpm 6350/1040/885 (at 3 points)
13. Effluent GAC 1 flow rate 124.0 acfm 141/82.2/25.9
14. KGB Bleed Valve Air Velocity 3450 fpm ~~3450~~
15. KGB bleed valve air flow 82.5 acfm

Note: bleed valve is open.

(B) GROUNDWATER PARAMETERS

MW I.D.	WATER LEVEL (GM) FT	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (μMHOS/SEC)
22A	4.19	Ø.55	13.0°F	4.67	169
22B	3.99	Ø.55	12.0°F	3.86	233 (2000 μs scale)
24A	3.9Ø	Ø.55	12.5	5.62	392
24B	4.76	Ø.65	12.8°F	5.40	220
23A	3.95	Ø.46	12.0°F	5.42	215
23B	5.07	0.80	14.2 ~~13.9~~ °F	4.32	176
25A	4.45	0.75	13.2°F	5.97	445
25B	3.87	0.5Ø	12.0°F	6.24	488

Special Remarks:

(B) GROUNDWATER PARAMETERS

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
22A	127.7		55.4		
22B	121.6		53.6		
24A	118.9		54.5		
24B	145.1		55.0		
23A	120.4		53.6		
23B	154.5		57.6		
25A	135.6		55.8		
25B	118.0		53.6		

Special Remarks:

* CORRECTIONS TO 4-5-96 VISIT

UNITS CHANGED: WATER LEVELS FT → CM

TEMP °C → °F

Site: Camp Lejeune, Site 69

System: UVB-250

Date: ________

Time: ________

Local Weather: ____________________

Field Technician: ____________________

(A) GROUNDWATER PARAMETERS

1. **Pump status:**
2. **UVB well water level:** ________ cm

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
17UW	908.0		64.0		
17IW	918.7		64.0		
18UW	897.9		62.6		
18IW	918.4		64.0		
19UW	908.0		64.8		
19IW	915.3		68.0		
15UW	853.1		64.0		
15IW	845.8		63.9		
2IW	826.0		63.5		
21UW	846.4 ~~989.8~~		64.4		
21IW	899.8 ~~934.8~~		63.5		
16UW	934.8		64.2		
16IW	953.1		64.0		
20UW	858.0		63.5		
20IW	861.7		64.0		

Special Remarks:

*CORRECTIONS TO 4-5-96 VISIT.
UNITS TRANSFORMED FROM FEET TO CM (H_2O LEVELS)
°C TO °F (TEMP.)

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: FAYAZ LAKHWALA	DATE: 3-22-96
FROM: D. BREWSTER	RECIPIENT'S FAX # 904-934-2420
PAGES: 3 (includes cover sheet)	W.O. #: 11100-003-001

COMMENTS:

Providing quality environmental management and consulting engineering services for over 40 years in the areas of:

Analytical Testing/Characterization	Life Sciences
Air Quality	Strategic Environmental Management
Water quality/Wastewater	Information Management
Hazardous, Solid, Radioactive Wast	Construction/Remediation
Health and Safety	Geosciences

55 Offices Worldwide

h:\msw\faxcover.doc

904 934 2420

UVB FIELD MONITORING SHEET

Site: Camp Lejeune, Site 89

System: UVB-250

Date: 3-21-96

Time: 1020

Local Weather: SUNNY, WINDY (10-15 mph), 50°

Field Technician: D. BREWSTER

(A) GROUNDWATER PARAMETERS

1. **Pump status:**
2. **Flow rate:** ________ gpm
3. **Cumulative flow:** ________ gallons
4. **UVB well water level:** ________ cm

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (μMHOS/SEC)
U01					
U02					
17UW	919.0	0.15	63.5	9.44	0.33
17IW	*923.8	0.11	63.5	7.56	0.30
18UW	909.8	0.11	64.0	9.59	0.26
18IW	923.8	0.15	64.0	7.64	0.27
19UW	923.8	0.15	64.0	10.61	0.26
19IW	922.3	0.13	64.0	9.26	0.15
15UW	862.3	0.14	63.1	6.22	1.72
15IW	862.9	0.21	64.0	9.90	0.39
Ø2IW	835.2	0.11	63.5	7.90	0.34
21UW	862.0	0.10	64.0	6.99	0.11
21IW	919.0	0.16	63.5	7.56	0.32
16UW	944.6	0.11	63.1	6.95	0.20
16IW	961.3	0.13	63.5	8.87	0.31
20UW					
20IW					

Special Remarks:

* BAILER REMAINS IN 17IW

UVB FIELD MONITORING SHEET

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 5.08 cm
3. Inlet pipe stick up: 127 cm average of 7 readings
4. Inlet air velocity: 1030 fpm
5. Inlet air temperature: 48.4 °F
6. relative humidity: 34.6 % saturation
7. VOC's (PID): 0.0 ppm
8. flow rate: 22.4 acfm average of 8 readings
9. Effluent air velocity: 720 fpm
10. flow rate: 15.6 acfm
11. temperature: 70.0 °F
12. relative humidity: 68.8 % saturation
13. VOC's (PID): ~~849.9~~ 0.0 ppm
14. Effluent GAC 1 VOCs (PID): 49.9 ppm 7
15. Effluent GAC2 VOCs (PID): N/A ppm
16. Well head vacuum: -56 mbars

Special Remarks:

DATA RECORDED BEFORE SYSTEM WAS TEMPORARILY OFF. BLOWER WAS OPENED BEFORE I LEFT THE SITE. INLET AIR VELOCITY 2540 fpm, WELL HEAD VACUUM -48 mbars AND SLOWLY RISING/INCREASING.

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: FAYAZ LAKHWALA	DATE: 3-14-96
FROM: D. BREWSTER	RECIPIENT'S FAX # 904-934-2420
PAGES: 4 (includes cover sheet)	W.O. #: 11101-003-001

COMMENTS:

FAYAZ,

I'M SENDING THE SUMMA CANISTERS FOR SATURDAY DELIVERY. I LEFT A MESSAGE WITH ESE'S ANSWERING SERVICE TO MAKE SURE SOMEONE WOULD BE ABLE TO RECEIVE THE CANISTERS. I LEFT YOUR NAME IF ANYONE HAD ANY QUESTIONS. THE REGULATORS FOR THE CANISTERS WERE SHIPPED 2-DAY ~~ECO~~ ECONOMY.

-DB

Providing quality environmental management and consulting engineering services for over 40 years in the areas of:

Analytical Testing/Characterization	Life Sciences
Air Quality	Strategic Environmental Management
Water quality/Wastewater	Information Management
Hazardous, Solid, Radioactive Wast	Construction/Remediation
Health and Safety	Geosciences

55 Offices Worldwide

h:\msw\faxcover.doc

UVB FIELD MONITORING SHEET

Site: Camp Lejeune, Site 89

System: UVB-250

Date: 3-14-96

Time: 1225

Local Weather: 70°, SUNNY

Field Technician: DAVID BREWSTER

(A) GROUNDWATER PARAMETERS

1. **Pump status:**
2. **Flow rate:** ________ gpm
3. **Cumulative flow:** ________ gallons
4. **UVB well water level:** DNR cm

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
U01					
U02					
17UW	928.1	0.15	63.5	9.56	0.33
17IW	949.8	0.15	64.0	7.72	0.27
18UW	918.1	0.20	64.0	9.86	0.23
18IW	953.1	0.15	64.0	7.78	0.24
19UW	928.1	2.33	65.3	10.64	0.23
19IW	932.1	0.35	65.3	9.31	0.12
15UW	864.4	0.10	64.0	6.41	1.71
15IW	870.5	0.15	64.0	8.63	0.36
~~20UW~~					
21UW	889.1		63.5	7.14	0.09
21IW	927.8	0.15	63.5	7.68	0.30
16UW	956.2	0.15	63.5	7.87	0.20
16IW	973.5	0.13	63.5	8.95	0.29
20UW					
20IW					
Ø2IW	841.6	0.10	64.0	7.99	0.32

Special Remarks:

DNR - DID NOT RECORD (RAN OUT OF LIGHT)

UVB FIELD MONITORING SHEET

(B) AIR PARAMETERS

1. Blower status: ON
2. Water in knock out tank: 31.75 cm
3. Inlet pipe stick up: 500 cm
4. Inlet air velocity: 499 fpm
5. Inlet air temperature: 69.2 °F
6. relative humidity: 26.8 % saturation
7. VOC's (PID): 0 ppm
8. flow rate: ~~2.72~~ acfm 10.55 cfm
9. Effluent air velocity: 1720 fpm
10. flow rate: 41.6 acfm
11. temperature: 78.5 °F
12. relative humidity: 41.3 % saturation
13. VOC's (PID): 24.9 ppm
14. Effluent GAC 1 VOCs (PID): 33.3 ppm
15. Effluent GAC2 VOCs (PID): N/A ppm
16. Well head vacuum: -45 mbars

Special Remarks:

BLEED VALVE TO THE AIR INLET WAS CLOSED AND HAD A VACUUM OF -55 mbars WHEN I LEFT THE SIGHT.

SENT BY WESTON

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 3-14-96 **Day:** ______

Time: 1623

Local Weather: SUNNY, 70°

Field Technician: DAVID BREWSTER

(A) AIR PARAMETERS

1. Blower status: ______
2. Water in knock out tank: ______ cm
3. Compressor status: ______
4. Compressor air pressure ______ psig
5. Compressor air flow rate ______ cfm
6. KGB effluent air velocity: ______ fpm
7. flow rate: ______ acfm
8. temperature: ______ °F
9. relative humidity: ______ % saturation
10. VOC's (PID): ______ ppm
11. Effluent GAC 1 VOCs (PID): ______ ppm
12. Effluent GAC2 VOCs (PID): ______ ppm

SYSTEM NOT YET ON-LINE

(B) GROUNDWATER PARAMETERS

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (µMHOS/SEC)
22A	142.6	0.80	52.3	5.00	0.14
22B	143.6	2.10	51.6	4.52	0.16
24A	131.1	0.20	53.4	6.21	0.41
24B	124.7	0.15	54.5	5.80	0.22
23A	133.5	0.15	51.6	5.85	0.26
23B	168.2	0.53	53.8	4.81	0.17
25A	149.7	0.20	53.2	6.45	0.49
25B	131.4	0.25	53.2	6.80	0.48

Special Remarks:

WELLS 22B & 23B - WHEN TAKING D.O. READINGS ON THESE TWO WELLS, PROBE WENT TO BOTTOM OF WELL. COULD THIS HAVE RELEASED ANY O_2 TRAPPED IN THE SEDIMENTS?

UVB FIELD MONITORING SHEET

Site: Camp Lejeune, Site 69

System: UVB-250

Date: 3-6,7-96

Time: —

Local Weather: OVERCAST, 60° (3-6-96); OVERCAST/RAIN 60° (3-7-96)

Field Technician: DAVID BREWSTER, LORI CAHILL

(A) GROUNDWATER PARAMETERS

1. Pump status:
2. Flow rate: ________ gpm
3. Cumulative flow: ________ gallons
4. UVB well water level: ________ cm

SYSTEM NOT YET ONLINE

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (μMHOS/SEC)
U01	X	X	X	X	X
U02	X	X	X	X	X
17VW ~~UE11~~	936.35 ~~78~~ DB	0.055	63.14	7.75	0.44
17IW ~~UE12~~	BAILER IN WELL	0.33	65.30	8.05	0.27 ~~0.44~~ DB
18VW ~~UE21~~	925.37	0.15	63.50	9.16	0.25
18IW ~~UE22~~	941.83	0.30	63.50	8.41	0.29
19VW ~~UE31~~	936.35	0.25	64.76	10.12	0.23
19IW ~~UE32~~	949.45	0.33	65.30	10.12	0.20
US11	X	X	X	X	X
US12	X	X	X	X	X
US31	X	X	X	X	X
US32	X	X	X	X	X
21VW ~~UW11~~	901.90	0.20	63.50	7.90	0.11
21IW ~~UW12~~	935.43	0.35	64.04	7.84	0.27
16VW ~~UN11~~	961.95	0.35	63.50	9.03	0.17
16IW ~~UN12~~	998.22	0.40	64.40	8.97	0.32

Special Remarks:

SENT BY: WESTON

WESTON MANAGERS DESIGNERS/CONSULTANTS

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: FAYAZ LAKHWALA	DATE: 3-8-96
FROM: DAVID BREWSTER	RECIPIENT'S FAX # 904-934-2420
PAGES: 4 (includes cover sheet)	W.O. #: 11100-003-001

COMMENTS:

919 462.6941

Providing quality environmental management and consulting engineering services for over 40 years in the areas of:

Analytical Testing/Characterization	Life Sciences
Air Quality	Strategic Environmental Management
Water quality/Wastewater	Information Management
Hazardous, Solid, Radioactive Wast	Construction/Remediation
Health and Safety	Geosciences

55 Offices Worldwide

h:\msw\faxcover.doc

KGB FIELD MONITORING SHEET

Site: Camp Lejeune, Site 69

System: KGB-standard

Date: 2-21-96 **Day:** 1

Time: 0950

Local Weather: OVERCAST, 65°

Field Technician: DAVID J. BREWSTER

(A) AIR PARAMETERS

1. Blower status: ______
2. Water in knock out tank: ______ cm
3. Compressor status: ______
4. Compressor air pressure ______ psig
5. Compressor air flow rate ______ cfm
6. KGB effluent air velocity: ______ fpm
7. flow rate: ______ acfm
8. temperature: ______ °F
9. relative humidity: ______ % saturation
10. VOC's (PID): ______ ppm
11. Effluent GAC 1 VOCs (PID): ______ ppm
12. Effluent GAC2 VOCs (PID): ______ ppm

NOT YET ON-LINE

(B) GROUNDWATER PARAMETERS

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (μMHOS/SEC)
22A ~~KE11~~	115.5			5.26	0.16
22B ~~KE12~~	135.5			4.86	0.17
24A ~~KE21~~	114.5			6.24	0.56
24B ~~KE22~~	137.6			5.50	0.20
23A ~~KS11~~	126.3			5.73	0.22
23B ~~KS12~~	119.0			4.88	0.18
25A ~~KS21~~	137.2			6.55	0.41
25B ~~KS22~~	117.3			6.37	0.36

Special Remarks:

D.O. METER NOT WORKING, ∴ DO./TEMP NOT MEASURED
PH/COND MEASURED 2-22-96

UVB FIELD MONITORING SHEET

Site: Camp Lejeune, Site 69

System: UVB-250

Date: 2-21-96

Time: 1041

Local Weather: OVERCAST, 65°

Field Technician: DAVID BREWSTER

(A) GROUNDWATER PARAMETERS

1. Pump status:
2. Flow rate: ________ gpm
3. Cumulative flow: ________ gallons
4. UVB well water level: ________ cm

NOT YET ON-LINE

MW I.D.	WATER LEVEL (CM)	D.O. (PPM)	TEMP. (°F)	pH	CONDUCTIVITY (μMHOS/SEC)
U01		DID NOT RECORD	DID NOT RECORD		
U02					
17VW ~~UE11~~	931.7			9.95	0.45
17IW ~~UE12~~	933.3			BAILER IN WELL	
18VW ~~UE21~~	897.5			10.54	0.34
18IW ~~UE22~~	962.0			9.52	0.28
19VW ~~UE31~~	925.9			11.33	0.68
19IW ~~UE32~~	939.2			9.07	0.78
15VW ~~US11~~	NOT RECORD			6.67	1.52
15IW ~~US12~~	974.5			7.64	0.38
~~US31~~					
2DW ~~US32~~	828.6			7.87	0.33
21VW ~~UW11~~	848.8			8.47	0.14
21IW ~~UW12~~	922.4			7.66	0.33
16VW ~~UN11~~	938.9			10.08	0.29
16IW ~~UN12~~	988.6			7.66	0.33

Special Remarks:
D.O. METER WAS NOT WORKING, ∴ TEMPERATURES/D.O. WERE NOT RECORDED.
2DW WATER LEVELS, PH, COND. TAKEN 2-23-96
PH AND COND. MEASURED 2-22-96

Roy F. Weston, Inc.
1000 Perimeter Park Drive
Suite E
Morrisville, NC 27560
(919) 462-6900 • Fax (919) 462-6901

FACSIMILE TRANSMITTAL

TO: Fayaz Lakwala	DATE: 3/4/96
FROM: Mike Walker	RECIPIENT'S FAX # 904-934-2420
PAGES: 4 (includes cover sheet)	W.O. #: Camp LeJeune

COMMENTS:

Providing quality environmental management and consulting engineering services for over 40 years in the areas of:

Analytical Testing/Characterization	**Life Sciences**
Air Quality	**Strategic Environmental Management**
Water quality/Wastewater	**Information Management**
Hazardous, Solid, Radioactive Wast	**Construction/Remediation**
Health and Safety	**Geosciences**

55 Offices Worldwide

h:\mew\faxcover.doc

SUMMARY OF CAMP LEJEUNE VISIT
Week ending 2-23-96

The following report is a summary of work performed at site 69 at Camp Lejeune Marine Corps base in Jacksonville, North Carolina that includes the week's scope of work, obstacles incurred on site, suggestions, and issues to consider prior to future visits.

SCOPE OF WORK
- Sample KGB and UVB monitoring wells for VOA
- PID readings from KGB and UVB wells
- TO-14 summa canister testing on the KGB and UVB air stripping system
- Samples for inorganic analyses at the KGB pump site

The original scope of work for the week was to have included sampling from all KGB and UVB monitoring wells, PID readings from the KGB and UVB pump systems, and TO-14 air sampling. Obstacles during the week resulted in shipping only samples of the KGB monitoring wells and two of the UVB monitoring wells. Delays were attributed to poor weather the first day, power hook up at the site (not received until the middle of the third day), and suspected poor development or undevelopment of wells. The KGB/UVB system was not yet on-line, therefore, no PID readings or TO-14 sampling was performed.

Equipment problems were encountered during the week and should be addressed before returning to Camp Lejeune. The D.O. meter could not be calibrated in the field after confirming that battery power was sufficient. Another should be rented until the mystery of SBP's meter can be resolved. Power problems with the Grundfos submersible pump were also a nuisance once power was supplied to the site. The pump repeatedly tripped the GFI and gave readings of "overcurrent" once an adapter was used to increase amperage to the controller. SBP Technologies would like to rent/borrow Weston's generator or rent one in Jacksonville for the pump the next time we are on site.

All wells were hand bailed by Fayaz Lakhwala (SBP), Gordon Ruggaber (Baker Environmental) and David Brewster (Weston). It was decided that all wells would be purged five well volumes by SBP in an effort to save time. High turbidity gray in color was suspected to have been grout in all the newly installed UVB wells. After most of the wells had been purged and sampled, SBP wanted pH and conductivity readings of all wells. Elevated pH readings from the UVB wells prompted reconsideration of sending the UVB samples to the lab with the exception of two preexisting wells. SBP would like to further develop the wells and resample the next time Weston is on site.

SBP will contact Weston to discuss additional manpower for development of wells and resampling for the week ending March 1 (next week), use of Weston's generator, and renegotiation of Weston's contract to support additional Weston personnel for the next sampling event.

EQUIPMENT NEEDED FOR NEXT SITE VISIT
- D.O. meter
- Transfer pump
- Grundfos controller and pump for back-up
- Generator
- Summa canister accessories (sampling hose and additional pressure gauges)

SUMMARY OF CAMP LEJEUNE VISIT
Week 2: March 1 - March 3, 1996

The following report is a summary of work performed at site 69 at Camp Lejeune Marine Corps base in Jacksonville, North Carolina, including the scope of work for the week and obstacles encountered on site.

WESTON met with IEG representatives Al Anderson and Bill Langely during the morning of March 1, 1996 to become familiar with the UVB and KGB systems and installation. During this time, electrical connections were completed and the UVB system was brought on-line; however, problems with foaming and improper fitting connections stopped the IEG representatives from connecting the UVB emission line to the carbon drum, and therefore the system was running with no filtration. IEG indicated that the foaming was a result of drilling activities in which foam was introduced to prevent caving of the borehole.

The scope of work was finalized Friday, March 1, via phone conference between SBP Technologies and WESTON. The tasks to be accomplished during week 2 were:

- Installation of tubing between the UVB and KGB pumping system's off-gas emissions and their respective carbon drum;
- Additional well development and volatile organic compounds (VOCs) sampling of the ten UVB monitoring wells;
- Sampling (via peristaltic pump) of the UVB well itself for VOCs; and
- TO-14 summa canister testing of the emissions before and after the carbon drum filter system on both the UVB and KGB pumping systems (4 canisters total).

Power problems with the GFI outlets at the site rendered the Grundfos controller and submersible pump inoperable. A later test of the pump at the hotel on Friday evening, March 1st, suggested a problem with either the submersible pump, the Grundfos controller, or the intermediary cable. Since a peristaltic pump, sent by SBP Technologies, was scheduled to arrive the next day in Jacksonville, it would be used to develop the shallow wells. WESTON continued to hand bail the deep wells until the pump was to have arrived. When the peristaltic pump did not arrive, WESTON continued to hand bail the wells to assess their turbidity. This information is presented in Table 1 below.

Clear	*Gal. Purged*
18IW	8.5
18VW	13
19IW	13
21IW	18
Slightly turbid, grey	
16IW	10
16VW	6
17VW	10
21VW	5
Heavily turbid, grey	
19VW	28

* Bailer in 17IW needs to be retrieved

Table 1 Well Conditions

Both the UVB and KGB systems were shut down by the IEG personnel onsite after each system failed to stabilize; therefore, no summa canister tests were performed. Al Anderson of IEG also recommended that the tubing between the system's off-gas outlet and the carbon drum be of the "flex-hose" nature instead of the vinyl tubing currently attached to the KGB system since the vinyl tubing tends to crimp and inhibit the air flow. The tubing that SBP Technologies sent to Jacksonville, NC on March 2nd was the same type that is already attached that creates the crimping problem.

On Saturday night, March 2nd, WESTON discontinued field activities in Jacksonville for the following reasons:

- the UVB and KGB systems were not operational;
- the peristaltic pump had not arrived;
- the five wells indicated in Table 1 still appeared turbid and may require more development, dependent upon well construction and well development data;
- two of the wells (19VW and 16IW) had foam present in the purge water - this will negatively impact VOC sampling;
- monitoring well 21IW appears to have a bend in the well at a depth of approximately 60 feet. A bailer cannot be lowered consistently past this point, and it is possible that a 2" pump would become stuck.
- the development status of the remaining monitoring wells was unknown at the time;
- the bailer in monitoring well 17IW requires retrieval prior to sampling; and
- all 10 UVB monitoring wells must be sampled in a time period as close together as possible.

In order to be prepared to sample the 10 UVB monitoring wells the following issues must be resolved:

- the bailer must be removed from 17IW. This task must be completed prior to sampling and/or continued development of the well;
- the development status of the 10 UVB monitoring wells must be decided. WESTON SOPs suggest development pumping until well water runs clear, or until 3 to 5 saturated borehole volumes have been removed. WESTON requests both well construction details and well development information to assess the development status of the wells.
- any wells with foamy purge water must be developed to the point that sampling can be free of foam;
- if wells require additional development, it is a normal WESTON SOP that the wells be allowed to stabilize for 7 days prior to sampling;
- the following equipment must be supplied for groundwater sampling - a peristaltic pump, a controller and 2 "pump, additional nitrile sampling gloves, and a DO meter.

Appendix C: Laboratory Analytical Reports for Dye Study

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-4289 • FAX (417) 785-4290

January 7, 1997

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp Lejeune-Site 69 - 69KGB-AC-FL(39).
Dye analysis results for charcoal samplers recovered on December 19, 1996.
Ozark Underground Laboratory (OUL) numbers F7935 through F7941.

Dear Dr. Lakhwala:

We have completed analysis of charcoal samplers received at OUL on December 21, 1996. We have indicated the OUL numbers for each sampler on the enclosed table.

The criteria used for selecting water samples for analysis is as follows. If dye was found in the charcoal sampler, the water samples that were collected on the placement date and on the collection date (if not previously analyzed) for that charcoal sampler were analyzed. This determines the actual amount of dye in the water on those days. There was no water analyzed in this set of samplers.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Catherine L. Aley

Catherine L. Aley

Enclosures: 1) Table 1 - Dye analysis results for charcoal samplers
2) Sample collection data sheet
3) Sample analysis graphs

mma:c:\amipro\docs\lejeun16.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: David Brewster
Date Samples Shipped: 12-19-96 **Date Samples Recd:** 12-21-96 **Date Analyzed:** 12-27-96

Table 1. Dye analysis results of charcoal samplers for 69KGB-AC-FL(39) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Fluorescein		Eosine		RWT		Pyranine	
		Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
Samples recovered on 12-19-96									
F7935	22A	ND		ND		ND		ND	
F7936	22B	ND		ND		ND		ND	
F7937	23A	ND		ND		ND		ND	
F7938	24A	ND		ND		ND		ND	
F7939	24B	ND		ND		ND		ND	
F7940	Laboratory Charcoal Control Blank								
F7941	25A	ND		ND		ND		ND	

ND = None Detected

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-4289 • FAX (417) 785-4290

December 20, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp Lejeune-Site 69 - 69KGB-AC-FLR(38) & 69KGB-GW-FLR(38).
Dye analysis results for charcoal and water samples recovered on December 9, 1996.
Ozark Underground Laboratory (OUL) numbers F7833 through F7839.

Dear Dr. Lakhwala:

We have completed analysis of charcoal and water samples received at OUL on December 11, 1996. We have indicated the OUL numbers for each sample on the enclosed table.

The criteria used for selecting water samples for analysis is as follows. If dye was found in the charcoal sampler, the water samples that were collected on the placement date and on the collection date (if not previously analyzed) for that charcoal sampler were analyzed. This determines the actual amount of dye in the water on those days. The only water analyzed in this set of samplers is for Station KGB because there was no charcoal received for this station.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas Aley

for Catherine L. Aley

Enclosures: 1) Table 1 - Dye analysis results for charcoal and water samples
2) Sample collection data sheet
3) Sample analysis graphs

mma:c:\amipro\docs\lejeun15.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: Rhoda J. Willis
Date Samples Shipped: 12-10-96 **Date Samples Recd:** 12-11-96 **Date Analyzed:** 12-12-96

Table 1. Dye analysis results of charcoal samplers for 69KGB-AC-FLR(38) and water samples for 69KGB-GW-FLR(38) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Fluorescein		Eosine		RWT		Pyranine	
		Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
Samples recovered on 12-09-96									
F7833	KGB (Water)	ND		ND		ND		ND	
F7834	22A	ND		ND		ND		ND	
F7835	22B	ND		ND		ND		ND	
F7836	23A	ND		ND		ND		ND	
F7837	24A	ND		ND		ND		ND	
F7838	24B	ND		ND		ND		ND	
F7839	25A	ND		ND		ND		ND	

ND = None Detected

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-4289 • FAX (417) 785-4290

December 6, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp Lejeune-Site 69 - 69KGB-AC-FLR(34,35,36&37) & 69KGB-GW-FLR(35,36&37).
Dye analysis results for charcoal samplers recovered on November 14, 21, 26, & December 2, 1996 and water samples recovered on November 21 & 26, and December 2, 1996.
Ozark Underground Laboratory (OUL) numbers F7667 thru F7672, F7749 thru F7763 & F7791 thru F7797.

Dear Dr. Lakhwala:

We have completed analysis of charcoal and water samples received at OUL on November 19, 26 and 27, 1996. We have indicated the OUL numbers for each sample on the enclosed table.

We would like to call to your attention that the set of samplers pulled on December 2 (Week 37) was placed, per your chain-of-custody, on November 25, 1996. That is one day before recovery date for the previous set of samplers (Week 36).

The criteria used for selecting water samples for analysis is as follows. If dye was found in the charcoal sampler, the water samples that were collected on the placement date and on the collection date (if not previously analyzed) for that charcoal sampler were analyzed. This determines the actual amount of dye in the water on those days. The only water analyzed in this set of samplers is for Station KGB, pulled on November 21 and 26, because there was no charcoal received for this station.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye.

(cont'd)

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Catherine L. Aley

Catherine L. Aley

Enclosures:
1) Table 1 - Dye analysis results for charcoal and water samples
2) Sample collection data sheet
3) Sample analysis graphs

mma:c:\amipro\docs\lejeun14.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: Rhoda J. Willis
Date Samples Shipped: 11-18,25,26&12-2-96 **Date Samples Recd:** 11-19,26&27&12-3-96 **Date Analyzed:** 11-20,12-02&4-96

Table 1. Dye analysis results of charcoal samplers for 69KGB-AC-FLR(34,35,36&37) and water samples for 69KGB-GW-FLR(35,36&37) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Fluorescein		Eosine		RWT		Pyranine	
		Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
Samples recovered on 11-14-96									
F7667	22A	ND		ND		ND		ND	
F7668	22B	ND		ND		ND		ND	
F7669	23A	ND		ND		ND		ND	
F7670	24A	ND		ND		ND		ND	
F7671	24B	ND		ND		ND		ND	
F7672	25A	ND		ND		ND		ND	
Samples recovered on 11-21-96									
F7749	22A	ND		ND		ND		ND	
F7750	22B	ND		ND		ND		ND	
F7751	23A	ND		ND		ND		ND	
F7752	24A	ND		ND		ND		ND	
F7753	24B	ND		ND		ND		ND	
F7754	25A	ND		ND		ND		ND	
F7755	KGB (Water)	ND		ND		ND		ND	
Samples recovered on 11-26-96									
F7756	22A	ND		ND		ND		ND	
F7757	22B	ND		ND		ND		ND	
F7758	23A	ND		ND		ND		ND	
F7759	24A	ND		ND		ND		ND	
F7760	Laboratory Charcoal Control Blank								
F7761	24B	ND		ND		ND		ND	
F7762	25A	ND		ND		ND		ND	
F7763	KGB (Water)	ND		ND		ND		ND	
Samples recovered on 12-2-96									
F7791	KGB (Water)	ND		ND		ND		ND	
F7792	22A	ND		ND		ND		ND	
F7793	22B	ND		ND		ND		ND	
F7794	23A	ND		ND		ND		ND	
F7795	24A	ND		ND		ND		ND	
F7796	24B	ND		ND		ND		ND	
F7797	25A	ND		ND		ND		ND	

ND = None Detected

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-4289 • FAX (417) 785-4290

October 31, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp Lejeune - Site 69 - 69KGB-AC-FLR(21) and 69KGB-GW-FLR(21).
Dye analysis results for charcoal samplers recovered on October 22 and water samples recovered on October 24, 1996.
Ozark Underground Laboratory (OUL) numbers F7245, F7402 through F7407 and F7429 through F7434.

Dear Dr. Lakhwala:

We have completed analysis of charcoal and water samples received at OUL on October 24 and 25, 1996. We have indicated the OUL numbers for each sample on the enclosed tables.

Per your telephone request, we have analyzed only the KGB charcoal samplers. We will hold the UVB samplers (OUL numbers F7387 through F7401) for one month in the event that you want them analyzed.

Normally, the criteria used for selecting water samples for analysis is as follows. If dye was found in the charcoal sampler, the water samples that were collected on the placement date and on the collection date (if not previously analyzed) for that charcoal sampler were analyzed. This determines the actual amount of dye in the water on those days. However, the water samples included in this certificate were pulled two days later and shipped to us a day later than the charcoal in this certificate. All these water samples have been analyzed. If this was not your intent, please advise and you will not be billed for them.

OUL number F7245, included in this certificate, is a water sample for station 21UW pulled on 10-7-96 that should have been analyzed and included in the Certificate of Analysis dated October 15, 1996.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye.

A summary of the results is presented in Tables 1 and 2. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas J. Aley

for Catherine L. Aley

Enclosures:
1) Table 1 - Dye analysis results for charcoal samplers
2) Table 2 - Dye analysis results for water samples
3) Sample collection data sheet
4) Discrepancy sheet
5) Sample analysis graphs

mma:c:\amipro\docs\lejeun13.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: David Brewster
Date Samples Shipped: 10-23&24-96 **Date Samples Recd:** 10-24&25-96 **Date Analyzed:** 10-29-96

Table 1. Dye analysis results of charcoal samplers for 69KGB-AC-FLR(21) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F7402	22A	10-22-96	ND		ND		ND		ND	
F7403	22B	10-22-96	ND		ND		ND		ND	
F7404	23A	10-22-96	ND		ND		ND		ND	
F7405	24A	10-22-96	ND		ND		ND		ND	
F7406	24B	10-22-96	ND		ND		ND		ND	
F7407	25A	10-22-96	ND		ND		ND		ND	

ND = None Detected

Table 2. Dye analysis results of water samples for 69UVB-GW-FLR(19) and 69KGB-GW-FLR(21) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F7245	21UW	10/07/96	ND		532.2	13.7	ND		ND	
F7429	22A	10-24-96	ND		ND		ND		ND	
F7430	22B	10-24-96	ND		ND		ND		ND	
F7431	23A	10-24-96	ND		ND		ND		ND	
F7432	24A	10-24-96	ND		ND		ND		ND	
F7433	24B	10-24-96	ND		ND		ND		ND	
F7434	25A	10-24-96	ND		ND		ND		ND	

ND = None Detected

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-4289 • FAX (417) 785-4290

October 15, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp Lejeune - Site 69 - 69UVB-AC-FLR(19) and 69KGB-AC-FLR(19).
Dye analysis results for charcoal samplers recovered on October 7, 1996.
Ozark Underground Laboratory (OUL) numbers F7184 through F7204.

Dear Dr. Lakhwala:

We have completed analysis of charcoal samplers received at OUL on October 9, 1996. We have indicated the OUL numbers for each sample on the enclosed table.

The criteria used for selecting water samples for analysis was as follows. If dye was found in the charcoal sampler, the water samples that were collected on the placement date and on the collection date (if not previously analyzed) for that charcoal sampler were analyzed. This determines the actual amount of dye in the water on those days. No water was received for this set of samplers.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Catherine L. Aley

Catherine L. Aley

Enclosures: 1) Table 1 - Dye analysis results for charcoal samplers
2) Sample collection data sheet
3) Sample analysis graphs

mma:c:\amipro\docs\lejeun12.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: David Brewster
Date Samples Shipped: 10/08/96 **Date Samples Recd:** 10/09/96 **Date Analyzed:** 10/10/96

Table 1. Dye analysis results of charcoal samplers (69UVB-AC-FLR(19) and 69KGB-AC-FLR(19) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F7184	UVB	10/07/96	ND		ND		ND		ND	
F7185	02IW	10/07/96	ND		ND		ND		ND	
F7186	15IW	10/07/96	ND		ND		ND		ND	
F7187	15UW	10/07/96	ND		ND		ND		ND	
F7188	16IW	10/07/96	ND		ND		ND		ND	
F7189	17IW	10/07/96	ND		ND		ND		ND	
F7190	17UW	10/07/96	ND		ND		ND		ND	
F7191	18UW	10/07/96	ND		ND		ND		ND	
F7192	19IW	10/07/96	ND		ND		ND		ND	
F7193	19UW	10/07/96	ND		ND		ND		ND	
F7194	20IW	10/07/96	ND		ND		ND		ND	
F7195	20UW	10/07/96	ND		ND		ND		ND	
F7196	21UW	10/07/96	ND		537.9	136	ND		ND	
F7197	22A	10/07/96	ND		ND		ND		ND	
F7198	22B	10/07/96	ND		ND		ND		ND	
F7199	23A	10/07/96	ND		ND		ND		ND	
F7200	Laboratory Charcoal Control Blank									
F7201	24A	10/07/96	ND		ND		ND		ND	
F7202	24B	10/07/96	ND		ND		ND		ND	
F7203	25A	10/07/96	ND		ND		ND		ND	
F7204	16UW	10/07/96	ND		ND		ND		ND	

ND = None Detected

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-4289 • FAX (417) 785-4290

October 9, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp Lejeune - Site 69 - 69UVB-AC-FLR(17), 69KGB-AC-FLR(17), and 69UVB-GW-FLR(17)
Dye analysis results for charcoal and water samples recovered on 09/25/96.
Ozark Underground Laboratory (OUL) numbers F7019 through F7041.

Dear Dr. Lakhwala:

We have completed analysis of charcoal and selected water samples received at OUL on September 27, 1996. We have indicated the OUL numbers for each sample on the enclosed tables.

The criteria used for selecting water samples for analysis was as follows. If dye was found in the charcoal sampler, the water samples that were collected on the placement date and on the collection date (if not previously analyzed) for that charcoal sampler were analyzed. This determines the actual amount of dye in the water on those days.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye.

A summary of the results is presented in Tables 1 and 2. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Catherine L. Aley

Catherine L. Aley

Enclosures: 1) Tables 1 & 2 - Dye analysis results for charcoal and water samples
2) Sample collection data sheets
3) Sample analysis graphs

mma:c:\amipro\docs\lejeun11.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: Rhoda J. Willis
Date Samples Shipped: 09/26/96 **Date Samples Recd:** 09/27/96 **Date Analyzed:** 09/30/96

Table 1. Dye analysis results of charcoal samplers (69UVB-AC-FLR(17) and 69KGB-AC-FLR(17) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F7019	UVB	09/25/96	ND		ND		ND		ND	
F7020	Laboratory Charcoal Control Blank									
F7021	02IW	09/25/96	ND		ND		ND		ND	
F7022	15IW	09/25/96	ND		ND		ND		ND	
F7023	15UW	09/25/96	ND		ND		ND		ND	
F7024	16IW	09/25/96	ND		ND		ND		ND	
F7025	16UW	09/25/96	ND		ND		ND		ND	
F7026	17IW	09/25/96	ND		ND		ND		ND	
F7027	17UW	09/25/96	ND		ND		ND		ND	
F7028	18UW	09/25/96	ND		ND		ND		ND	
F7029	19IW	09/25/96	ND		ND		ND		ND	
F7030	19UW	09/25/96	ND		ND		ND		ND	
F7031	20IW	09/25/96	ND		ND		ND		ND	
F7032	20UW	09/25/96	ND		ND		ND		ND	
F7033	21UW	09/25/96	ND		538.2	317	ND		ND	
F7034	22A	09/25/96	ND		ND		ND		ND	
F7035	22B	09/25/96	ND		ND		ND		ND	
F7036	23A	09/25/96	ND		ND		ND		ND	
F7037	24A	09/25/96	ND		ND		ND		ND	
F7038	24B	09/25/96	ND		ND		ND		ND	
F7039	25A	09/25/96	ND		ND		ND		ND	
F7040	Laboratory Charcoal Control Blank									

ND = None Detected

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: Rhoda J. Willis
Date Samples Shipped: 09/26/96 **Date Samples Recd:** 09/27/96 **Date Analyzed:** 10/01/96

Table 2. Dye analysis results for water samples (69UVB-GW-FLR(17) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F7041	21UW	09/25/96	ND		532.2	19.7	ND		ND	

ND = None Detected

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-4289 • FAX (417) 785-4290

September 19, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp Lejeune - Site 69 - 69UVB-AC-FLR(15), 69KGB-AC-FLR(15), and 69UVB-GW-FLR(15)
Dye analysis results for charcoal and water samples recovered on 08/26/96.
Ozark Underground Laboratory (OUL) numbers F6469 thru F6489, F6673 and F6675.

Dear Dr. Lakhwala:

We have completed analysis of charcoal and selected water samples received at OUL on August 28, 1996. We have indicated the OUL numbers for each sample on the enclosed tables.

The criteria used for selecting water samples for analysis was as follows. If dye was found in the charcoal sampler, the water samples that were collected on the placement date and on the collection date (if not previously analyzed) for that charcoal sampler were analyzed. This determines the actual amount of dye in the water on those days.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye.

A summary of the results is presented in Tables 1 and 2. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Catherine L. Aley

Catherine L. Aley

Enclosures:
1) Tables 1 & 2 - Dye analysis results for charcoal and water samples
2) Sample collection data sheets
3) Discrepancy sheet
4) Sample analysis graphs

mma:c:\amipro\docs\lejeun10.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: D. Brewster
Date Samples Shipped: 08/27/96 **Date Samples Recd:** 08/28/96 **Date Analyzed:** 09/11/96

Table 1. Dye analysis results of charcoal samplers (69UVB-AC-FLR(15) and 69KGB-AC-FLR(15) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F6469	UVB	08/26/96	ND		ND		ND		ND	
F6470	02IW	08/26/96	ND		ND		ND		ND	
F6471	15IW	08/26/96	ND		ND		ND		ND	
F6472	15UW	08/26/96	ND		ND		ND		ND	
F6473	16IW	08/26/96	510.8*	0.358	ND		ND		ND	
F6474	16UW	08/26/96	ND		ND		ND		ND	
F6475	17IW	08/26/96	ND		ND		ND		ND	
F6476	17UW	08/26/96	ND		ND		ND		ND	
F6477	18UW	08/26/96	ND		ND		ND		ND	
F6478	19IW	08/26/96	ND		ND		ND		ND	
F6479	19UW	08/26/96	ND		ND		ND		ND	
F6480	Laboratory Charcoal Control Blank									
F6481	20IW	08/26/96	ND		ND		ND		ND	
F6482	20UW	08/26/96	ND		ND		ND		ND	
F6483	21UW	08/26/96	ND		538.0	225	ND		ND	
F6484	22A	08/26/96	ND		ND		ND		ND	
F6485	22B	08/26/96	ND		ND		ND		ND	
F6486	23A	08/26/96	ND		ND		ND		ND	
F6487	24A	08/26/96	ND		ND		ND		ND	
F6488	24B	08/26/96	ND		ND		ND		ND	
F6489	25A	08/26/96	ND		ND		ND		ND	

ND = None Detected

* = A fluorescent peak is present which is atypical of fluorescein dye but has been calculated as though it were the dye.

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: D. Brewster
Date Samples Shipped: 08/27/96 **Date Samples Recd:** 08/28/96 **Date Analyzed:** 09/12/96

Table 2. Dye analysis results for water samples (69UVB-GW-FLR(15) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F6673	16IW	08/26/96	ND		ND		ND		ND	
F6675	21UW	08/26/96	ND		532.2	55.6	ND		ND	

ND = None Detected

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-4289

August 29, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp Lejeune - Site 69 - 69UVB-AC-FLR(13), 69KGB-AC-FLR(13), and 69UVB-GW-FLR(13)
Dye analysis results for charcoal and water samples recovered on 08/15/96.
Ozark Underground Laboratory (OUL) numbers F5981Gthrough F6001, and F6316.

Dear Dr. Lakhwala:

We have completed analysis of charcoal and selected water samples received at OUL on August 19, 1996. We have indicated the OUL numbers for each sample on the enclosed tables.

The criteria used for selecting water samples for analysis was as follows. If dye was found in the charcoal sampler, the water samples that were collected on the placement date and on the collection date (if not previously analyzed) for that charcoal sampler were analyzed. This determines the actual amount of dye in the water on those days.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye.

A summary of the results is presented in Tables 1 and 2. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Catherine L. Aley (ja)

Catherine L. Aley

Enclosures: 1) Tables 1 & 2 - Dye analysis results for charcoal and water samples
2) Sample collection data sheets
3) Sample analysis graphs

mma:c:\amipro\docs\lejeun09.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: Rhoda J. Willis
Date Samples Shipped: 08/16/96 **Date Samples Recd:** 08/19/96 **Date Analyzed:** 08/27/96

Table 1. Dye analysis results of charcoal samplers (69UVB-AC-FLR(13) and 69KGB-AC-FLR(13) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F5981	UVB	08/15/96	ND		ND		ND		ND	
F5982	02IW	08/15/96	ND		ND		ND		ND	
F5983	15IW	08/15/96	ND		ND		ND		ND	
F5984	15UW	08/15/96	ND		ND		ND		ND	
F5985	16IW	08/15/96	ND		ND		ND		ND	
F5986	16UW	08/15/96	ND		ND		ND		ND	
F5987	17IW	08/15/96	ND		ND		ND		ND	
F5988	17UW	08/15/96	ND		ND		ND		ND	
F5989	18UW	08/15/96	ND		ND		ND		ND	
F5990	19IW	08/15/96	ND		ND		ND		ND	
F5991	19UW	08/15/96	ND		ND		ND		ND	
F5992	20IW	08/15/96	ND		ND		ND		ND	
F5993	20UW	08/15/96	ND		ND		ND		ND	
F5994	21UW	08/15/96	ND		538.2	222	ND		ND	
F5995	22A	08/15/96	ND		ND		ND		ND	
F5996	22B	08/15/96	ND		ND		ND		ND	
F5997	23A	08/15/96	ND		ND		ND		ND	
F5998	24A	08/15/96	ND		ND		ND		ND	
F5999	24B	08/15/96	ND		ND		ND		ND	
F6000	Laboratory control charcoal blank									
F6001	25A	08/15/96	ND		ND		ND		ND	

ND = None Detected

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: Rhonda J. Willis
Date Samples Shipped: 08/16/96 **Date Samples Recd:** 08/19/96 **Date Analyzed:** 08/28/96

Table 2. Dye analysis results for a water sample (69UVB-GW-FLR(13) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F6316	21UW	08/15/96	ND		532.1	65..5	ND		ND	

ND = None Detected

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-4289 • FAX (417) 785-4290

August 15, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp Lejeune - Site 69 - 69UVB-AC-FLR(9), 69KGB-AC-FLR(9), 69UVB-GW-FLR(9) and 69KGB-GW-FLR(9)
Dye analysis results for charcoal and water samples recovered on 07/30/96.
Ozark Underground Laboratory (OUL) numbers F5339 through F5359, F5473 through F5477 and F5749.

Dear Dr. Lakhwala:

We have completed analysis of charcoal and selected water samples received at OUL on August 1, 1996. We have indicated the OUL numbers for each sample on the enclosed tables.

The criteria used for selecting water samples for analysis was as follows. If dye was found in the charcoal sampler, the water samples that were collected on the placement date and on the collection date (if not previously analyzed) for that charcoal sampler were analyzed. This determines the actual amount of dye in the water on those days.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye.

A summary of the results is presented in Tables 1 and 2. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Catherine L. Aley by Martha Arnold

Catherine L. Aley

Enclosures: 1) Tables 1 & 2 - Dye analysis results for charcoal and water samples
2) Sample collection data sheets
3) Discrepancy sheet
4) Sample analysis graphs

mma:c:\amipro\docs\lejeun08.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: David Brewster / Doug Lincoln
Date Samples Shipped: 07/31/96 **Date Samples Recd:** 08/01/96 **Date Analyzed:** 08/09/96

Table 1. Dye analysis results of charcoal samplers (69UVB-AC-FLR(9) and 69KGB-AC-FLR(9)) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F5339	UVB	07/30/96	ND		ND		ND		ND	
F5340	Laboratory Charcoal Control Blank									
F5341	02IW	07/30/96	ND*		ND		ND		ND	
F5342	15IW	07/30/96	ND		ND		ND		ND	
F5343	15UW	07/30/96	ND		ND		ND		ND	
F5344	16IW	07/30/96	511.1	1.28	ND		ND		ND	
F5345	16UW	07/30/96	ND		ND		ND		ND	
F5346	17IW	07/30/96	511.3	0.422	ND		ND		ND	
F5347	17UW	07/30/96	ND		ND		ND		ND	
F5348	18UW	07/30/96	ND		ND		ND		ND	
F5349	19IW	07/30/96	511.6	0.609	ND		ND		ND	
F5350	19UW	07/30/96	ND		ND		ND		ND	
F5351	20IW	07/30/96	511.2	1.76	ND		ND		ND	
F5352	20UW	07/30/96	ND		ND		ND		ND	
F5353	21UW	07/30/96	ND		537.9	347	ND		ND	
F5354	22A	07/30/96	ND		ND		ND		ND	
F5355	22B	07/30/96	ND		ND		ND		ND	
F5356	23A	07/30/96	ND		ND		ND		ND	
F5357	24A	07/30/96	ND		ND		ND		ND	
F5358	24B	07/30/96	ND		ND		ND		ND	
F5359	25A	07/30/96	ND		ND		ND		ND	
F5360	Laboratory Charcoal Control Blank									

ND = None Detected

* = A fluorescence peak is present that is atypical and outside the normal acceptable wavelength range for fluorescein dye and is not considered a positive dye recovery.

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: David Brewster / Doug Lincoln
Date Samples Shipped: 07/31/96 **Date Samples Recd:** 08/01/96 **Date Analyzed:** 08/09&16/96

Table 2. Dye analysis results of water samples (69UVB-GW-FLR(9)) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F5473	16IW	07/30/96	ND		ND		ND		ND	
F5474	17IW	07/30/96	ND		ND		ND		ND	
F5475	19IW	07/30/96	ND		ND		ND		ND	
F5476	20IW	07/30/96	ND		ND		ND		ND	
F5477	21UW	07/30/96	ND		532.2	88.1	ND		ND	
F5749	17IW	07/02/96	ND		ND		ND		ND	

ND = None Detected

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-428'

July 23, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE. Camp Lejeune - Site 69 - 69UVB-AC-FLR(7), 69KGB-AC-FLR(7), 69UVB-GW-FLR(7) and 69KGB-GW-FLR(5)
Dye analysis results for charcoal and water samples recovered on 07/02/96.
Ozark Underground Laboratory (OUL) numbers F4055 thru F4075, F4446 thru F4451, F4153 and F4154.

Dear Dr. Lakhwala:

We have completed analysis of charcoal and selected water samples received at OUL on July 5, 1996. We have indicated the OUL numbers for each sample on the enclosed tables.

The criteria used for selecting water samples for analysis was as follows. If dye was found in the charcoal sampler, the water samples that were collected on the placement date and on the collection date for that charcoal sampler were analyzed. This determines the actual amount of dye in the water on those days.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye.

A summary of the results is presented in Tables 1 and 2. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas Aley

Thomas Aley, PHG

Enclosures: 1) Tables 1 & 2 - Dye analysis results for charcoal and water samples
2) Sample collection data sheets
3) Sample analysis graphs

mma:c:\amipro\docs\lejeun07.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: David Brewster
Date Samples Shipped: 07/03/96 **Date Samples Recd:** 07/05/96 **Date Analyzed:** 07/17/96

Table 1. Dye analysis results of charcoal samplers (69UVB-AC-FLR(7) and 69KGB-AC-FLR(7)) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F4055	UVB	07/02/96	511.8	4.42	ND		ND		ND	
F4056	02IW	07/02/96	ND*		ND		ND		ND	
F4057	15UW	07/02/96	ND		ND		ND		ND	
F4058	15IW	07/02/96	ND		ND		ND		ND	
F4059	16UW	07/02/96	ND		ND		ND		ND	
F4060	Laboratory Charcoal Control Blank									
F4061	16IW	07/02/96	511.1	0.855	ND		ND		ND	
F4062	17UW	07/02/96	511.1	0.856	ND		ND		ND	
F4063	17IW	07/02/96	510.8	0.385	ND		ND		ND	
F4064	18UW	07/02/96	ND		ND		ND		ND	
F4065	19UW	07/02/96	ND		ND		ND		ND	
F4066	19IW	07/02/96	511.3	0.696	ND		ND		ND	
F4067	20UW	07/02/96	ND		ND**		ND		ND	
F4068	20IW	07/02/96	511.1a	0.694	ND		ND		ND	
F4069	21UW	07/02/96	ND		537.1	170	ND		ND	
F4070	22A	07/02/96	ND		ND		ND		ND	
F4071	22B	07/02/96	ND		ND		ND		ND	
F4072	23A	07/02/96	ND		ND		ND		ND	
F4073	24A	07/02/96	ND		ND		ND		ND	
F4074	24B	07/02/96	ND		ND		ND		ND	
F4075	25A	07/02/96	ND		ND		ND		ND	

ND = None Detected

* = A fluorescence peak is present that is atypical and outside the normal acceptable wavelength range for fluorescein dye and is not considered a positive dye recovery.

** = Eosine may be present in this sample, but seems to be masked by a fluorescence peak at 508.5 nm.

a = The fluorescein peak is asymetrical and could be obscuring an eosine peak.

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp Lejeune - Site 69
Samples Collected By: David Brewster
Date Samples Shipped: 07/03/96 **Date Samples Recd:** 07/05/96 **Date Analyzed:** 07/18-19/96

Table 2. Dye analysis results of water samples (69UVB-GW-FLR(7)) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F4446	UVB	07/02/96	ND		ND		ND		ND	
F4447	16IW	07/02/96	ND		ND		ND		ND	
F4448	17UW	07/02/96	507.5	0.490	ND		ND		ND	
F4449	19IW	07/02/96	507.1*	0.028	ND		ND		ND	
F4450	20UW	07/02/96	ND		ND		ND		ND	
F4451	21UW	07/02/96	ND		532.2	75.7	ND		ND	
F4153	16IW	06/18/96	ND		ND		ND		ND	
F4154	20IW	07/02/96	ND		ND		ND		ND	

ND = None Detected

* = This fluorescence peak is atypical of fluorescein dye and has another fluorescent substance present. Fluorescein is probably present but the concentration cannot be accurately calculated.

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-4289

July 11, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp LeJeune - Site 69 - 69UVB-AC-FLR(5), 69KGB-AC-FLR(5), 69UVB-GW-FLR(5) and 69KGB-GW-FLR(5)
Dye analysis results for charcoal and water samples recovered on 6/18/96.
Ozark Underground Laboratory (OUL) numbers F3365 thru F3393, F3813 thru F3816, F4228 and 4229.

Dear Dr. Lakhwala:

We have completed analysis of charcoal and selected water samples received at OUL on June 20, 1996. We have indicated the OUL numbers for each sample on the enclosed tables.

The criteria used for selecting water samples for analysis was as follows. If dye was found in the charcoal sampler, the water samples that were collected on the placement date and on the collection date for that charcoal sampler were analyzed. This determines the actual amount of dye in the water on those days.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent. the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye.

A summary of the results is presented in Tables 1 and 2. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas Aley

Thomas Aley, PHG

Enclosures:
1) Tables 1 & 2 - Dye analysis results for charcoal and water samples
2) Sample collection data sheets
3) Discrepancy sheet
4) Sample analysis graphs

mma:c:\amipro\docs\lejeun06.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp LeJeune - Site 69
Samples Collected By: David Brewster / Rhoda Willis
Date Samples Shipped: 06/19/96 **Date Samples Recd:** 06/20/96 **Date Analyzed:** 07/2&3/96

Table 1. Dye analysis results of charcoal samplers (69UVB-AC-FLR(5) and 69KGB-AC-FLR(5)) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F3365	UVB	06/18/96	511.2	2.09	ND		ND		ND	
F3366	02IW	06/18/96	ND*		ND		ND		ND	
F3367	15UW	06/18/96	511.5	0.687	ND		ND		ND	
F3368	15IW	06/18/96	ND		ND		ND		ND	
F3369	16UW	06/18/96	ND*		ND		ND		ND	
F3370	16IW	06/18/96	ND*		ND		ND		ND	
F3371	17UW	06/18/96	512.6	3.36	ND		ND		ND	
F3372	17IW	06/18/96	510.9	0.536	ND		ND		ND	
F3373	18UW	06/18/96	512.1	1.16	ND		ND		ND	
F3374	19UW	06/18/96	ND*		ND		ND		ND	
F3375	19IW	06/18/96	511.5	0.515	ND		ND		ND	
F3376	20UW	06/18/96	510.8**	0.505	ND		ND		ND	
F3377	20IW	06/18/96	512.3	0.864			ND		ND	
F3378	21UW	06/18/96	ND		537.5	165	ND		ND	
F3379	22A	06/18/96	ND		ND		ND		ND	
F3380	Laboratory Charcoal Control Blank									
F3381	22B	06/18/96	ND		ND		ND		ND	
F3382	23A	06/18/96	ND		ND		ND		ND	
F3383	24A	06/18/96	ND		ND		ND		ND	
F3384	24B	06/18/96	ND		ND		ND		ND	
F3385	25A	06/18/96	ND		ND		ND		ND	

ND = None Detected
* = A fluorescence peak is present that is atypical and outside the normal acceptable wavelength range for fluorescein dye and is not considered a positive dye recovery.
** = The fluorescein peak is asymetrical and could be obscuring an eosine peak.

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp LeJeune - Site 69
Samples Collected By: Rhoda J. Willis
Date Samples Shipped: 06/19/96 **Date Samples Recd:** 06/20/96 **Date Analyzed:** 07/2[illegible]3/96

Table 1. Dye analysis results of water samples (69UVB-GW-FLR(3&5) and 69KGB-GW-FLR(5)) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F3386	UVB	06/18/96	507.2*	0.023	ND		ND		ND	
F3387	15UW	06/18/96	ND		ND		ND		ND	
F3388	17UW	06/18/96	507.4	0.846	ND		ND		ND	
F3389	17IW	06/18/96	ND		ND		ND		ND	
F3390	18UW	06/18/96	ND		ND		ND		ND	
F3391	19IW	06/18/96	ND		ND		ND		ND	
F3392	20IW	06/18/96	ND		ND		ND		ND	
F3393	21UW	06/18/96	ND		532.2	43.0	ND		ND	
F3813	UVB	06/05/96	ND		ND		ND		ND	
F3814	15UW	06/05/96	ND		ND		ND		ND	
F3815	15IW	06/18/96	ND**		ND		ND		ND	
F3816	17IW	06/05/96	ND		ND		ND		ND	
F4228	20UW	06/05/96	ND		ND		ND		ND	
F4229	20UW	06/05/96	ND		ND		ND		ND	

ND = None Detected
* = A fluorescence peak is present that is atypical of fluorescein dye and has another fluorescent substance present which limits the accuracy of the fluorescein dye concentration calculation.
** = This fluorescence peak is atypical of fluorescein dye and has another fluorescent substance present. Fluorescein is probably present but the concentration cannot be accurately calculated.

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-428

July 3, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp LeJeune - Site 69 - 69UVB-GW-FLR(1&3) and 69KGB-GW-FLR(1&3)
Dye analysis results for water samples recovered on 5/21-22 & 6/5/96.
Ozark Underground Laboratory (OUL) numbers F2985 through F3001.

Dear Dr. Lakhwala:

We have completed analysis of selected water samples received at OUL on May 25 and June 7, 1996. The samples were assigned OUL numbers F2985 through F3001. We have indicated the OUL numbers on the enclosed copies of your sample collection data sheets..

The criteria used for selecting water samples for analysis was as follows. If the dye was found in the charcoal sampler for a certain sampling period, the water samples that were collected on the placement date and on the collection date for that charcoal sampler were analyzed. This determines the actual amount of dye in the water on those days.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas Aley

Thomas Aley, PHG

Enclosures: 1) Table 1 - Dye analysis results for water samples
2) Sample collection data sheets
3) Sample analysis graphs

mma:c:\amipro\docs\lejeun05.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp LeJeune - Site 69
Samples Collected By: David Brewster / Rhoda Willis
Date Samples Shipped: 05/23/96 & 06/06/96 **Date Samples Recd:** 05/24/96 & 06/07/96 **Date Analyzed:** 06/20/96

Table 1. Dye analysis results of water samples (69UVB-GW-FLR(1 & 3) and 69[illegible]GB-GW-FLR(1 & 3)) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F2985	15IW	05/21/96	ND		ND		ND		ND	
F2986	17UW	05/21/96	ND		ND		ND		ND	
F2987	18UW	05/21/96	ND		ND		ND		ND	
F2988	19IW	05/21/96	ND		ND		ND		ND	
F2989	19UW	05/21/96	ND		ND		ND		ND	
F2990	20IW	05/21/96	ND		ND		ND		ND	
F2991	21UW	05/21/96	ND		ND		ND		ND	
F2992	25A	05/21/96	ND		ND		ND		ND	
F2993	15IW	06/05/96	ND		ND		ND		ND	
F2994	17UW	06/05/96	507.1	1.69	ND		ND		ND	
F2995	18UW	06/05/96	ND		ND		ND		ND	
F2996	19IW	06/05/96	ND		ND		ND		ND	
F2997	19UW	06/05/96	507.4	0.171	534.0*	0.262	ND		ND	
F2998	20IW	06/05/96	ND**		ND		ND		ND	
F2999	21UW	06/05/96	ND		531.1	4.08	ND		ND	
F3000	Laboratory Charcoal Control Blank									
F3001	25A	06/05/96	ND		ND		ND		ND	

ND = None Detected

* = The eosine peak is partially obscured by fluorescein dye which limits the accuracy of the eosine dye concentration calculation.

** = A fluorescence peak is present that is atypical and outside the normal acceptable wavelength range for fluorescein dye and is not considered a positive dye recovery.

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem. Missouri 65733 • (417) 785-428[illegible]

June 28, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp LeJeune - Site 69 - 69UVB-AC-FLR(3) and 69KGB-AC-FLR(3).
Dye analysis results for charcoal samplers recovered on June 5, 1996.
Ozark Underground Laboratory (OUL) numbers F2686 through F2706.

Dear Dr. Lakhwala:

We have completed analysis of the charcoal samplers received at OUL on June 7, 1996. The samplers were assigned OUL numbers F2686 through F2706. We have indicated the OUL numbers on the enclosed copies of your sample collection data sheets.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas Aley, PHG

Enclosures: 1) Table 1 - Dye analysis results for charcoal samplers
2) Sample collection data sheet
3) Sample analysis graphs

mma:c:\amipro\docs\lejeun04.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp LeJeune - Site 69
Samples Collected By: David Brewster
Date Samples Shipped: 06/06/96 Date Samples Recd: 06/07/96 Date Analyzed: 06/19/96

Table 1. Dye analysis results of charcoal samplers (69UVB-AC-FLR(3) and 69KGB-AC-FLR(3)) for fluorescein, eosine, rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F2686	UVB	06/05/96	ND		ND		ND		ND	
F2687	02IW	06/05/96	ND		ND		ND		ND	
F2688	15IW	06/05/96	511.5	1.07	ND		ND		ND	
F2689	15UW	06/05/96	ND		ND		ND		ND	
F2690	16IW	06/05/96	ND		ND		ND		ND	
F2691	16UW	06/05/96	ND		ND		ND		ND	
F2692	17IW	06/05/96	ND *		ND		ND		ND	
F2693	17UW	06/05/96	513.0	78.6	ND		ND		ND	
F2694	18UW	06/05/96	511.4	0.609	ND		ND		ND	
F2695	19IW	06/05/96	511.0	0.633	ND		ND		ND	
F2696	19UW	06/05/96	511.1	1.19	ND		ND		ND	
F2697	20IW	06/05/96	511.8	1.52	ND		ND		ND	
F2698	20UW	06/05/96	ND		ND		ND		ND	
F2699	21UW	06/05/96	ND		536.8	49.7	ND		ND	
F2700	Laboratory Charcoal Control Blank									
F2701	22A	06/05/96	ND		ND		ND		ND	
F2702	22B	06/05/96	ND		ND		ND		ND	
F2703	23A	06/05/96	ND		ND		ND		ND	
F2704	24A	06/05/96	ND		ND		ND		ND	
F2705	24B	06/05/96	ND		ND		ND		ND	
F2706	25A	06/05/96	512.3	5.71	ND		ND		ND	

ND = None Detected

* = A fluorescence peak is present that is atypical and outside the normal acceptable wavelength range for fluorescein dye and is not a positive dye recovery.

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-4289

June 7, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp LeJeune - Site 69 - 69UVB-AC-FLR(1), 69KGB-AC-FLR(1) & 69-GW-FLR(1)
Dye analysis results for charcoal samplers recovered on May 21 & 22, 1996.
Ozark Underground Laboratory (OUL) numbers F1825 through F1845 and F1941.

Dear Dr. Lakhwala:

We have completed analysis of the charcoal and water samples received at OUL on May 24, 1996. The charcoal was assigned OUL numbers F1825 through F1845. The water sample was assigned OUL number F1941. We have indicated the OUL numbers on the enclosed copies of your sample collection data sheets.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye. No dyes were detected in this group of samples.

A summary of the results is presented in Tables 1 and 2. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Catherine L. Aley

Catherine L. Aley

Enclosures: 1) Tables 1and 2 - Dye analysis results for charcoal and water samples
2) Sample collection data sheet
3) Discrepancy sheet
4) Sample analysis graphs

mma:c:\amipro\docs\lejeun03.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp LeJeune - Site 69
Samples Collected By: David Brewster / Rhoda Willis
Date Samples Shipped: 05/23/96 Date Samples Recd: 05/24/96 Date Analyzed: 06/04/96

Table 1. Dye analysis results of charcoal samplers (69UVB-AC-FLR(1) and 69KGB-AC-FLR(1)) for fluorescein, eosine and rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F1825	UVB	05-22-96	ND		ND		ND		ND	
F1826	2IW	05-21-96	ND		ND		ND		ND	
F1827	15IW	05-21-96	ND		ND		ND		ND	
F1828	15UW	05-21-96	ND		ND		ND		ND	
F1829	16IW	05-21-96	ND		ND		ND		ND	
F1830	16UW	05-21-96	ND		ND		ND		ND	
F1831	17IW	05-21-96	ND		ND		ND		ND	
F1832	17UW	05-21-96	ND		ND		ND		ND	
F1833	18UW	05-21-96	ND		ND		ND		ND	
F1834	19IW	05-21-96	ND		ND		ND		ND	
F1835	19UW	05-21-96	ND		ND		ND		ND	
F1836	20IW	05-21-96	ND		ND		ND		ND	
F1837	20UW	05-21-96	ND		ND		ND		ND	
F1838	21UW	05-21-96	ND		ND		ND		ND	
F1839	22A	05-21-96	ND		ND		ND		ND	
F1840	Laboratory charcoal control blank									
F1841	22B	05-21-96	ND		ND		ND		ND	
F1842	23A	05-21-96	ND		ND		ND		ND	
F1843	24A	05-21-96	ND		ND		ND		ND	
F1844	24B	05-21-96	ND		ND		ND		ND	
F1845	25A	05-21-96	ND		ND		ND		ND	

ND = None Detected

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp LeJeune - Site 69
Samples Collected By: David Brewster / Rhoda Willis
Date Samples Shipped: 05/23/96 Date Samples Recd: 05/24/96 Date Analyzed: 06/04/96

Table 2. Dye analysis results of water sample (69-GW-FLR(1)) for fluorescein, eosine and rhodamine WT (RWT) and pyranine dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F1941	TANK (Water)	05-22-96	ND		ND		ND		ND	

ND = None Detected

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-4289

May 24, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: *Camp LeJeune - Site 69* - 69UVB-GW-FLR(B2) & 69KGB-GW-FLR(B2)
Dye analysis results for charcoal samplers recovered on May 2 & 3, 1996.
Ozark Underground Laboratory (OUL) numbers F1227 through F1251.

Dear Dr. Lakhwala:

We have completed analysis of the charcoal samplers received at Ozark Underground Laboratory (OUL) on May 7, 1996. The samplers were assigned OUL numbers F1227 through F1251. We have indicated the OUL numbers on the enclosed copy of your sample collection data sheets.

All fluorescein, eosine, rhodamine WT, and pyranine concentrations are based upon standards routinely used at OUL. The fluorescein and eosine are mixtures of 75% dye and 25% diluent, the rhodamine WT is a 20% solution, and the pyranine is a mixture of 77% dye and 23% diluent. The concentrations are based upon the as-sold weight of that dye. No dyes were detected in this group of samples.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs.

Sincerely,

Thomas Aley, PHG

Enclosures: 1) Table 1 - Dye analysis results for charcoal samplers
2) Sample collection data sheet
3) Discrepancy sheet
4) Sample analysis graphs

mma:c:\amipro\docs\lejeun02.sam

Ozark Underground Laboratory for SBP Technologies

Project Name: Camp LeJeune - Site 69
Samples Collected By: David Brewster
Date Samples Shipped: 5/6/96 Date Samples Recd: 5/7/96 Date Analyzed: 5/16/96

Table 1. Dye analysis results of charcoal samplers (69UVB-GW-FLR(Background 2) and 69KGB-GW-FLR(B2)) for fluorescein, eosine and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Date Recovered	Fluorescein		Eosine		RWT		Pyranine	
			Peak	Conc.	Peak	Conc.	Peak	Conc.	Peak	Conc.
F1227	UVB	05-03-96	ND		ND		ND		ND	
F1228	2IW	05-02-96	ND		ND		ND		ND	
F1229	15IW	05-02-96	ND		ND		ND		ND	
F1230	15UW	05-02-96	ND		ND		ND		ND	
F1231	16IW	05-02-96	ND		ND		ND		ND	
F1232	16UW	05-02-96	ND		ND		ND		ND	
F1233	17IW	05-02-96	ND		ND		ND		ND	
F1234	17UW	05-02-96	ND		ND		ND		ND	
F1235	18IW	05-02-96	ND		ND		ND		ND	
F1236	18UW	05-02-96	ND		ND		ND		ND	
F1237	19IW	05-02-96	ND		ND		ND		ND	
F1238	19UW	05-02-96	ND		ND		ND		ND	
F1239	20IW	05-02-96	ND		ND		ND		ND	
F1240	Laboratory Control Blank									
F1241	20UW	05-02-96	ND		ND		ND		ND	
F1242	21IW	05-02-96	ND		ND		ND		ND	
F1243	21UW	05-02-96	ND		ND		ND		ND	
F1244	22A	05-02-96	ND		ND		ND		ND	
F1245	22B	05-02-96	ND		ND		ND		ND	
F1246	23A	05-02-96	ND		ND		ND		ND	
F1247	23B	05-02-96	ND		ND		ND		ND	
F1248	24A	05-02-96	ND		ND		ND		ND	
F1249	24B	05-02-96	ND		ND		ND		ND	
F1250	25A	05-02-96	ND		ND		ND		ND	
F1251	25B	05-02-96	ND		ND		ND		ND	

ND = None Detected

OZARK UNDERGROUND LABORATORY

1572 Aley Lane • Protem, Missouri 65733 • (417) 785-4289

May 2, 1996

CERTIFICATE OF ANALYSIS

Fayaz Lakhwala, PhD
SBP Technologies
Sabine Island
Gulf Breeze, FL 32561-3999

RE: Camp LeJeune - Site 69 - 69UVB-GW-FLR(Background 1)
Dye analysis results for charcoal samplers recovered on April 18, 1996.
Ozark Underground Laboratory (OUL) numbers F0132 through F0156.

Dear Dr. Lakhwala:

We have completed analysis of the charcoal samplers received at Ozark Underground Laboratory (OUL) on April 22, 1996. The samplers were assigned OUL numbers F0132 through F0156. We have indicated the OUL numbers on the enclosed copy of your sample collection data sheet.

All fluorescein and rhodamine WT concentrations are based upon standards routinely used at OUL. The fluorescein is a mixture of 75% dye and 25% diluent; the rhodamine WT is a 20% solution. The concentrations are based upon the as-sold weight of that dye. No dyes were detected in this group of samples.

A summary of the results is presented in Table 1. Additional sampling information is available on the enclosed analysis graphs. We have recently sent you copies of our current Procedures and Criteria documents.

Sincerely,

Thomas Aley

Thomas Aley, PHG

Enclosures: 1) Table 1 - Dye analysis results for charcoal samplers
2) Sample collection data sheet
3) Sample analysis graphs

mma:c:\amipro\docs\lejeun01.sam

Table 1. Dye analysis results of charcoal samplers (69UVB-GW-FLR-Background 1) for fluorescein, eosine and rhodamine WT (RWT) dyes. Peak wavelengths are reported in nanometers (nm); dye concentrations are reported in parts per billion (ppb).

OUL Number	Station Number	Fluorescein		Eosine		RWT	
		Peak	Conc.	Peak	Conc.	Peak	Conc.
F0132	2IW	ND		ND		ND	
F0133	15IW	ND		ND		ND	
F0134	15UW	ND		ND		ND	
F0135	16IW	ND		ND		ND	
F0136	16UW	ND		ND		ND	
F0137	17IW	ND		ND		ND	
F0138	17UW	ND		ND		ND	
F0139	18IW	ND		ND		ND	
F0140	Laboratory Control Blank						
F0141	18UW	ND		ND		ND	
F0142	19IW	ND		ND		ND	
F0143	19UW	ND		ND		ND	
F0144	20IW	ND		ND		ND	
F0145	20UW	ND		ND		ND	
F0146	21IW	ND		ND		ND	
F0147	21UW	ND		ND		ND	
F0148	22A	ND		ND		ND	
F0149	22B	ND		ND		ND	
F0150	23A	ND		ND		ND	
F0151	23B	ND		ND		ND	
F0152	24A	ND		ND		ND	
F0153	24B	ND		ND		ND	
F0154	25A	ND		ND		ND	
F0155	25B	ND		ND		ND	
F0156	UVB	ND		ND		ND	

ND = None Detected

Appendix D: Pressure Transducer Summary

IEG TECHNOLOGIES CORP.

CAMP LEJEUNE, NC. TRANSDUCER STUDY
JUNE 15 AND 16, 1996 AND AUGUST 18, 1996

Transducer readings were recorded on June 15 and 16, 1996 in wells monitoring the UVB system at Camp Lejeune, North Carolina. On August 18, 1996, transducer recordings were taken in wells monitoring the KGB system at Camp Lejeune, North Carolina.

METHODS

In each case, transducers were lowered into the monitor wells to the top of water level and a "zero reading' was taken. Subsequently, the transducers were lowered to the screened interval and a series of readings were recorded during stabilization periods while the UVB and KGB systems were turned on and off in alternating pattern.

Pressure differential calculations were computed from results recorded at the site. For ease of communication, these have been converted to height in millimeters of water (mm/H_2O). Comments have also been made referring to differential trends as they compare in a rising or falling relationship with respect to trends of previous events.

OBSERVATIONS

UVB TRANSDUCER STUDY

It was first noticed that upon positioning the transducer, and with each event change, a period of 45 minutes to 75 minutes was necessary for readings to stabilize. We attempted to achieve readings from as many wells as possible within the given time frame, yet obtain information that was meaningful. As a result, recordings were taken during each event for a time period that would identify definite changes and pattern trends, as opposed to obtaining stabilized quantitative measurements. Each event was maintained for a minimum of 30 minutes, though some zeroing events lasted up to 120 minutes. The time required to record readings from five UVB monitor wells was approximately 24 hours.

The greatest differential between UVB on and off periods occurred at the deep monitor well site #16, which is 55 feet north and upgradient from the UVB. With the UVB initially off, a falling differential of 120 mm/H_2O was recorded after 60 minutes of running the system. Recordings every 15 minutes indicated stabilization in hyperbolic progression. To verify that changes were not the result of atmospheric conditions, the system was shut off and monitored. This resulted in a reversal trend with a rising differential of 34 mm/H_2O after 30 minutes.

The least differential, though for only 30 minute cycles, between UVB on and off periods occurred in both shallow and deep monitor wells at site #20, which is 60 feet south and downgradient from the UVB. Both wells showed 16 mm/H_2O of falling differential from the off to on period with subsequent trend reversals of 5 mm/H2O rising differentials when the system was again turned off for 30 minutes.

On and off cycle responses were also recorded in the shallow and deep wells at site #17, which is 52 feet east and cross-gradient from the UVB well. The shallow well was initially off, and showed 41mm/H_2O falling differential after being on for 45 minutes, followed by a trend reversal and 32 mm/H2O rising differential after being turned off. Recordings for the deep well started while the UVB was running for several hours. When the system was turned off, a recording after 30 minutes reflected a falling differential of 5mm/H_2O. After this off period, the system was turned on for 60 minutes that reflected an 18mm/H_2O falling differential followed by a 60 minute off period that reflected a trend reversal and 8 mm/H_2O rising differential.

KGB TRANSDUCER STUDY

Transducer readings were recorded at the following KGB monitor well sites: #24-A, #24-B and #22-B. Each recording began with the KGB on, transducer in position and monitored for 30 minutes. Subsequently, the systems were turned off for 30 minutes and back on for 30 minutes while being monitored.

Sites 24-A had on to off and off to on differentials of 2mm/H_2O, falling and rising respectively, and 22-B had on to off and off to on differentials of 6 and 1 mm/H_2O falling and rising respectively. Site 24-B did not have a trend reversal, but had on to off and off to on falling differentials of 16 and 7 mmH2O.

CONCLUSIONS

For all UVB monitor wells, very distinct responses and trend reversals were recorded for each event of turning on and turning off the UVB well. The responses were evident in both shallow and deep wells for an apparent radius of at least 50 to 60 feet around the UVB well as indicated from readings up, down and cross gradient. Monitoring transducer recording trends provided verification that transducer recordings were not the effect of atmospheric changes. The trend of each event appeared to began immediately with the initiation of that event, but an extended period was necessary at each location to stabilize. This time requirement prevented any attempt to measure or calculate meaningful quantitative response or comparisons.

Transducer readings at the KGB monitor well sites had a very minor degree of differential. The differential was so slight that it was within the practical error range of reading the digits of the recorder. The results at site 24-B also did not show trend reversal, but did show progressive change, that could be due to changes in atmospheric conditions. As a result, it is determined that transducer results from KGB monitor wells were inconclusive.

As a warning to readers of this document, it could be misleading to attempt to interpret quantitative differentials or trend directions from this data. The nature of the system and distances to monitor wells may result in changes that are not necessarily representative of conditions as they relate in time.

Appendix E: Groundwater VOCs Analytical Reports

6

Roy F. Weston, Inc. - Lionville Laboratory
VOA ANALYTICAL DATA PACKAGE FOR
SBP CAMP LEJEUNE

DATE RECEIVED: 10/26/96 RFW LOT # :9610L936

CLIENT ID	RFW #		MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
69GW-UVB1	001		W	96LVN261	10/23/96	N/A	11/04/96
69GW-UVB2	002		W	96LVN261	10/23/96	N/A	11/04/96
69GW-UVB2	002	D1	W	96LVQ124	10/23/96	N/A	11/06/96
69GW-02IW	003		W	96LVN261	10/23/96	N/A	11/04/96
69GW-16IW	004		W	96LVN262	10/23/96	N/A	11/05/96
69GW-16IW	004	R1	W	96LVQ124	10/23/96	N/A	11/06/96
69GW-16UW	005		W	96LVN261	10/23/96	N/A	11/04/96
69GW-16UW	005 MS		W	96LVN262	10/23/96	N/A	11/05/96
69GW-16UW	005 MSD		W	96LVN262	10/23/96	N/A	11/05/96
69GW-17IW	006		W	96LVN261	10/23/96	N/A	11/04/96
69GW-17IW	006	D1	W	96LVN262	10/23/96	N/A	11/05/96
69GW-17UW	007		W	96LVN263	10/23/96	N/A	11/06/96
69GW-18IW	008		W	96LVN263	10/23/96	N/A	11/06/96
69GW-18UW	009		W	96LVN263	10/23/96	N/A	11/06/96
69GW-19IW	010		W	96LVN262	10/23/96	N/A	11/05/96
69GW-19IW	010	R1	W	96LVQ124	10/23/96	N/A	11/06/96
69GW-19UW	011		W	96LVN261	10/23/96	N/A	11/04/96
69GW-19UW	011	D1	W	96LVN262	10/23/96	N/A	11/05/96
69GW-20IW	012		W	96LVN261	10/23/96	N/A	11/04/96
69GW-20IW	012	D1	W	96LVN262	10/23/96	N/A	11/05/96
69GW-20UW	013		W	96LVN262	10/23/96	N/A	11/05/96
69GW-15IW	014		W	96LVN263	10/23/96	N/A	11/06/96
69GW-15UW	015		W	96LVN263	10/23/96	N/A	11/06/96
69GW-15UW	015	R1	W	96LVN263	10/23/96	N/A	11/06/96
69GW-21IW	016		W	96LVN261	10/23/96	N/A	11/04/96
69GW-21IW	016	R1	W	96LVQ124	10/23/96	N/A	11/06/96
69GW-21UW	017		W	96LVN261	10/23/96	N/A	11/04/96
69GW-21UW	017	D1	W	96LVN263	10/23/96	N/A	11/06/96
69GW-22A	018		W	96LVN262	10/22/96	N/A	11/05/96
69GW-22B	019		W	96LVN262	10/22/96	N/A	11/05/96
69GW-22B	019	R1	W	96LVN262	10/22/96	N/A	11/05/96
69GW-23A	020		W	96LVN262	10/22/96	N/A	11/05/96
69GW-23B	021		W	96LVN263	10/23/96	N/A	11/06/96
69GW-24A	022		W	96LVN264	10/24/96	N/A	11/07/96
69GW-24B	023		W	96LVN264	10/24/96	N/A	11/07/96
69GW-25A	024		W	96LVN264	10/24/96	N/A	11/07/96
69GW-25B	025		W	96LVN263	10/23/96	N/A	11/06/96

LAB QC:

VBLKVQ	MB1		W	96LVN261	N/A	0880001	11/04/96

Roy F. Weston, Inc. - Lionville Laboratory
VOA ANALYTICAL DATA PACKAGE FOR
SBP CAMP LEJEUNE

DATE RECEIVED: 10/26/96 RFW LOT # :9610L936

CLIENT ID	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
VBLKVU	MB1	W	96LVQ124	N/A	N/A	11/06/96
VBLKVR	MB1	W	96LVN262	N/A	N/A	11/05/96
VBLKVR	MB1 BS	W	96LVN262	N/A	N/A	11/05/96
VBLKVS	MB1	W	96LVN263	N/A	N/A	11/06/96
VBLKVT	MB1	W	96LVN264	N/A	N/A	11/07/96

Roy F. Weston, Inc[illegible] ionville Laboratory
Volati[illegible] oy GC/MS
Report Date: 11/[illegible] 12:41

RFW Batch Number: 9610L936 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 1a

	Cust ID:	69GW-UVB1		69GW-UVB2		69GW-UVB2		69GW-02IW		69GW-16IW		69GW-16IW	
Sample	RFW#:	001		002		002 DL		003		004		004	
Information	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	1.00		1.00		10.0		1.00		1.00		1.00	
	Units:	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
												REPREP	
	1,2-Dichloroethane-d4	90	%	88	%	75 *	%	85	%	96	%	66 *	%
Surrogate	Toluene-d8	106	%	104	%	112 *	%	103	%	87 *	%	114 *	%
Recovery	Bromofluorobenzene	90	%	88	%	91	%	86	%	81 *	%	85 *	%
			fl		fl		fl		fl		fl		fl
Chloromethane		2	U	2	U	20	U	2	U	2	U	2	U
Bromomethane		2	U	2	U	20	U	2	U	2	U	2	U
Vinyl Chloride		2	U	2	U	20	U	0.5	J	2	U	2	U
Chloroethane		2	U	2	U	20	U	2	U	2	U	2	U
Methylene Chloride		0.8	BJ	0.6	BJ	13	BJD	1	BJ	0.5	BJ	0.6	BJ
Acetone		2	BJ	86	BE	130	D	3	BJ	12	B	5	U
Carbon Disulfide		1	U	1	U	10	U	1	U	1	U	1	U
1,1-Dichloroethene		1	U	1	U	10	U	1	U	1	U	1	U
1,1-Dichloroethane		1	U	1	U	10	U	1	U	1	U	1	U
1,2-Dichloroethene (total)		1	U	1	U	10	U	20		0.4	J	0.4	J
Chloroform		1	U	1	U	10	U	1	U	2		2	
1,2-Dichloroethane		1	U	1	U	10	U	1	U	1	U	1	U
2-Butanone		5	U	7		50	U	5	U	5	U	5	U
1,1,1-Trichloroethane		1	U	1	U	10	U	1	U	1	U	1	U
Carbon Tetrachloride		1	U	1	U	10	U	1	U	1	U	1	U
Bromodichloromethane		1	U	1	U	10	U	1	U	1	U	1	U
1,2-Dichloropropane		1	U	1	U	10	U	1	U	1	U	1	U
cis-1,3-Dichloropropene		1	U	1	U	10	U	1	U	1	U	1	U
Trichloroethene		1	U	1	U	10	U	0.5	J	1	U	1	U
Dibromochloromethane		1	U	1	U	10	U	1	U	1	U	1	U
1,1,2-Trichloroethane		1	U	1	U	10	U	1	U	1	U	1	U
Benzene		1	U	1	U	10	U	1	U	1	U	1	U
Trans-1,3-Dichloropropene		1	U	1	U	10	U	1	U	1	U	1	U
Bromoform		1	U	1	U	10	U	1	U	1	U	1	U
4-Methyl-2-pentanone		5	U	5	U	50	U	5	U	5	U	5	U
2-Hexanone		5	U	5	U	50	U	5	U	5	U	5	U
Tetrachloroethene		1	U	1	U	10	U	1	U	1	U	1	U
Toluene		1	U	1	U	10	U	1	U	1	U	1	U
1,1,2,2-Tetrachloroethane		1	U	1	U	10	U	1	U	1	U	1	U

*= Outside of EPA CLP QC limits.

RFW Batch Number: **9610L936** Client: **SBP CAMP LEJEUNE** Work Order: 11431002001 Page: 1b

Cust ID:	69GW-UVB1		69GW-UVB2		69GW-UVB2		69GW-02IW		69GW-16IW		69GW-16IW	
RFW#:	001		002		002 DL		003		004		004 REPREP	
Chlorobenzene	1	U	1	U	10	U	1	U	1	U	1	U
Ethylbenzene	1	U	1	U	10	U	1	U	1	U	1	U
Styrene	1	U	1	U	10	U	1	U	1	U	1	U
Xylene (total)	1	U	1	U	10	U	1	U	1	U	1	U

*= Outside of EPA CLP QC limits.

0000010

Roy F. Weston, Inc ionville Laboratory

Volati by GC/MS — Report Date: 11/ 12:41

RFW Batch Number: 9610L936 — Client: SBP CAMP LEJEUNE — Work Order: 11431002001 — Page: 2a

Cust ID:	69GW-16UW		69GW-16UW		69GW-16UW		69GW-17IW		69GW-17IW		69GW-17UW	
Sample Information RFW#:	005		005 MS		005 MSD		006		006 DL		007	
Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
D.F.:	1.00		1.00		1.00		2.00		10.0		500	
Units:	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
Surrogate Recovery 1,2-Dichloroethane-d4	95	%	113	%	112	%	87	%	100	%	88	%
Toluene-d8	100	%	89	%	97	%	104	%	103	%	101	%
Bromofluorobenzene	86	%	82 *	%	89	%	83 *	%	89	%	87	%
		fl		fl		fl		fl		fl		fl
Chloromethane	2	U	2	U	2	U	4	U	20	U	1000	U
Bromomethane	2	U	2	U	2	U	4	U	20	U	1000	U
Vinyl Chloride	2	U	2	U	2	U	3	J	3	JD	590	J
Chloroethane	2	U	2	U	2	U	4	U	20	U	1000	U
Methylene Chloride	0.7	BJ	0.5	BJ	0.7	BJ	2	BJ	6	BJD	1000	B
Acetone	2	BJ	5	U	0.9	BJ	10	U	50	U	980	BJ
Carbon Disulfide	1	U	1	U	1	U	2	J	2	JD	500	U
1,1-Dichloroethene	1	U	64	%	69	%	2	U	10	U	500	U
1,1-Dichloroethane	1	U	1	U	1	U	2	U	10	U	500	U
1,2-Dichloroethene (total)	1	U	1	U	1	U	300	E	220	D	11000	
Chloroform	1	U	1	U	1	U	2	U	10	U	500	U
1,2-Dichloroethane	1	U	1	U	1	U	2	U	10	U	500	U
2-Butanone	5	U	5	U	5	U	10	U	50	U	2500	U
1,1,1-Trichloroethane	1	U	1	U	1	U	2	U	10	U	500	U
Carbon Tetrachloride	1	U	1	U	1	U	2	U	10	U	500	U
Bromodichloromethane	1	U	1	U	1	U	2	U	10	U	500	U
1,2-Dichloropropane	1	U	1	U	1	U	2	U	10	U	500	U
cis-1,3-Dichloropropene	1	U	1	U	1	U	2	U	10	U	500	U
Trichloroethene	1	U	86	%	89	%	0.7	J	10	U	500	U
Dibromochloromethane	1	U	1	U	1	U	2	U	10	U	500	U
1,1,2-Trichloroethane	1	U	1	U	1	U	2	U	10	U	500	U
Benzene	1	U	87	%	92	%	0.2	J	10	U	500	U
Trans-1,3-Dichloropropene	1	U	1	U	1	U	2	U	10	U	500	U
Bromoform	1	U	1	U	1	U	2	U	10	U	500	U
4-Methyl-2-pentanone	5	U	5	U	5	U	10	U	50	U	2500	U
2-Hexanone	5	U	5	U	5	U	10	U	50	U	2500	U
Tetrachloroethene	1	U	1	U	1	U	2	U	10	U	500	U
Toluene	1	U	82	%	90	%	2	U	10	U	500	U
1,1,2,2-Tetrachloroethane	1	U	1	U	1	U	2	U	10	U	500	U

*= Outside of EPA CLP QC limits.

RFW Batch Number: **9610L936** Client: **SBP CAMP LEJEUNE** Work Order: 11431002001 Page: 2b

Cust ID:	69GW-16UW		69GW-16UW		69GW-16UW		69GW-17IW		69GW-17IW		69GW-17UW	
RFW#:	005		005 MS		005 MSD		006		006 DL		007	
Chlorobenzene	1	U	88	%	94	%	2	U	10	U	500	U
Ethylbenzene	1	U	1	U	1	U	2	U	10	U	500	U
Styrene	1	U	1	U	1	U	2	U	10	U	500	U
Xylene (total)	1	U	1	U	1	U	2	U	10	U	500	U

*= Outside of EPA CLP QC limits.

	Cust ID:	69GW-18IW		69GW-18UW		69GW-19IW		69GW-19IW		69GW-19UW		69GW-19UW	
Sample	RFW#:	008		009		010		010		011		011 DL	
Information	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	2.00		1.00		1.00		1.00		1.00		[illegible].00	
	Units:	UG/L		UG/L		UG/L		UG/L REPREP		UG/L		[illegible]/L	
	1,2-Dichloroethane-d4	95	%	93	%	116 *	%	72 *	%	83	%	[illegible]	%
Surrogate	Toluene-d8	102	%	102	%	96	%	112 *	%	103	%	[illegible]	%
Recovery	Bromofluorobenzene	93	%	92	%	90	%	86	%	85 *	%	[illegible]	%
			fl		fl		fl		fl		fl		fl
Chloromethane		4	U	2	U	0.4	J	2	U	2	U	10	U
Bromomethane		4	U	2	U	2	U	2	U	2	U	10	U
Vinyl Chloride		4	U	2	U	2	U	2	U	2	U	10	U
Chloroethane		4	U	2	U	2	U	2	U	2	U	10	U
Methylene Chloride		1	BJ	0.8	BJ	0.4	BJ	0.7	BJ	0.6	BJ	3	BJD
Acetone		80	B	2	BJ	5	BJ	5	U	3	BJ	25	U
Carbon Disulfide		1	J	1	U	3		4		1	U	5	U
1,1-Dichloroethene		2	U	1	U	1	U	1	U	0.1	J	5	U
1,1-Dichloroethane		2	U	1	U	1	U	1	U	1	U	5	U
1,2-Dichloroethene (total)		1	J	0.9	J	21		26		120	E	65	D
Chloroform		2	U	1	U	1	U	1	U	0.1	J	5	U
1,2-Dichloroethane		2	U	1	U	1	U	1	U	1	U	5	U
2-Butanone		10	U	5	U	5	U	5	U	5	U	25	U
1,1,1-Trichloroethane		2	U	1	U	1	U	1	U	1	U	5	U
Carbon Tetrachloride		2	U	1	U	1	U	1	U	1	U	5	U
Bromodichloromethane		2	U	1	U	1	U	1	U	1	U	5	U
1,2-Dichloropropane		2	U	1	U	1	U	1	U	1	U	5	U
cis-1,3-Dichloropropene		2	U	1	U	1	U	1	U	1	U	5	U
Trichloroethene		2	U	1	U	25		23		12		8	D
Dibromochloromethane		2	U	1	U	1	U	1	U	1	U	5	U
1,1,2-Trichloroethane		2	U	1	U	1	U	1	U	1	U	5	U
Benzene		2	U	0.6	J	1	U	1	U	0.2	J	5	U
Trans-1,3-Dichloropropene		2	U	1	U	1	U	1	U	1	U	5	U
Bromoform		2	U	1	U	1	U	1	U	1	U	5	U
4-Methyl-2-pentanone		10	U	5	U	5	U	5	U	5	U	25	U
2-Hexanone		10	U	5	U	5	U	5	U	5	U	25	U
Tetrachloroethene		2	U	1	U	1	U	1	U	1	U	5	U
Toluene		2	U	0.1	J	1	U	1	U	0.2	J	5	U
1,1,2,2-Tetrachloroethane		2	U	1	U	1	U	1	U	1	U	5	U

*= Outside of EPA CLP QC limits.

Cust ID:	69GW-18IW		69GW-18UW		69GW-19IW		69GW-19IW		69GW-19UW		69GW-19UW	
RFW#:	008		009		010		010 REPREP		011		011 DL	
Chlorobenzene	2	U	0.2	J	1	U	1	U	1	U	5	U
Ethylbenzene	2	U	1	U	1	U	1	U	1	U	5	U
Styrene	2	U	1	U	1	U	1	U	1	U	5	U
Xylene (total)	2	U	1	U	1	U	1	U	1	U	5	U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc ionville Laboratory
Volat by GC/MS
Report Date: 11/ 12:41

RFW Batch Number: 9610L936 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 4a

	Cust ID:	69GW-20IW		69GW-20IW		69GW-20UW		69GW-15IW		69GW-15UW		69GW-15UW	
Sample	RFW#:	012		012 DL		013		014		015		015	
Information	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	1.00		25.0		2.50		200		5000		[illegible]5000	
	Units:	UG/L		UG/L		UG/L		UG/L		UG/L		[illegible]G/L	
												[illegible]ERREP	
	1,2-Dichloroethane-d4	89	%	106	%	105	%	95	%	94	%	[illegible]9.	%
Surrogate	Toluene-d8	102	%	98	%	102	%	102	%	101	%	[illegible]5.	%
Recovery	Bromofluorobenzene	84 *	%	87	%	88	%	87	%	83 *	%	[illegible]3. *	%
			fl		fl		fl		fl		fl		fl
Chloromethane		2	U	50	U	5	U	400	U	10000	U	10000	U
Bromomethane		2	U	50	U	5	U	400	U	10000	U	10000	U
Vinyl Chloride		8		7	JD	1	J	430		5200	J	5000	J
Chloroethane		2	U	50	U	5	U	400	U	10000	U	10000	U
Methylene Chloride		0.7	BJ	19	BJD	2	BJ	230	BJ	7300	BJ	8300	BJ
Acetone		7	B	120	U	12	U	1000	U	25000	U	12000	BJ
Carbon Disulfide		1	U	25	U	2	U	200	U	5000	U	5000	U
1,1-Dichloroethene		1	U	25	U	2	U	200	U	5000	U	5000	U
1,1-Dichloroethane		1	U	25	U	2	U	200	U	5000	U	5000	U
1,2-Dichloroethene (total)		400	E	250	D	82		5600		180000		160000	
Chloroform		1	U	25	U	0.6	J	200	U	5000	U	5000	U
1,2-Dichloroethane		1	U	25	U	2	U	200	U	5000	U	5000	U
2-Butanone		5	U	120	U	12	U	1000	U	25000	U	25000	U
1,1,1-Trichloroethane		1	U	25	U	2	U	200	U	5000	U	5000	U
Carbon Tetrachloride		1	U	25	U	2	U	200	U	5000	U	5000	U
Bromodichloromethane		1	U	25	U	2	U	200	U	5000	U	5000	U
1,2-Dichloropropane		1	U	25	U	2	U	200	U	5000	U	5000	U
cis-1,3-Dichloropropene		1	U	25	U	2	U	200	U	5000	U	5000	U
Trichloroethene		4		4	JD	7		710		1700	J	1800	J
Dibromochloromethane		1	U	25	U	2	U	200	U	5000	U	5000	U
1,1,2-Trichloroethane		1	U	25	U	2	U	200	U	5000	U	5000	U
Benzene		0.1	J	25	U	2	U	200	U	5000	U	5000	U
Trans-1,3-Dichloropropene		1	U	25	U	2	U	200	U	5000	U	5000	U
Bromoform		1	U	25	U	2	U	200	U	5000	U	5000	U
4-Methyl-2-pentanone		5	U	120	U	12	U	1000	U	25000	U	25000	U
2-Hexanone		5	U	120	U	12	U	1000	U	25000	U	25000	U
Tetrachloroethene		1	U	25	U	2	U	200	U	5000	U	5000	U
Toluene		0.2	J	25	U	2	U	200	U	5000	U	5000	U
1,1,2,2-Tetrachloroethane		1	U	25	U	2	U	200	U	5000	U	5000	U

*= Outside of EPA CLP QC limits.

Cust ID:	69GW-20IW	69GW-20IW	69GW-20UW	69GW-15IW	69GW-15UW	69GW-15UW
RFW#:	012	012 DL	013	014	015	015 REPREP
Chlorobenzene	1 U	25 U	2 U	200 U	5000 U	5000 U
Ethylbenzene	1 U	25 U	2 U	200 U	5000 U	5000 U
Styrene	1 U	25 U	2 U	200 U	5000 U	5000 U
Xylene (total)	1 U	25 U	2 U	200 U	5000 U	5000 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc('ionville Laboratory
Volati ɔy GC/MS
Report Date: 11/:(12:41

RFW Batch Number: 9610L936 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 5a

	Cust ID:	69GW-21IW		69GW-21IW		69GW-21UW		69GW-21UW		69GW-22A		69GW-22B	
Sample Information	RFW#:	016		016		017		017 DL		018		019	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	1.00		1.00		1.00		12.5		125		62.5	
	Units:	UG/L		UG/L REPREP		UG/L		UG/L		UG/L		UG/L	
Surrogate Recovery	1,2-Dichloroethane-d4	83	%	69 *	%	85	%	91	%	100	%	108	%
	Toluene-d8	106	%	114 *	%	106	%	98	%	99	%	97	%
	Bromofluorobenzene	85 *	%	85 *	%	84 *	%	84 *	%	89	%	89	%
			fl		fl		fl		fl		fl		fl
Chloromethane		1	J	2	U	2	U	25	U	250	U	120	U
Bromomethane		2	U	2	U	2	U	25	U	250	U	120	U
Vinyl Chloride		8		6		31		26	D	420		650	
Chloroethane		2	U	2	U	2	U	25	U	250	U	120	U
Methylene Chloride		2	BJ	1	BJ	0.6	BJ	15	BJD	160	BJ	86	BJ
Acetone		7	B	5	U	5	U	62	U	620	U	90	BJ
Carbon Disulfide		5		4		1	U	12	U	120	U	62	U
1,1-Dichloroethene		1	U	1	U	0.3	J	12	U	120	U	62	U
1,1-Dichloroethane		1	U	1	U	1	U	12	U	120	U	62	U
1,2-Dichloroethene (total)		43		41		380	E	250	D	2400		4100	
Chloroform		1	U	1	U	1	U	12	U	120	U	62	U
1,2-Dichloroethane		1	U	1	U	1	U	12	U	120	U	62	U
2-Butanone		5	U	5	U	5	U	62	U	620	U	310	U
1,1,1-Trichloroethane		1	U	1	U	1	U	12	U	120	U	62	U
Carbon Tetrachloride		1	U	1	U	1	U	12	U	120	U	62	U
Bromodichloromethane		1	U	1	U	1	U	12	U	120	U	62	U
1,2-Dichloropropane		1	U	1	U	1	U	12	U	120	U	62	U
cis-1,3-Dichloropropene		1	U	1	U	1	U	12	U	120	U	62	U
Trichloroethene		7		7		28		25	D	340		110	
Dibromochloromethane		1	U	1	U	1	U	12	U	120	U	62	U
1,1,2-Trichloroethane		1	U	1	U	0.8	J	12	U	29	J	62	U
Benzene		1	U	1	U	0.2	J	12	U	120	U	62	U
Trans-1,3-Dichloropropene		1	U	1	U	1	U	12	U	120	U	62	U
Bromoform		1	U	1	U	1	U	12	U	120	U	62	U
4-Methyl-2-pentanone		5	U	5	U	5	U	62	U	620	U	310	U
2-Hexanone		5	U	5	U	5	U	62	U	620	U	310	U
Tetrachloroethene		1	U	1	U	1	U	12	U	35	J	9	J
Toluene		0.5	J	0.6	J	0.3	J	12	U	13	J	14	J
1,1,2,2-Tetrachloroethane		1	U	1	U	1	U	12	U	4300		62	U

*= Outside of EPA CLP QC limits.

000107

Cust ID:	69GW-21IW		69GW-21IW		69GW-21UW		69GW-21UW		69GW-22A		69GW-22B	
RFW#:	016		016 REPREP		017		017 DL		018		019	
Chlorobenzene	1	U	1	U	1	U	12	U	24	J	55	J
Ethylbenzene	1	U	1	U	1	U	12	U	120	U	62	U
Styrene	1	U	1	U	1	U	12	U	120	U	62	U
Xylene (total)	1	U	0.2	J	0.1	J	12	U	120	U	26	J

*= Outside of EPA CLP QC limits.

000018

	Cust ID:	69GW-22B	fl	69GW-23A	fl	69GW-23B	fl	69GW-24A	fl	69GW-24B	fl	69GW-25A	fl
Sample	RFW#:	019		020		021		022		023		024	
Information	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	125		10.0		5000		250		250		625	
	Units:	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
		REPREP											
	1,2-Dichloroethane-d4	110	%	105	%	98	%	99	%	96	%	110.	%
Surrogate	Toluene-d8	95	%	98	%	101	%	103	%	102	%	101.	%
Recovery	Bromofluorobenzene	89	%	93	%	87	%	93	%	91	%	91.	%
Chloromethane		250	U	20	U	10000	U	500	U	500	U	1200	U
Bromomethane		250	U	20	U	10000	U	500	U	500	U	1200	U
Vinyl Chloride		590		370		3400	J	3600		630		240	J
Chloroethane		250	U	20	U	10000	U	500	U	500	U	1200	U
Methylene Chloride		90	BJ	7	BJ	14000	B	360	BJ	400	BJ	930	BJ
Acetone		620	U	50	U	25000	U	1200	U	420	BJ	3100	U
Carbon Disulfide		120	U	10	U	5000	U	250	U	250	U	620	U
1,1-Dichloroethene		120	U	10	U	5000	U	110	J	250	U	620	U
1,1-Dichloroethane		120	U	10	U	5000	U	250	U	250	U	620	U
1,2-Dichloroethene (total)		3200		38		110000		6900		12000		16000	
Chloroform		120	U	10	U	5000	U	250	U	250	U	84	J
1,2-Dichloroethane		120	U	10	U	5000	U	250	U	250	U	620	U
2-Butanone		620	U	50	U	25000	U	1200	U	1200	U	3100	U
1,1,1-Trichloroethane		120	U	10	U	5000	U	250	U	250	U	620	U
Carbon Tetrachloride		120	U	10	U	5000	U	250	U	250	U	620	U
Bromodichloromethane		120	U	10	U	5000	U	250	U	250	U	620	U
1,2-Dichloropropane		120	U	10	U	5000	U	250	U	250	U	620	U
cis-1,3-Dichloropropene		120	U	10	U	5000	U	250	U	250	U	620	U
Trichloroethene		97	J	7	J	4400	J	54	J	430		890	
Dibromochloromethane		120	U	10	U	5000	U	250	U	250	U	620	U
1,1,2-Trichloroethane		120	U	10	U	5000	U	250	U	250	U	190	J
Benzene		120	U	2	J	5000	U	250	U	250	U	620	U
Trans-1,3-Dichloropropene		120	U	10	U	5000	U	250	U	250	U	620	U
Bromoform		120	U	10	U	5000	U	250	U	250	U	620	U
4-Methyl-2-pentanone		620	U	50	U	25000	U	1200	U	1200	U	3100	U
2-Hexanone		620	U	50	U	25000	U	1200	U	1200	U	3100	U
Tetrachloroethene		120	U	3	J	5000	U	250	U	250	U	69	J
Toluene		120	U	17		5000	U	250	U	250	U	620	U
1,1,2,2-Tetrachloroethane		120	U	10	U	52000		250	U	6500		19000	

*= Outside of EPA CLP QC limits.

Cust ID:	69GW-22B		69GW-23A		69GW-23B		69GW-24A		69GW-24B		69GW-25A	
RFW#:	019 REPREP		020		021		022		023		024	
Chlorobenzene	47	J	320		5000	U	530		350		620	U
Ethylbenzene	120	U	3	J	5000	U	250	U	250	U	620	U
Styrene	120	U	10	U	5000	U	250	U	250	U	620	U
Xylene (total)	15	J	13		5000	U	23	J	250	U	620	U

*= Outside of EPA CLP QC limits.

0000028

Roy F. Weston, Inc. Lionville Laboratory
Volatiles by GC/MS

Report Date: 11/[illegible] 12:41

RFW Batch Number: 9610L936 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 7a

Sample Information		69GW-25B		VBLKVQ		VBLKVU		VBLKVR		VBLKVR BS		VBLKVS	
	Cust ID:	69GW-25B		VBLKVQ		VBLKVU		VBLKVR		VBLKVR BS		VBLKVS	
	RFW#:	025		96LVN261-MB1		96LVQ124-MB1		96LVN262-MB1		96LVN262-MB1		96LVN263-MB1	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	50.0		1.00		1.00		1.00		1.00		1.00	
	Units:	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
	1,2-Dichloroethane-d4	106	%	85	%	84	%	99	%	106	%	[illegible]	%
Surrogate	Toluene-d8	95	%	106	%	106	%	100	%	100	%	[illegible]	%
Recovery	Bromofluorobenzene	87	%	90	%	94	%	88	%	90	%	[illegible]	%
			fl		fl		fl		fl		fl		fl
Chloromethane		100	U	2	U	2	U	2	U	2	U	2	U
Bromomethane		100	U	2	U	2	U	2	U	2	U	2	U
Vinyl Chloride		140		2	U	2	U	2	U	2	U	2	U
Chloroethane		100	U	2	U	2	U	2	U	2	U	2	U
Methylene Chloride		140	B	0.7	J	2	J	1	J	0.5	BJ	0.8	J
Acetone		250	U	2	J	5	U	0.8	J	5	U	0.7	J
Carbon Disulfide		50	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethene		50	U	1	U	1	U	1	U	75	%	1	U
1,1-Dichloroethane		50	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethene (total)		1300		1	U	1	U	1	U	1	U	1	U
Chloroform		50	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethane		50	U	1	U	1	U	1	U	1	U	1	U
2-Butanone		250	U	5	U	5	U	5	U	5	U	5	U
1,1,1-Trichloroethane		50	U	1	U	1	U	1	U	1	U	1	U
Carbon Tetrachloride		50	U	1	U	1	U	1	U	1	U	1	U
Bromodichloromethane		50	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloropropane		50	U	1	U	1	U	1	U	1	U	1	U
cis-1,3-Dichloropropene		50	U	1	U	1	U	1	U	1	U	1	U
Trichloroethene		74		1	U	1	U	1	U	90	%	1	U
Dibromochloromethane		50	U	1	U	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane		50	U	1	U	1	U	1	U	1	U	1	U
Benzene		50	U	1	U	1	U	1	U	90	%	1	U
Trans-1,3-Dichloropropene		50	U	1	U	1	U	1	U	1	U	1	U
Bromoform		50	U	1	U	1	U	1	U	1	U	1	U
4-Methyl-2-pentanone		250	U	5	U	5	U	5	U	5	U	5	U
2-Hexanone		250	U	5	U	5	U	5	U	5	U	5	U
Tetrachloroethene		8	J	1	U	1	U	1	U	0.2	J	1	U
Toluene		6	J	1	U	1	U	1	U	89	%	1	U
1,1,2,2-Tetrachloroethane		360		1	U	1	U	1	U	1	U	1	U

*= Outside of EPA CLP QC limits.

Cust ID:	69GW-25B		VBLKVQ		VBLKVU		VBLKVR		VBLKVR BS		VBLKVS	
RFW#:	025		96LVN261-MB1		96LVQ124-MB1		96LVN262-MB1		96LVN262-MB1		96LVN263-MB1	
Chlorobenzene	14	J	1	U	1	U	1	U	93	*	1	U
Ethylbenzene	50	U	1	U	1	U	1	U	1	U	1	U
Styrene	50	U	1	U	1	U	1	U	1	U	1	U
Xylene (total)	50	U	1	U	1	U	1	U	1	U	1	U

*= Outside of EPA CLP QC limits.

0000022

Cust ID: VBLKVT

Sample Information	RFW#:	96LVN264-MB1
	Matrix:	WATER
	D.F.:	1.00
	Units:	UG/L

	1,2-Dichloroethane-d4	109	%
Surrogate	Toluene-d8	95	%
Recovery	Bromofluorobenzene	93	%

	fl	
Chloromethane	2	U
Bromomethane	2	U
Vinyl Chloride	2	U
Chloroethane	2	U
Methylene Chloride	0.8	J
Acetone	1	J
Carbon Disulfide	1	U
1,1-Dichloroethene	1	U
1,1-Dichloroethane	1	U
1,2-Dichloroethene (total)	1	U
Chloroform	1	U
1,2-Dichloroethane	1	U
2-Butanone	5	U
1,1,1-Trichloroethane	1	U
Carbon Tetrachloride	1	U
Bromodichloromethane	1	U
1,2-Dichloropropane	1	U
cis-1,3-Dichloropropene	1	U
Trichloroethene	1	U
Dibromochloromethane	1	U
1,1,2-Trichloroethane	1	U
Benzene	1	U
Trans-1,3-Dichloropropene	1	U
Bromoform	1	U
4-Methyl-2-pentanone	5	U
2-Hexanone	5	U
Tetrachloroethene	1	U
Toluene	1	U
1,1,2,2-Tetrachloroethane	1	U

*= Outside of EPA CLP QC limits.

000023

Cust ID: **VBLKVT**

RFW#: **96LVN264-MB1**

Chlorobenzene	1	U
Ethylbenzene	1	U
Styrene	1	U
Xylene (total)	1	U

*= Outside of EPA CLP QC limits.

000024

WESTON

MANAGERS DESIGNERS/CONSULTANTS

Weston Environmental Metrics, Inc.
2417 Bond Street
University Park, Illinois 60466-3182
708-534-5200 • Fax 708-534-5211

TO: Fayaz Lakhwala
SBP Tech.

Recipient's Telecopy #: 904-934-2420

Recipient's Telephone #:

FROM: P Buckley for Jane Huber

Originator's Telephone #: 708-534-5200

TOTAL PAGES: 3 (include cover sheet)

DATE: 8-21

W.O.#:

COMMENTS:

Call with questions

Providing quality environmental management and consulting engineering services for over 40 years in the areas of:

Analytical Testing/Characterization
Air Quality
Water Quality/Wastewater
Hazardous, Solid, Radioactive Waste
Health and Safety

Life Sciences
Strategic Environmental Management
Information Management
Construction/Remediation
Geosciences

55 Offices Worldwide

Weston Environmental Metrics, Inc.
GC/MS Case Narrative

SBP Technologies
RFW# 9608G566
VOA DATA

1. All volatile analyses were performed within the Method hold times.

2. All Method Blank target compounds were below reporting limits.

3. All LCS (Method Blank Spike) recoveries were within limits. A full-list spike was used for analysis; only the five method-suggested compounds are used for control purposes. Limits are in-house generated. All other recoveries were also within limits for all other compounds.

4. Matrix Spike analyses were conducted on sample -008. Same comments as above apply to the matrix spikes. All recoveries and RPD's were within limits for all compounds.

5. All surrogate recoveries in the volatile analyses were within QC limits.

6. All samples were analyzed following SW846 Method 8240, modified for a 25 ml purge volume. Due to an analytical/computer error, the continuing calibrations noted below were erroneously compared to the incorrect initial calibration. The error was noted before the data was released, however, hold-times had expired so the samples were not re-analyzed, as would have been proper procedure. For the calibration checks completed on 8/9/96, 8/10/96 and 8/11/96 , the compound chloroform did not meet method criteria. All other control compounds were within limits for the method. The compound in question was not detected in any associated samples, therefore this data is not affected. For one of the calibration checks completed on 8/12/96 , the standard did not meet method criteria for several control compounds. The data for the following analyses and compounds must be qualified and considered suspect.

RFW#	Analysis Date	Compounds
9608G566-014	08/13/96	vinyl chloride
		1,2-dichloroethene
		trichloroethene
		1,1,2-trichloroethane
		tetrachloroethene
		1,1,2,2-tetrachloroethane
9608G566-015	08/12/96	1,2-dichloroethene

9608G566-016	08/12/96	1,1-dichloroethene
		trichloroethene
		toluene
		tetrachloroethene
		ethylbenzene
		xylene
		1,1,2,2-tetrachloroethane
9608G566-017	08/13/96	vinyl chloride
9608G566-018	08/12/96	1,2-dichloroethene
		1,1,2,2-tetrachloroethane

7. The following samples were analyzed at initial dilutions due to probable high levels of target compounds : -002, 016, 017, 018, 019, 020, 021, 022 and -023. In addition, the following samples also required secondary and tertiary dilutions to accurately quantitate many compounds : -002, 003, 006, 007, 09, 010, 011, 013, 014, 015, 016, 017, 018, 019, 022 and -023. All reporting limits and concentrations are adjusted for the diltuions.

8. All internal standard areas and retention times were within SOP limits.

Marilyn Krueding
Marilyn Krueding
GC/MS Section Manager

8/19/96
Date

WESTON
MANAGERS DESIGNERS-CONSULTANTS

Weston Environmental Metrics, Inc.
2417 Bond Street
University Park, Illinois 60466-3182
708-534-5200 • Fax 708-534-5211

TO: Fayaz Lakhwala / Michael Walker
SBP Technologies

Recipient's Telecopy #: 904-934-2420

Recipient's Telephone #:

FROM: P Buckley for Jane Huber

Originator's Telephone #: 708-534-5200

TOTAL PAGES: 21 (include cover sheet)

DATE: 8.20.96

W.O.#:

COMMENTS:

96086566. final 624H results.

Providing quality environmental management and consulting engineering services for over 40 years in the areas of:

- Analytical Testing/Characterization
- Air Quality
- Water Quality/Wastewater
- Hazardous, Solid, Radioactive Waste
- Health and Safety
- Life Sciences
- Strategic Environmental Management
- Information Management
- Construction/Remediation
- Geosciences

55 Offices Worldwide

RFW 64-02-406/A-04/94

SENT BY:WESTON EMI ; 8-20-96 ; 12:51 ; WESTON EMI- 904 934 2420;# 2/21

Weston Environmental Metrics, Inc. (Gulf Coast)
VOLATILES BY GC/MS, HSL LIST

Report Date: 08/19/96 16:20

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9 Page: 1a

	Cust ID:	69UVB-GW-02I W		69UVB-GW-15U W		69UVB-GW-15U W		69UVB-GW-15I W		69UVB-GW-15I W		69UVB-GW-15I W	
Sample Information	RFW#:	001		002		002 DL		003		003 DL		003 DL	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	1		1000		5000		1		50		250	
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
	1,2-Dichloroethane-d4	102	%	105	%	97	%	100	%	100	%	102	%
Surrogate	Toluene-d8	97	%	101	%	95	%	95	%	100	%	94	%
Recovery	4-Bromofluorobenzene	94	%	94	%	100	%	99	%	104	%	102	%
			fl		fl		fl		fl		fl		fl
Chloromethane		2	U	2000	U	NA		2	U	NA		NA	
Vinyl chloride		1	U	6300		NA			E	310		NA	
Bromomethane		2	U	2000	U	NA		2	U	NA		NA	
Chloroethane		2	U	2000	U	NA		2	U	NA		NA	
1,1-Dichloroethene		1	U	1000	U	NA		2		NA		NA	
Acetone		2	U	2000	U	NA		2	U	NA		NA	
Carbon Disulfide		1	U	1000	U	NA		1	U	NA		NA	
Methylene Chloride		1	U	1000	U	NA		1	U	NA		NA	
1,2-Dichloroethene (total)		17			E	150000			E		E	4400	
1,1-Dichloroethane		1	U	1000	U	NA		1	U	NA		NA	
Vinyl acetate		2	U	2000	U	NA		2	U	NA		NA	
2-Butanone		2	U	2000	U	NA		2	U	NA		NA	
Chloroform		1	U	1000	U	NA		1	U	NA		NA	
1,1,1-Trichloroethane		1	U	1000	U	NA		1	U	NA		NA	
Carbon Tetrachloride		1	U	1000	U	NA		1	U	NA		NA	
Benzene		1	U	1000	U	NA		1	U	NA		NA	
1,2-Dichloroethane		1	U	1000	U	NA		2		NA		NA	
Trichloroethene		1	U	2200		NA			E	860		NA	
1,2-Dichloropropane		1	U	1000	U	NA		1	U	NA		NA	
Bromodichloromethane		1	U	1000	U	NA		1	U	NA		NA	
cis-1,3-Dichloropropene		1	U	1000	U	NA		1	U	NA		NA	
4-Methyl-2-pentanone		2	U	2000	U	NA		2	U	NA		NA	
Toluene		1	U	1000	U	NA		1	U	NA		NA	
trans-1,3-Dichloropropene		1	U	1000	U	NA		1	U	NA		NA	
1,1,2-Trichloroethane		1	U	1000	U	NA		1	U	NA		NA	
Tetrachloroethene		1	U	1000	U	NA		1		NA		NA	
2-Hexanone		2	U	2000	U	NA		2	U	NA		NA	
Dibromochloromethane		1	U	1000	U	NA		1	U	NA		NA	
Chlorobenzene		1	U	1000	U	NA		1	U	NA		NA	

*= Outside of EPA CLP QC limits.

SENT BY:WESTON EMI ; 8-20-96 ; 12:52 ; WESTON EMI- 904 934 2420;# 3/21

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9 Page: 1b

Cust ID:	69UVB-GW-02IW	69UVB-GW-15UW	69UVB-GW-15UW	69UVB-GW-15IW	69UVB-GW-15IW	69UVB-GW-15IW
RFW#:	001	002	002 DL	003	003 DL	003 DL
Ethylbenzene	1 U	1000 U	NA	1 U	NA	NA
Styrene	1 U	1000 U	NA	1 U	NA	NA
Bromoform	1 U	1000 U	NA	1 U	NA	NA
1,1,2,2-Tetrachloroethane	1 U	1000 U	NA	1 U	NA	NA
Xylene (total)	1 U	1000 U	NA	1 U	NA	NA

*= Outside of EPA CLP QC limits.

904 934 2420:# 4/21 WESTON EMI- : 8-20-96 . 12:52 . SENT BY:WESTON EMI

Weston Environmental Metrics, Inc. (Gulf Coast)
VOLATILES BY GC/MS, HSL LIST

Report Date: 08/19/96 16:20

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9 Page: 2a

	Cust ID:	69UVB-GW-16UW		69UVB-GW-16IW		69UVB-GW-17UW		69UVB-GW-17UW		69UVB-GW-17UW		69UVB-GW-17IW	
Sample Information	RFW#:	004		005		006		006 DL		006 DL		007	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	1		1		1		25		250		1	
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
	1,2-Dichloroethane-d4	99	%	101	%	88	%	99	%	101	%	99	%
Surrogate	Toluene-d8	94	%	97	%	96	%	95	%	99	%	94	%
Recovery	4-Bromofluorobenzene	99	%	100	%	100	%	99	%	102	%	98	%
			fl		fl		fl		fl		fl		fl
Chloromethane		2	U	2	U	2	U	NA		NA		2	U
Vinyl chloride		1	U	1	U		E	420		NA		1	
Bromomethane		2	U	2	U	2	U	NA		NA		2	U
Chloroethane		2	U	2	U	2	U	NA		NA		2	U
1,1-Dichloroethene		1	U	1	U	1	U	NA		NA		1	U
Acetone		2	U	15		2	U	NA		NA		4	
Carbon Disulfide		1	U	2		1	U	NA		NA		1	U
Methylene Chloride		1	U	1	U	3		NA		NA		1	U
1,2-Dichloroethene (total)		1	U	2			E		E	11000			E
1,1-Dichloroethane		1	U	1	U	1	U	NA		NA		1	U
Vinyl acetate		2	U	2	U	2	U	NA		NA		2	U
2-Butanone		2	U	2	U	2	U	NA		NA		2	U
Chloroform		1	U	1	U	1	U	NA		NA		1	U
1,1,1-Trichloroethane		1	U	1	U	1	U	NA		NA		1	U
Carbon Tetrachloride		1	U	1	U	1	U	NA		NA		1	U
Benzene		1	U	1	U	1	U	NA		NA		1	U
1,2-Dichloroethane		1	U	1	U	5		NA		NA		1	U
Trichloroethene		1	U	1	U	36		NA		NA		1	U
1,2-Dichloropropane		1	U	1	U	1	U	NA		NA		1	U
Bromodichloromethane		1	U	1	U	1	U	NA		NA		1	U
cis-1,3-Dichloropropene		1	U	1	U	1	U	NA		NA		1	U
4-Methyl-2-pentanone		2	U	2	U	2	U	NA		NA		2	U
Toluene		1	U	1	U	1	U	NA		NA		1	U
trans-1,3-Dichloropropene		1	U	1	U	1	U	NA		NA		1	U
1,1,2-Trichloroethane		1	U	1	U	1	U	NA		NA		1	U
Tetrachloroethene		1	U	1	U	1	U	NA		NA		1	U
2-Hexanone		2	U	2	U	2	U	NA		NA		2	U
Dibromochloromethane		1	U	1	U	1	U	NA		NA		1	U
Chlorobenzene		1	U	1	U	1	U	NA		NA		1	U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9

Cust ID:	69UVB-GW-16U W		69UVB-GW-16I W		69UVB-GW-17U W		69UVB-GW-17U W	69UVB-GW-17U W	69UVB-GW-17I W	
RFW#:	004		005		006		006 DL	006 DL	007	
Ethylbenzene	1	U	1	U	1	U	NA	NA	1	U
Styrene	1	U	1	U	1	U	NA	NA	1	U
Bromoform	1	U	1	U	1	U	NA	NA	1	U
1,1,2,2-Tetrachloroethane	1	U	1	U	1	U	NA	NA	1	U
Xylene (total)	1	U	1	U	1	U	NA	NA	1	U

*= Outside of EPA CLP QC limits.

Weston Environmental Metrics, Inc. (Gulf Coast)
VOLATILES BY GC/MS, HSL LIST

Report Date: 08/19/96 16:20

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9 Page: 3a

Sample Information													
	Cust ID:	69UVB-GW-17I W		69UVB-GW-18U W		69UVB-GW-18U W		69UVB-GW-18U W		69UVB-GW-19U W		69UVB-GW-19U W	
	RFW#:	007 DL		008		008 MS		008 MSD		009		009 DL	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	5		1		1		1		1		5	
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Surrogate Recovery	1,2-Dichloroethane-d4	102	%	102	%	103	%	101	%	100	%	103	%
	Toluene-d8	96	%	97	%	110	%	101	%	105	%	101	%
	4-Bromofluorobenzene	101	%	100	%	104	%	102	%	91	%	109	%
			fl		fl		fl		fl		fl		fl
Chloromethane		NA		2	U	100	%	85	%	2	U	NA	
Vinyl chloride		NA		1	U	106	%	88	%	1	U	NA	
Bromomethane		NA		2	U	90	%	77	%	2	U	NA	
Chloroethane		NA		2	U	104	%	87	%	2	U	NA	
1,1-Dichloroethene		NA		1	U	114	%	97	%	1	U	NA	
Acetone		NA		2	U	65	%	65	%	2	U	NA	
Carbon Disulfide		NA		1	U	75	%	64	%	1	U	NA	
Methylene Chloride		NA		1	U	95	%	89	%	1	U	NA	
1,2-Dichloroethene (total)		110		2		104	%	91	%		E	71	
1,1-Dichloroethane		NA		1	U	101	%	90	%	1	U	NA	
Vinyl acetate		NA		2	U	73	%	83	%	2	U	NA	
2-Butanone		NA		2	U	72	%	83	%	2	U	NA	
Chloroform		NA		1	U	100	%	93	%	1	U	NA	
1,1,1-Trichloroethane		NA		1	U	102	%	94	%	1	U	NA	
Carbon Tetrachloride		NA		1	U	104	%	97	%	1	U	NA	
Benzene		NA		2		102	%	94	%	1	U	NA	
1,2-Dichloroethane		NA		1	U	108	%	94	%	1	U	NA	
Trichloroethene		NA		1	U	96	%	90	%	6		NA	
1,2-Dichloropropane		NA		1	U	94	%	97	%	1	U	NA	
Bromodichloromethane		NA		1	U	92	%	97	%	1	U	NA	
cis-1,3-Dichloropropene		NA		1	U	99	%	105	%	1	U	NA	
4-Methyl-2-pentanone		NA		2	U	88	%	95	%	2	U	NA	
Toluene		NA		1	U	104	%	95	%	1	U	NA	
trans-1,3-Dichloropropene		NA		1	U	108	%	112	%	1	U	NA	
1,1,2-Trichloroethane		NA		1	U	85	%	93	%	1	U	NA	
Tetrachloroethene		NA		1	U	107	%	94	%	1	U	NA	
2-Hexanone		NA		2	U	75	%	83	%	2	U	NA	
Dibromochloromethane		NA		1	U	90	%	100	%	1	U	NA	
Chlorobenzene		NA		2		102	%	95	%	1	U	NA	

*= Outside of EPA CLP QC limits.

Cust ID:	69UVB-GW-17I W	69UVB-GW-18U W	69UVB-GW-18U W	69UVB-GW-18U W	69UVB-GW-19U W	69UVB-GW-19U W
RFW#:	007 DL	008	008 MS	008 MSD	009	009 DL
Ethylbenzene	NA	1 U	105 %	96 %	1 U	NA
Styrene	NA	1 U	94 %	93 %	1 U	NA
Bromoform	NA	1 U	89 %	100 %	1 U	NA
1,1,2,2-Tetrachloroethane	NA	1 U	95 %	100 %	1 U	NA
Xylene (total)	NA	1 U	106 %	99 %	1 U	NA

*= Outside of EPA CLP QC limits.

Weston Environmental Metrics, Inc. (Gulf Coast)
VOLATILES BY GC/MS, HSL LIST

Report Date: 08/19/96 16:20

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9 Page: 4a

Sample Information												
Cust ID:	69UVB-GW-19I W		69UVB-GW-19I W		69UVB-GW-20U W		69UVB-GW-20U W		69UVB-GW-20I W		69UVB-GW-21U W	
RFW#:	010		010 DL		011		011 DL		012		013	
Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
D.F.:	1		10		1		5		1		1	
Units:	ug/L		ug/L		ug/L		ug/l		ug/L		ug/l	
Surrogate Recovery 1,2-Dichloroethane-d4	105	%	99	%	98	%	100	%	98	%	99	%
Toluene-d8	95	%	95	%	95	%	96	%	93	%	94	%
4-Bromofluorobenzene	100	%	98	%	101	%	100	%	99	%	100	%
		fl		fl		fl		fl		fl		fl
Chloromethane	2	U	NA		2	U	NA		2	U	2	U
Vinyl chloride	1	U	NA		1		NA		1	U	10	
Bromomethane	2	U	NA		2	U	NA		2	U	2	U
Chloroethane	2	U	NA		2	U	NA		2	U	2	U
1,1-Dichloroethene	1	U	NA		1	U	NA		1	U	1	U
Acetone		E	300		2	U	NA		2	U	2	U
Carbon Disulfide	3		NA		1	U	NA		1	U	1	U
Methylene Chloride	1	U	NA		1	U	NA		1	U	1	U
1,2-Dichloroethene (total)	4		NA			E	110		45			E
1,1-Dichloroethane	1	U	NA		1	U	NA		1	U	1	U
Vinyl acetate	2	U	NA		2	U	NA		2	U	2	U
2-Butanone	7		NA		2	U	NA		2	U	2	U
Chloroform	1	U	NA		1	U	NA		1	U	1	U
1,1,1-Trichloroethane	1	U	NA		1	U	NA		1	U	1	U
Carbon Tetrachloride	1	U	NA		1	U	NA		1	U	1	U
Benzene	1	U	NA		1	U	NA		1	U	1	U
1,2-Dichloroethane	1	U	NA		1	U	NA		1	U	1	U
Trichloroethene	3		NA		11		NA		1		20	
1,2-Dichloropropane	1	U	NA		1	U	NA		1	U	1	U
Bromodichloromethane	1	U	NA		1	U	NA		1	U	1	U
cis-1,3-Dichloropropene	1	U	NA		1	U	NA		1	U	1	U
4-Methyl-2-pentanone	2	U	NA		2	U	NA		2	U	2	U
Toluene	1	U	NA		1	U	NA		1	U	1	U
trans-1,3-Dichloropropene	1	U	NA		1	U	NA		1	U	1	U
1,1,2-Trichloroethane	1	U	NA		1	U	NA		1	U	1	U
Tetrachloroethene	1	U	NA		1	U	NA		1	U	1	U
2-Hexanone	2	U	NA		2	U	NA		2	U	2	U
Dibromochloromethane	1	U	NA		1	U	NA		1	U	1	U
Chlorobenzene	1	U	NA		1	U	NA		1	U	1	U

*= Outside of EPA CLP QC limits

Cust ID:	69UVB-GW-19I W	69UVB-GW-19I W	69UVB-GW-20U W	69UVB-GW-20U W	69UVB-GW-20I W	69UVB-GW-21U W
RFW#:	010	010 DL	011	011 DL	012	013
Ethylbenzene	1 U	NA	1 U	NA	1 U	1 U
Styrene	1 U	NA	1 U	NA	1 U	1 U
Bromoform	1 U	NA	1 U	NA	1 U	1 U
1,1,2,2-Tetrachloroethane	1 U	NA	1 U	NA	1 U	1 U
Xylene (total)	1 U	NA	1 U	NA	1 U	1 U

*= Outside of EPA CLP QC limits.

Weston Environmental Metrics, Inc. (Gulf Coast)
VOLATILES BY GC/MS, HSL LIST

Report Date: 08/19/96 16:20

RFW Batch Number: 9608G566 | Client: SBP Technologies | Work Order: 11100-003-001-9 | Page: 5a

Sample Information						
Cust ID:	69UVB-GW-21UW	69KGB-GW-22A	69KGB-GW-22A	69KGB-GW-22A	69KGB-GW-22B	69KGB-GW-22B
RFW#:	013 DL	014	014 DL	014 DL	015	015 DL
Matrix:	WATER	WATER	WATER	WATER	WATER	WATER
D.F.:	5	1	10	250	1	50
Units:	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surrogate Recovery 1,2-Dichloroethane-d4	104 %	100 %	99 %	95 %	104 %	100 %
Toluene-d8	101 %	95 %	97 %	92 %	98 %	92 %
4-Bromofluorobenzene	98 %	104 %	96 %	92 %	109 %	91 %
	fl	fl	fl	fl	fl	fl
Chloromethane	NA	2 U	NA	NA	2 U	NA
Vinyl chloride	NA	E	E	410	E	1700
Bromomethane	NA	2 U	NA	NA	2 U	NA
Chloroethane	NA	2 U	NA	NA	2 U	NA
1,1-Dichloroethene	NA	3	NA	NA	7	NA
Acetone	NA	2 U	NA	NA	2 U	NA
Carbon Disulfide	NA	1	NA	NA	1 U	NA
Methylene Chloride	NA	1 U	NA	NA	1 U	NA
1,2-Dichloroethene (total)	110	E	E	2300	E	E
1,1-Dichloroethane	NA	1 U	NA	NA	1 U	NA
Vinyl acetate	NA	2 U	NA	NA	2 U	NA
2-Butanone	NA	2 J	NA	NA	2 U	NA
Chloroform	NA	9	NA	NA	1 U	NA
1,1,1-Trichloroethane	NA	1 U	NA	NA	1 U	NA
Carbon Tetrachloride	NA	1 U	NA	NA	1 U	NA
Benzene	NA	5	NA	NA	14	NA
1,2-Dichloroethane	NA	1 U	NA	NA	1 U	NA
Trichloroethene	NA	E	370	NA	E	350
1,2-Dichloropropane	NA	1 U	NA	NA	1 U	NA
Bromodichloromethane	NA	1 U	NA	NA	1 U	NA
cis-1,3-Dichloropropene	NA	1 U	NA	NA	1 U	NA
4-Methyl-2-pentanone	NA	2 U	NA	NA	2 U	NA
Toluene	NA	16	NA	NA	31	NA
trans-1,3-Dichloropropene	NA	1 U	NA	NA	1 U	NA
1,1,2-Trichloroethane	NA	E	44	NA	10	NA
Tetrachloroethene	NA	E	64	NA	24	NA
2-Hexanone	NA	2 U	NA	NA	2 U	NA
Dibromochloromethane	NA	1 U	NA	NA	1 U	NA
Chlorobenzene	NA	32	NA	NA	E	130

*= Outside of EPA CLP QC limits.

Cust ID:	69UVB-GW-21UW	69KGB-GW-22A	69KGB-GW-22A	69KGB-GW-22A	69KGB-GW-22B	69KGB-GW-22B
RFW#:	013 DL	014	014 DL	014 DL	015	015 DL
Ethylbenzene	NA	4	NA	NA	9	NA
Styrene	NA	1 U	NA	NA	1 U	NA
Bromoform	NA	1 U	NA	NA	1 U	NA
1,1,2,2-Tetrachloroethane	NA	E	E	5100	E	640
Xylene (total)	NA	33	NA	NA	[illegible]	57

*= Outside of EPA CLP QC limits.

Weston Environmental Metrics, Inc. (Gulf Coast)
VOLATILES BY GC/MS, HSL LIST

Report Date: 08/19/96 16:20

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9 Page: 6a

Cust ID:	69KGB-GW-22B		69KGB-GW-23A		69KGB-GW-23A		69KGB-GW-24A		69KGB-GW-24A		69KGB-GW-24B	
Sample Information RFW#:	015 DL		016		016 DL		017		017 DL		018	
Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
D.F.:	500		5		50		50		250		50	
Units:	ug/L		ug/L		ug/L		ug/l		ug/L		ug/L	
Surrogate Recovery 1,2-Dichloroethane d4	99	%	101	%	107	%	102	%	89	%	105	%
Toluene-d8	95	%	100	%	102	%	98	%	88	%	99	%
4-Bromofluorobenzene	94	%	100	%	100	%	98	%	88	%	92	%
		fl		fl		fl		fl		fl		fl
Chloromethane	NA		10	U	NA		100	U	NA		100	U
Vinyl chloride	NA			E	430			E	3100		630	
Bromomethane	NA		10	U	NA		100	U	NA		100	U
Chloroethane	NA		10	U	NA		100	U	NA		100	U
1,1-Dichloroethene	NA		13		NA		400		NA		50	U
Acetone	NA		10	U	NA		100	U	NA		100	U
Carbon Disulfide	NA		5	U	NA		50	U	NA		50	U
Methylene Chloride	NA		5	U	NA		50	U	NA		50	U
1,2-Dichloroethene ~~(total)~~	8200			E	360			E	8000			E
1,1-Dichloroethane	NA		5	U	NA		50	U	NA		50	U
Vinyl acetate	NA		10	U	NA		100	U	NA		100	U
2-Butanone	NA		10	U	NA		100	U	NA		100	U
Chloroform	NA		5	U	NA		50	U	NA		50	U
1,1,1-Trichloroethane	NA		5	U	NA		50	U	NA		50	U
Carbon Tetrachloride	NA		5	U	NA		50	U	NA		50	U
Benzene	NA		5	U	NA		50	U	NA		50	U
1,2-Dichloroethane	NA		5	U	NA		50	U	NA		50	U
Trichloroethene	NA		25		NA		540		NA		1400	
1,2-Dichloropropane	NA		5	U	NA		50	U	NA		50	U
Bromodichloromethane	NA		5	U	NA		50	U	NA		50	U
cis-1,3-Dichloropropene	NA		5	U	NA		50	U	NA		50	U
4-Methyl-2-pentanone	NA		10	U	NA		100	U	NA		100	U
Toluene	NA		23		NA		50	U	NA		50	U
trans-1,3-Dichloropropene	NA		5	U	NA		50	U	NA		50	U
1,1,2-Trichloroethane	NA		5	U	NA		50	U	NA		84	
Tetrachloroethene	NA		8		NA		50	U	NA		110	
2-Hexanone	NA		10	U	NA		100	U	NA		100	U
Dibromochloromethane	NA		5	U	NA		50	U	NA		50	U
Chlorobenzene	NA		5	U	NA		650		NA		400	

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9 Page: 6b

Cust ID:	69KGB-GW-22B	69KGB-GW-23A	69KGB-GW-23A	69KGB-GW-24A	69KGB-GW-24A	69KGB-GW-24B
RFW#:	015 DL	016	016 DL	017	017 DL	018
Ethylbenzene	NA	7	NA	50 U	NA	50 U
Styrene	NA	5 U	NA	50 U	NA	50 U
Bromoform	NA	5 U	NA	50 U	NA	50 U
1,1,2,2-Tetrachloroethane	NA	11	NA	85	NA	F
Xylene (total)	NA	38	NA	56	NA	50 U

*= Outside of EPA CLP QC limits.

Weston Environmental Metrics, Inc. (Gulf Coast)
VOLATILES BY GC/MS, HSL LIST

Report Date: 08/19/96 16:20

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9 Page: /a

Sample Information		69KGB-GW-24B		69KGB-GW-25A		69KGB-GW-25A		69UVB-GW-18IW		69UVB-GW-21IW		69KGB-GW-23B	
	RFW#:	018 DL		019		019 DL		020		021		022	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	500		50		1000		25		25		250	
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Surrogate Recovery	1,2-Dichloroethane-d4	92	%	106	%	102	%	102	%	110	%	105	%
	Toluene-d8	90	%	102	%	98	%	102	%	108	%	103	%
	4-Bromofluorobenzene	88	%	101	%	89	%	96	%	102	%	105	%
			fl		fl		fl		fl		fl		fl
Chloromethane		NA		100	U	NA		50	U	50	U	500	U
Vinyl chloride		NA		590		NA		25	U	25	U	670	
Bromomethane		NA		100	U	NA		50	U	50	U	500	U
Chloroethane		NA		100	U	NA		50	U	50	U	500	U
1,1-Dichloroethene		NA		50	U	NA		25	U	25	U	250	U
Acetone		NA		100	U	NA		120		50	U	500	U
Carbon Disulfide		NA		50	U	NA		25	U	25	U	250	U
Methylene Chloride		NA		50	U	NA		25	U	33		250	U
1,2-Dichloroethene (total)		12000			E	24000		25	U	25	U	6200	
1,1-Dichloroethane		NA		50	U	NA		25	U	25	U	250	U
Vinyl acetate		NA		100	U	NA		50	U	50	U	500	U
2-Butanone		NA		100	U	NA		50	U	50	U	500	U
Chloroform		NA		140		NA		25	U	25	U	250	U
1,1,1-Trichloroethane		NA		50	U	NA		25	U	25	U	250	U
Carbon Tetrachloride		NA		50	U	NA		25	U	25	U	250	U
Benzene		NA		50	U	NA		25	U	25	U	250	U
1,2-Dichloroethane		NA		50	U	NA		25	U	25	U	250	U
Trichloroethene		NA			E	3000		25	U	25	U	4000	
1,2-Dichloropropane		NA		50	U	NA		25	U	25	U	250	U
Bromodichloromethane		NA		50	U	NA		25	U	25	U	250	U
cis-1,3-Dichloropropene		NA		50	U	NA		25	U	25	U	250	U
4-Methyl-2-pentanone		NA		100	U	NA		50	U	50	U	500	U
Toluene		NA		50	U	NA		25	U	25	U	250	U
trans-1,3-Dichloropropene		NA		50	U	NA		25	U	25	U	250	U
1,1,2-Trichloroethane		NA		460		NA		25	U	25	U	250	U
Tetrachloroethene		NA		390		NA		25	U	25	U	370	
2 Hexanone		NA		100	U	NA		50	U	50	U	500	U
Dibromochloromethane		NA		50	U	NA		25	U	25	U	250	U
Chlorobenzene		NA		50	U	NA		25	U	25	U	510	

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9

Cust ID:	69KGB-GW-24B		69KGB-GW-25A		69KGB-GW-25A		69UVB-GW-18IW		69UVB-GW-21IW		69KGB-GW-23B	
RFW#:	018 DL		019		019 DL		020		021		022	
Ethylbenzene	NA		50	U	NA		25	U	25	U	250	U
Styrene	NA		50	U	NA		25	U	25	U	250	U
Bromoform	NA		50	U	NA		25	U	25	U	250	U
1,1,2,2-Tetrachloroethane	14000			E	20000		25	U	25	U		E
Xylene (total)	NA		50	U	NA		25	U	25	U	250	U

*= Outside of EPA CLP QC limits.

Weston Environmental Metrics, Inc. (Gulf Coast)

VOLATILES BY GC/MS, HSL LIST

Report Date: 08/19/96 16:20

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9 Page: 8a

Cust ID:	69KGB-GW-23B		69KGB-GW-25B		69KGB-GW-25B		VBLKBZ		VBLKBZ BS		VBLKBT	
Sample Information RFW#:	022 DL		023		023 DL		96GVT240-MB1		96GVT240-MB1		96GVT262-MB1	
Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
D.F.:	2500		25		250		1		1		1	
Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L	
Surrogate Recovery 1,2-Dichloroethane-d4	99	%	108	%	105	%	103	%	99	%	111	%
Toluene-d8	94	%	104	%	104	%	99	%	97	%	106	%
4-Bromofluorobenzene	97	%	107	%	101	%	97	%	96	%	104	%
		fl		fl		fl		fl		fl		fl
Chloromethane	NA		50	U	NA		2	U	94	%	2	U
Vinyl chloride	NA		270		NA		1	U	97	%	1	U
Bromomethane	NA		50	U	NA		2	U	82	%	2	U
Chloroethane	NA		50	U	NA		2	U	94	%	2	U
1,1-Dichloroethene	NA		25	U	NA		1	U	98	%	1	U
Acetone	NA		51		NA		2	U	54	%	2	U
Carbon Disulfide	NA		25	U	NA		1	U	65	%	1	U
Methylene Chloride	NA		25	U	NA		1	U	88	%	1	U
1,2-Dichloroethene (total)	NA			E	4700		1	U	88	%	1	U
1,1-Dichloroethane	NA		25	U	NA		1	U	85	%	1	U
Vinyl acetate	NA		50	U	NA		2	U	79	%	2	U
2-Butanone	NA		50	U	NA		2	U	85	%	2	U
Chloroform	NA		25	U	NA		1	U	86	%	1	U
1,1,1-Trichloroethane	NA		25	U	NA		1	U	94	%	1	U
Carbon Tetrachloride	NA		25	U	NA		1	U	96	%	1	U
Benzene	NA		25	U	NA		1	U	94	%	1	U
1,2-Dichloroethane	NA		25	U	NA		1	U	85	%	1	U
Trichloroethene	NA		210		NA		1	U	89	%	1	U
1,2-Dichloropropane	NA		25	U	NA		1	U	92	%	1	U
Bromodichloromethane	NA		25	U	NA		1	U	91	%	1	U
cis-1,3-Dichloropropene	NA		25	U	NA		1	U	102	%	1	U
4-Methyl-2-pentanone	NA		50	U	NA		2	U	86	%	2	U
Toluene	NA		25	U	NA		1	U	89	%	1	U
trans-1,3-Dichloropropene	NA		25	U	NA		1	U	104	%	1	U
1,1,2-Trichloroethane	NA		37		NA		1	U	91	%	1	U
Tetrachloroethene	NA		25	U	NA		1	U	92	%	1	U
2-Hexanone	NA		50	U	NA		2	U	80	%	2	U
Dibromochloromethane	NA		25	U	NA		1	U	92	%	1	U
Chlorobenzene	NA		25		NA		1	U	90	%	1	U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9 Page: 8b

Cust ID:	69KGB-GW-23B	69KGB-GW-25B	69KGB-GW-25B	VBLKBZ	VBLKBZ BS	VBLKBT
RFW#:	022 DL	023	023 DL	96GVT240-MB1	96GVT240-MB1	96GVT262-MB1
Ethylbenzene	NA	25 U	NA	1 U	91 %	1 U
Styrene	NA	25 U	NA	1 U	88 %	1 U
Bromoform	NA	25 U	NA	1 U	90 %	1 U
1,1,2,2-Tetrachloroethane	40000	510	NA	1 U	84 %	1 U
Xylene (total)	NA	25 U	NA	1 U	92 %	1 U

*= Outside of EPA CLP QC limits.

904 934 2420;#18/21 WESTON EMI- 8-20-96 ; 12:57 ; SENT BY:WESTON EMI

Weston Environmental Metrics, Inc. (Gulf Coast)
VOLATILES BY GC/MS, HSL LIST

Report Date: 08/19/96 16:20

RFW Batch Number: 9608G566   Client: SBP Technologies   Work Order: 11100-003-001-9   Page: 9a

	Cust ID:	VBLKBT BS		VBLKBX		VBLKBX BS		VBLKBV		VBLKBV BS		VBLKBR
Sample Information	RFW#:	96GVT262-MB1		96GVT241-MB1		96GVT241-MB1		96GVT242-MB1		96GVT242-MB1		96GVT263-MB1
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER
	D.F.:	1		1		1		1		1		1
	Units:	ug/L		ug/L		ug/L		ug/L		ug/L		ug/L

Surrogate Recovery	1,2-Dichloroethane-d4	105	%	98	%	102	%	101	%	97	%	92	%
	Toluene-d8	103	%	96	%	99	%	99	%	100	%	94	%
	4-Bromofluorobenzene	102	%	95	%	102	%	100	%	99	%	91	%

Compound	VBLKBT BS	fl	VBLKBX	fl	VBLKBX BS	fl	VBLKBV	fl	VBLKBV BS	fl	VBLKBR	fl
Chloromethane	87	%	2	U	95	%	2	U	89	%	2	U
Vinyl chloride	94	%	1	U	96	%	1	U	91	%	1	U
Bromomethane	79	%	2	U	85	%	2	U	80	%	2	U
Chloroethane	93	%	2	U	95	%	2	U	90	%	2	U
1,1-Dichloroethene	104	%	1	U	101	%	1	U	99	%	1	U
Acetone	94	%	2	U	122	%	2	U	65	%	2	U
Carbon Disulfide	67	%	1	U	67	%	1	U	65	%	1	U
Methylene Chloride	94	%	1	U	95	%	1	U	88	%	1	U
1,2-Dichloroethene (total)	95	%	1	U	94	%	1	U	92	%	1	U
1,1-Dichloroethane	103	%	1	U	92	%	1	U	90	%	1	U
Vinyl acetate	83	%	2	U	82	%	2	U	75	%	2	U
2-Butanone	82	%	2	U	105	%	2	U	83	%	2	U
Chloroform	94	%	1	U	94	%	1	U	92	%	1	U
1,1,1-Trichloroethane	99	%	1	U	96	%	1	U	92	%	1	U
Carbon Tetrachloride	101	%	1	U	98	%	1	U	94	%	1	U
Benzene	97	%	1	U	98	%	1	U	94	%	1	U
1,2-Dichloroethane	100	%	1	U	95	%	1	U	91	%	1	U
Trichloroethene	96	%	1	U	93	%	1	U	89	%	1	U
1,2-Dichloropropane	94	%	1	U	98	%	1	U	92	%	1	U
Bromodichloromethane	93	%	1	U	98	%	1	U	91	%	1	U
cis-1,3-Dichloropropene	102	%	1	U	108	%	1	U	100	%	1	U
4-Methyl-2-pentanone	89	%	2	U	96	%	2	U	88	%	2	U
Toluene	96	%	1	U	95	%	1	U	94	%	1	U
trans-1,3-Dichloropropene	107	%	1	U	111	%	1	U	106	%	1	U
1,1,2-Trichloroethane	88	%	1	U	95	%	1	U	86	%	1	U
Tetrachloroethene	99	%	1	U	94	%	1	U	96	%	1	U
2-Hexanone	80	%	2	U	103	%	2	U	76	%	2	U
Dibromochloromethane	93	%	1	U	103	%	1	U	93	%	1	U
Chlorobenzene	94	%	1	U	96	%	1	U	95	%	1	U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9

Cust ID:	VBLKBT BS		VBLKBX		VBLKBX BS		VBLKBV		VBLKBV BS		VBLKBR	
RFW#:	96GVT262-MB1		96GVT241-MB1		96GVT241-MB1		96GVT242-MB1		96GVT242-MB1		96GVT263-MB1	
Ethylbenzene	99	%	1	U	96	%	1	U	96	%	1	U
Styrene	97	%	1	U	95	%	1	U	92	%	1	U
Bromoform	91	%	1	U	100	%	1	U	92	%	1	U
1.1.2.2-Tetrachloroethane	91	%	1	U	97	%	1	U	90	%	1	U
Xylene (total)	97	%	1	U	99	%	1	U	98	%	1	U

*= Outside of EPA CLP QC limits.

Weston Environmental Metrics, Inc. (Gulf Coast)
VOLATILES BY GC/MS, HSL LIST

Report Date: 08/19/96 16:20

RFW Batch Number: 9608G566 Client: SBP Technologies Work Order: 11100-003-001-9 Page: 10a

	Cust ID:	VBLKBR BS		VBLKDB		VBLKDB BS	
Sample Information	RFW#:	96GVT263-MB1		96GVT264-MB1		96GVT264-MB1	
	Matrix:	WATER		WATER		WATER	
	D.F..	1		1		1	
	Units:	ug/L		ug/L		ug/L	
Surrogate Recovery	1,2-Dichloroethane-d4	90	%	106	%	106	%
	Toluene-d8	91	%	105	%	106	%
	4-Bromofluorobenzene	88	%	101	%	107	%
			fl		fl		fl
Chloromethane		88	%	2	U	88	%
Vinyl chloride		90	%	1	U	89	%
Bromomethane		78	%	2	U	77	%
Chloroethane		90	%	2	U	90	%
1,1-Dichloroethene		102	%	1	U	113	%
Acetone		86	%	2	U	79	%
Carbon Disulfide		66	%	1	U	79	%
Methylene Chloride		90	%	1	U	109	%
1,2-Dichloroethene (total)		94	%	1	U	99	%
1,1-Dichloroethane		93	%	1	U	98	%
Vinyl acetate		75	%	2	U	81	%
2-Butanone		78	%	2	U	97	%
Chloroform		94	%	1	U	97	%
1,1,1-Trichloroethane		92	%	1	U	98	%
Carbon Tetrachloride		95	%	1	U	99	%
Benzene		92	%	1	U	102	%
1,2-Dichloroethane		90	%	1	U	97	%
Trichloroethene		81	%	1	U	94	%
1,2-Dichloropropane		90	%	1	U	100	%
Bromodichloromethane		90	%	1	U	98	%
cis-1,3-Dichloropropene		98	%	1	U	107	%
4-Methyl-2-pentanone		89	%	2	U	100	%
Toluene		93	%	1	U	98	%
trans-1,3-Dichloropropene		104	%	1	U	111	%
1,1,2-Trichloroethane		84	%	1	U	95	%
Tetrachloroethene		94	%	1	U	95	%
2-Hexanone		78	%	2	U	87	%
Dibromochloromethane		90	%	1	U	100	%
Chlorobenzene		92	%	1	U	97	%

*= Outside of EPA CLP QC limits.

Cust ID:	VBLKBR BS		VBLKDB		VBLKDB BS	
RFW#:	96GVT263-MB1		96GVT264-MB1		96GVT264-MB1	
Ethylbenzene	94	%	1	U	97	%
Styrene	91	%	1	U	96	%
Bromoform	88	%	1	U	101	%
1.1.2.2-Tetrachloroethane	83	%	1	U	99	%
Xylene (total)	96	%	1	U	100	%

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory
VOA ANALYTICAL DATA PACKAGE FOR
SBP CAMP LEJEUNE

DATE RECEIVED: 04/13/96 RFW LOT # :9604L765

CLIENT ID	RFW #	MTX	PREP #	COLLECTION	EXTR/PREP	ANALYSIS
69-GW-20 UW	001	W	96LVN078	04/11/96	N/A	04/17/96
69-GW-20 UW	001 D1	W	96LVN083	04/11/96	N/A	04/22/96
69-GW-20 UW	001 MS	W	96LVN078	04/11/96	N/A	04/17/96
69-GW-20 UW	001 MSD	W	96LVN078	04/11/96	N/A	04/17/96
69-GW-20 IW	002	W	96LVN083	04/11/96	N/A	04/22/96
TRIP BLANK	003	W	96LVN078	04/11/96	N/A	04/17/96
69-WELL-14	004	W	96LVN083	04/11/96	N/A	04/22/96

LAB QC:

VBLKEC	MB1	W	96LVN078	N/A	N/A	04/16/96
VBLKEC	MB1 BS	W	96LVN078	N/A	N/A	04/17/96
VBLKEU	MB1	W	96LVN083	N/A	N/A	04/22/96
VBLKEU	MB1 BS	W	96LVN083	N/A	N/A	04/22/96

	Cust ID:	69-GW-20 UW	fl	69-GW-20 UW	fl	69-GW-20 UW	fl	69-GW-20 UW	fl	69-GW-20 IW	fl	TRIP BLANK	fl
Sample Information	RFW#:	001		001 DL		001 MS		001 MSD		002		003	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	1.00		10.0		1.00		1.00		5.00		1.00	
	Units:	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
Surrogate Recovery	1,2-Dichloroethane-d4	104	%	100	%	113	%	111	%	107	%	108	%
	Toluene-d8	104	%	108	%	97	%	101	%	107	%	101	%
	Bromofluorobenzene	96	%	93	%	98	%	96	%	93	%	96	%
Chloromethane		2	U	20	U	2	U	2	U	10	U	2	U
Bromomethane		2	U	20	U	2	U	2	U	10	U	2	U
Vinyl Chloride		5		20	U	5		5		3	J	2	U
Chloroethane		2	U	20	U	2	U	2	U	10	U	2	U
Methylene Chloride		1	JB	28	BD	3	B	3	B	12	B	1	JB
Acetone		5	U	50	U	5	U	5	U	25	U	5	U
Carbon Disulfide		1	U	10	U	1	U	1	U	5	U	1	U
1,1-Dichloroethene		1	U	10	U	102	%	93	%	5	U	1	U
1,1-Dichloroethane		1	U	10	U	1	U	1	U	5	U	1	U
1,2-Dichloroethene (total)		290	E	320	D	270	E	290	E	130		1	U
Chloroform		0.1	J	10	U	1	U	0.1	J	5	U	1	U
1,2-Dichloroethane		1	U	10	U	1	U	1	U	5	U	1	U
2-Butanone		5	U	50	U	5	U	5	U	25	U	5	U
1,1,1-Trichloroethane		1	U	10	U	1	U	1	U	5	U	1	U
Carbon Tetrachloride		1	U	10	U	1	U	1	U	5	U	1	U
Bromodichloromethane		1	U	10	U	1	U	1	U	5	U	1	U
1,2-Dichloropropane		1	U	10	U	1	U	1	U	5	U	1	U
cis-1,3-Dichloropropene		1	U	10	U	1	U	1	U	5	U	1	U
Trichloroethene		30		24	D	123 *	%	137 *	%	5		1	U
Dibromochloromethane		1	U	10	U	1	U	1	U	5	U	1	U
1,1,2-Trichloroethane		0.6	J	10	U	0.5	J	0.7	J	5	U	1	U
Benzene		1	U	10	U	132 *	%	118	%	5	U	1	U
Trans-1,3-Dichloropropene		1	U	10	U	1	U	1	U	5	U	1	U
Bromoform		1	U	10	U	1	U	1	U	5	U	1	U
4-Methyl-2-pentanone		5	U	50	U	5	U	5	U	25	U	5	U
2-Hexanone		5	U	50	U	5	U	5	U	25	U	5	U
Tetrachloroethene		0.4	J	10	U	0.4	J	0.4	J	5	U	1	U
Toluene		0.2	J	10	U	131 *	%	118	%	5	U	1	U
1,1,2,2-Tetrachloroethane		1	U	10	U	1	U	1	U	5	U	1	U

*= [illegible]side of EPA CLP QC limits.

Roy F. Weston, Inc Lionville Laboratory
Volat... by GC/MS
Report Date: 05/... 6 11:00

RFW Batch Number: 9604L765 Client: SBP CAMP LEJEUNE Work Order: 11431001001 Page: 2a

	Cust ID:	69-WELL-14	fl	VBLKEC	fl	VBLKEC BS	fl	VBLKEU	fl	VBLKEU BS	fl
Sample Information	RFW#:	004		96LVN078-MB1		96LVN078-MB1		96LVN083-MB1		96LVN083-MB1	
	Matrix:	WATER		WATER		WATER		WATER		WATER	
	D.F.:	1.00		1.00		1.00		1.00		1.00	
	Units:	UG/L		UG/L		UG/L		UG/L		UG/L	
Surrogate Recovery	1,2-Dichloroethane-d4	111	%	103	%	110	%	100	%	105	%
	Toluene-d8	100	%	102	%	103	%	105	%	105	%
	Bromofluorobenzene	92	%	98	%	98	%	94	%	94	%
Chloromethane		2	U	2	U	2	U	2	U	2	U
Bromomethane		2	U	2	U	2	U	2	U	2	U
Vinyl Chloride		2	U	2	U	2	U	2	U	2	U
Chloroethane		2	U	2	U	2	U	2	U	2	U
Methylene Chloride		0.3	JB	1	J	4	B	1	J	1	JB
Acetone		5	U	1	J	5	U	1	J	5	U
Carbon Disulfide		1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethene		1	U	1	U	99	%	1	U	114	%
1,1-Dichloroethane		1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethene (total)		7		1	U	1	U	1	U	1	U
Chloroform		1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethane		1	U	1	U	1	U	1	U	1	U
2-Butanone		5	U	5	U	5	U	5	U	5	U
1,1,1-Trichloroethane		1	U	1	U	1	U	1	U	1	U
Carbon Tetrachloride		1	U	1	U	1	U	1	U	1	U
Bromodichloromethane		1	U	1	U	1	U	1	U	1	U
1,2-Dichloropropane		1	U	1	U	1	U	1	U	1	U
cis-1,3-Dichloropropene		1	U	1	U	1	U	1	U	1	U
Trichloroethene		2		1	U	115	%	1	U	110	%
Dibromochloromethane		1	U	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane		1	U	1	U	1	U	1	U	1	U
Benzene		1	U	1	U	116	%	1	U	111	%
Trans-1,3-Dichloropropene		1	U	1	U	1	U	1	U	1	U
Bromoform		1	U	1	U	1	U	1	U	1	U
4-Methyl-2-pentanone		5	U	5	U	5	U	5	U	5	U
2-Hexanone		5	U	5	U	5	U	5	U	5	U
Tetrachloroethene		1	U	1	U	1	U	1	U	1	U
Toluene		1	U	1	U	119	%	1	U	111	%
1,1,2,2-Tetrachloroethane		1	U	1	U	1	U	1	U	1	U

*= Outside of EPA CLP QC limits.

000008

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Roy F. Weston, Inc.
208 Welsh Pool Road
Lionville, Pennsylvania 19341-1225
610-701-6100 • Fax 610-701-6141

FACSIMILE TRANSMITTAL
208 Laboratory · 2nd Floor
FAX 610-701-6141

TO: Fayaz Lakhwala

Recipient's Telecopy Telephone # ____________

Recipient's Telephone # ____________

FROM: Gail DePuzzo

Originator's Telephone # ____________

TOTAL PAGES: 11 (incl. cover sheet)

DATE: 3/18/96

W.O.#: ____________

COMMENTS:

96026202
VOA results for 1st Rd of sampling.
The final report will be out later this wk.

Providing quality environmental management and consulting engineering services for over 40 years in the areas of:

- Analytical Testing/Characterization
- Air Quality
- Water Quality/Wastewater
- Hazardous, Solid, Radioactive Waste
- Health and Safety
- Life Sciences
- Strategic Environmental Management
- Information Management
- Construction/Remediation
- Geosciences

55 Offices Worldwide

Roy F. Weston, Inc. - Lionville Laboratory

Volatiles by GC/MS

Report Date: 03/18/96 08:53

RFW Batch Number: 9602L202 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 1a

Cust ID:	69-GW-22A		69-GW-22B		69-GW-23A		69-GW-23A		69-GW-23A		69-GW-23B	
Sample Information RFW#:	001		002		003		003 MS		003 MSD		004	
Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
D.F.:	200		100		50.0		50.0		50.0		250	
Units:	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
Surrogate Recovery 1,2-Dichloroethane-d4	98	%	103	%	105	%	106	%	103	%	102	%
Toluene-d8	102	%	101	%	103	%	102	%	99	%	102	%
Bromofluorobenzene	98	%	99	%	101	%	100	%	98	%	100	%
		fl		fl		fl		fl		fl		fl
Chloromethane	400	U	200	U	100	U	100	U	100	U	500	U
Bromomethane	400	U	200	U	100	U	100	U	100	U	500	U
Vinyl Chloride	390	J	840		620		640		590		790	
Chloroethane	400	U	200	U	100	U	100	U	100	U	500	U
Methylene Chloride	300	JB	190	JB	53	JB	140	B	140	B	350	JB
Acetone	530	JB	190	JB	94	JB	210	JB	210	JB	470	JB
Carbon Disulfide	42	J	100	U	50	U	50	U	8	J	94	J
1,1-Dichloroethene	200	U	100	U	9	J	74	%	80	%	250	U
1,1-Dichloroethane	200	U	100	U	50	U	50	U	50	U	250	U
1,2-Dichloroethene (total)	2700		4500		1100		1100		990		14000	
Chloroform	200	U	100	U	50	U	50	U	50	U	250	U
1,2-Dichloroethane	200	U	100	U	50	U	50	U	50	U	250	U
2-Butanone	1000	U	500	U	250	U	250	U	250	U	1200	U
1,1,1-Trichloroethane	200	U	100	U	50	U	50	U	50	U	250	U
Carbon Tetrachloride	200	U	100	U	50	U	50	U	50	U	250	U
Bromodichloromethane	200	U	100	U	50	U	50	U	50	U	250	U
1,2-Dichloropropane	200	U	100	U	50	U	50	U	50	U	250	U
cis-1,3-Dichloropropene	200	U	100	U	50	U	50	U	50	U	250	U
Trichloroethene	530		240		130		103	%	103	%		E
Dibromochloromethane	200	U	100	U	50	U	50	U	50	U	250	U
1,1,2-Trichloroethane	55	J	100	U	50	U	50	U	50	U	240	J
Benzene	200	U	100	U	50	U	102	%	104	%	250	U
Trans-1,3-Dichloropropene	200	U	100	U	50	U	50	U	50	U	250	U
Bromoform	200	U	100	U	50	U	50	U	50	U	250	U
4-Methyl-2-pentanone	1000	U	500	U	250	U	250	U	250	U	1200	U
2-Hexanone	1000	U	500	U	250	U	250	U	250	U	1200	U
Tetrachloroethene	86	J	21	J	12	J	12	J	10	J	1100	
Toluene	20	J	21	J	17	J	106	%	107	%	40	J
1,1,2,2-Tetrachloroethane	6800		1200		1200		1200		1100			E

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory

Volatiles by GC/MS

Report Date: 03/18/96 08:53

RFW Batch Number: 9602L202 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 2a

	Cust ID:	69-GW-23B	fl	69-GW-24A	fl	69-GW-24B	fl	69-GW-24B	fl	69-GW-25A	fl	69-GW-25A	fl
Sample Information	RFW#:	004 DL		005		006		006 DL		007		007 DL	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	5000		250		250		500		500		2500	
	Units:	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
	1,2-Dichloroethane-d4	105	%	100	%	106	%	93	%	102	%	103	%
Surrogate	Toluene d8	98	%	102	%	100	%	100	%	101	%	102	%
Recovery	Bromofluorobenzene	95	%	98	%	99	%	93	%	99	%	96	%
Chloromethane		NA		500	U	500	U	NA		1000	U	NA	
Bromomethane		NA		500	U	500	U	NA		1000	U	NA	
Vinyl Chloride		NA		3900		750		NA		580	J	NA	
Chloroethane		NA		500	U	500	U	NA		1000	U	NA	
Methylene Chloride		NA		430	JB	260	JB	NA		970	JB	NA	
Acetone		NA		820	JB	680	JB	NA		2400	JB	NA	
Carbon Disulfide		NA		67	J	40	J	NA		500	U	NA	
1,1-Dichloroethene		NA		260		27	J	NA		500	U	NA	
1,1-Dichloroethane		NA		250	U	250	U	NA		500	U	NA	
1,2-Dichloroethene (total)		NA		7900		3300		NA		4500		NA	
Chloroform		NA		250	U	250	U	NA		150	J	NA	
1,2-Dichloroethane		NA		250	U	250	U	NA		500	U	NA	
2-Butanone		NA		1200	U	1200	U	NA		2500	U	NA	
1,1,1-Trichloroethane		NA		250	U	250	U	NA		500	U	NA	
Carbon Tetrachloride		NA		250	U	250	U	NA		150	J	NA	
Bromodichloromethane		NA		250	U	250	U	NA		500	U	NA	
1,2-Dichloropropane		NA		250	U	250	U	NA		500	U	NA	
cis-1,3-Dichloropropene		NA		250	U	250	U	NA		500	U	NA	
Trichloroethene		12000		1100		990		NA		2300		NA	
Dibromochloromethane		NA		250	U	250	U	NA		500	U	NA	
1,1,2-Trichloroethane		NA		250	U	250	U	NA		320	J	NA	
Benzene		NA		250	U	250	U	NA		500	U	NA	
Trans-1,3-Dichloropropene		NA		250	U	250	U	NA		500	U	NA	
Bromoform		NA		250	U	250	U	NA		500	U	NA	
4-Methyl-2-pentanone		NA		1200	U	1200	U	NA		2500	U	NA	
2-Hexanone		NA		1200	U	1200	U	NA		2500	U	NA	
Tetrachloroethene		NA		250	U	80	J	NA		340	J	NA	
Toluene		NA		36	J	250	U	NA		500	U	NA	
1,1,2,2-Tetrachloroethane		170000		250	U		E	9600			E	62000	

*- Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory

Volatiles by GC/MS

Report Date: 03/18/96 08:53

RFW Batch Number: 9602L202 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 3a

Cust ID:	69-GW-25B		69-GW-15VW		69-GW-15VW		69-GW-15IW		69-GW-15IW		69-GW-KGB	
Sample Information RFW#:	008		009		009 DL		010		010 DL		011	
Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
D.F.:	100		1000		5000		50.0		100		250	
Units:	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
Surrogate Recovery 1,2-Dichloroethane-d4	98	%	90	%	99	%	94	%	93	%	93	%
Toluene-d8	103	%	99	%	110	%	103	%	100	%	99	%
Bromofluorobenzene	96	%	90	%	99	%	95	%	92	%	92	%
		fl		fl		fl		fl		fl		fl
Chloromethane	200	U	2000	U	NA		100	U	NA		500	U
Bromomethane	200	U	2000	U	NA		100	U	NA		500	U
Vinyl Chloride	330		5900		NA		380		NA		190	J
Chloroethane	200	U	2000	U	NA		100	U	NA		500	U
Methylene Chloride	110	JB	570	JB	NA		77	JB	NA		200	JB
Acetone	220	JB	1700	JB	NA		140	JB	NA		530	JB
Carbon Disulfide	100	U	1000	U	NA		50	U	NA		34	J
1,1-Dichloroethene	100	U	1000	U	NA		50	U	NA		250	U
1,1-Dichloroethane	100	U	1000	U	NA		50	U	NA		250	U
1,2-Dichloroethene (total)	2100			E	270000			E	3600		3700	
Chloroform	100	U	1000	U	NA		50	U	NA		250	U
1,2-Dichloroethane	100	U	1000	U	NA		50	U	NA		250	U
2-Butanone	500	U	5000	U	NA		250	U	NA		1200	U
1,1,1-Trichloroethane	100	U	1000	U	NA		50	U	NA		250	U
Carbon Tetrachloride	100	U	1000	U	NA		50	U	NA		250	U
Bromodichloromethane	100	U	1000	U	NA		50	U	NA		250	U
1,2-Dichloropropane	100	U	1000	U	NA		50	U	NA		250	U
cis-1,3-Dichloropropene	100	U	1000	U	NA		50	U	NA		250	U
Trichloroethene	200		830	J	NA		1100		NA		580	
Dibromochloromethane	100	U	1000	U	NA		50	U	NA		250	U
1,1,2-Trichloroethane	23	J	1000	U	NA		50	U	NA		48	J
Benzene	100	U	1000	U	NA		50	U	NA		250	U
Trans-1,3-Dichloropropene	100	U	1000	U	NA		50	U	NA		250	U
Bromoform	100	U	1000	U	NA		50	U	NA		250	U
4-Methyl-2-pentanone	500	U	5000	U	NA		250	U	NA		1200	U
2-Hexanone	500	U	5000	U	NA		250	U	NA		1200	U
Tetrachloroethene	12	J	1000	U	NA		50	U	NA		250	U
Toluene	13	J	1000	U	NA		50	U	NA		250	U
1,1,2,2-Tetrachloroethane	2100		1000	U	NA		50	U	NA		5500	

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS
Report Date: 03/18/96 08:53

RFW Batch Number: 9602L202 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 4a

	Cust ID:	69-GW-UVB		69-GW-2DW		TRIP BLANK		FIELD BLANK		VBLKWF		VBLKWF BS	
Sample Information	RFW#:	012		013		014		015		96LVN037-MB1		96LVN037-MB1	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	100		1.00		1.00		1.00		1.00		1.00	
	Units:	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
	1,2-Dichloroethane-d4	100	%	111	%	101	%	95	%	100	%	103	%
Surrogate	Toluene-d8	93	%	103	%	104	%	101	%	101	%	101	%
Recovery	Bromofluorobenzene	92	%	102	%	101	%	98	%	100	%	101	%
			fl		fl		fl		fl		fl		fl
Chloromethane		200	U	2	U	2	U	2	U	2	U	2	U
Bromomethane		200	U	2	U	2	U	2	U	2	U	2	U
Vinyl Chloride		200	U	0.5	J	2	U	2	U	2	U	2	U
Chloroethane		200	U	2	U	2	U	2	U	2	U	2	U
Methylene Chloride		170	JB	2	B	0.8	JB	0.6	JB	2		0.9	JB
Acetone		3200	B	5	B	3	JB	7	B	3	J	2	JB
Carbon Disulfide		100	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethene		100	U	1	U	1	U	1	U	1	U	85	%
1,1-Dichloroethane		100	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethene (total)		110		25		1	U	1	U	1	U	1	U
Chloroform		100	U	1	U	1	U	5		1	U	1	U
1,2-Dichloroethane		100	U	1	U	1	U	1	U	1	U	1	U
2-Butanone		500	U	5	U	5	U	2	J	5	U	5	U
1,1,1-Trichloroethane		100	U	1	U	1	U	1	U	1	U	1	U
Carbon Tetrachloride		100	U	1	U	1	U	1	U	1	U	1	U
Bromodichloromethane		100	U	1	U	1	U	0.7	J	1	U	1	U
1,2-Dichloropropane		100	U	1	U	1	U	1	U	1	U	1	U
cis-1,3-Dichloropropene		100	U	1	U	1	U	1	U	1	U	1	U
Trichloroethene		100	U	0.9	J	1	U	1	U	1	U	110	%
Dibromochloromethane		100	U	1	U	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane		100	U	1	U	1	U	1	U	1	U	1	U
Benzene		100	U	1	U	1	U	1	U	1	U	107	%
Trans-1,3-Dichloropropene		100	U	1	U	1	U	1	U	1	U	1	U
Bromoform		100	U	1	U	1	U	1	U	1	U	1	U
4-Methyl-2-pentanone		500	U	5	U	5	U	5	U	5	U	5	U
2-Hexanone		500	U	5	U	5	U	5	U	5	U	5	U
Tetrachloroethene		100	U	1	U	1	U	1	U	1	U	1	U
Toluene		28	J	1	U	1	U	0.3	J	1	U	111	%
1,1,2,2-Tetrachloroethane		100	U	1	U	1	U	1	U	1	U	1	U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS

Report Date: 03/18/96 08:53

RFW Batch Number: 9602L202 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 5a

	Cust ID:	VBLKWG		VBLKWG BS	
Sample Information	RFW#:	96LVN038-MB1		96LVN038-MB1	
	Matrix:	WATER		WATER	
	D.F.:	1.00		1.00	
	Units:	UG/L		UG/L	
	1,2-Dichloroethane-d4	93	%	98	%
Surrogate	Toluene-d8	100	%	99	%
Recovery	Bromofluorobenzene	95	%	94	%
Chloromethane		2	U	2	U
Bromomethane		2	U	2	U
Vinyl Chloride		2	U	2	U
Chloroethane		2	U	2	U
Methylene Chloride		0.5	J	0.8	JB
Acetone		2	J	2	JB
Carbon Disulfide		1	U	1	U
1,1-Dichloroethene		1	U	86	%
1,1-Dichloroethane		1	U	1	U
1,2-Dichloroethene (total)		1	U	1	U
Chloroform		1	U	1	U
1,2-Dichloroethane		1	U	1	U
2-Butanone		5	U	5	U
1,1,1-Trichloroethane		1	U	1	U
Carbon Tetrachloride		1	U	1	U
Bromodichloromethane		1	U	1	U
1,2-Dichloropropane		1	U	1	U
cis-1,3-Dichloropropene		1	U	1	U
Trichloroethene		1	U	110	%
Dibromochloromethane		1	U	1	U
1,1,2-Trichloroethane		1	U	1	U
Benzene		1	U	105	%
Trans-1,3-Dichloropropene		1	U	1	U
Bromoform		1	U	1	U
4-Methyl-2-pentanone		5	U	5	U
2-Hexanone		5	U	5	U
Tetrachloroethene		1	U	1	U
Toluene		1	U	111	%
1,1,2,2-Tetrachloroethane		1	U	1	U

*= Outside of EPA CLP QC limits.

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Roy F. Weston, Inc.
208 Welsh Pool Road
Lionville, Pennsylvania 19341-1225
610-701-6100 • Fax 610-701-6141

FACSIMILE TRANSMITTAL
208 Laboratory · 2nd Floor
FAX 610-701-6141

TO: Fayaz Lakhwala

Recipient's Telecopy Telephone #

Recipient's Telephone #

FROM: Gail DeRuzzo

Originator's Telephone #

TOTAL PAGES: 3 (incl. cover sheet)

DATE: 4/5/96

W.O.#:

COMMENTS:

Camp Lejeune VOA Results, 96L486

RFW 04-03-008/A-04/94

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS

Report Date: 04/05/96 13:51

RFW Batch Number: 9603L486 Client: SBP CAMP LEJEUNE Work Order: 11431001001 Page: 1a

	Cust ID:	UVB-IW		UVB-IW		TRIP BLANK		VBLKAI
Sample Information	RFW#:	001		001 DL		002		96LVM061-MB1
	Matrix:	WATER		WATER		WATER		WATER
	D.F.:	1.00		25.0		1.00		1.00
	Units:	UG/L		UG/L		UG/L		UG/L
Surrogate Recovery	1,2-Dichloroethane-d4	105	%	105	%	102	%	100	%
	Toluene-d8	108	%	108	%	106	%	101	%
	Bromofluorobenzene	103	%	103	%	102	%	98	%
			fl		fl		fl		fl
Chloromethane		2	U	NA		2	U	2	U
Bromomethane		2	U	NA		2	U	2	U
Vinyl Chloride		2	U	NA		2	U	2	U
Chloroethane		2	U	NA		2	U	2	U
Methylene Chloride		0.3	JB	NA		0.5	JB	0.5	J
Acetone			E	660	B	1	JB	0.7	J
Carbon Disulfide		1	U	NA		1	U	1	U
1,1-Dichloroethene		1	U	NA		1	U	1	U
1,1-Dichloroethane		1	U	NA		1	U	1	U
1,2-Dichloroethene (total)		1	U	NA		1	U	1	U
Chloroform		1	U	NA		1	U	1	U
1,2-Dichloroethane		1	U	NA		1	U	1	U
2-Butanone		5	U	NA		5	U	5	U
1,1,1-Trichloroethane		1	U	NA		1	U	1	U
Carbon Tetrachloride		1	U	NA		1	U	1	U
Bromodichloromethane		1	U	NA		1	U	1	U
1,2-Dichloropropane		1	U	NA		1	U	1	U
cis-1,3-Dichloropropene		1	U	NA		1	U	1	U
Trichloroethene		1	U	NA		1	U	1	U
Dibromochloromethane		1	U	NA		1	U	1	U
1,1,2-Trichloroethane		1	U	NA		1	U	1	U
Benzene		1	U	NA		1	U	1	U
Trans-1,3-Dichloropropene		1	U	NA		1	U	1	U
Bromoform		1	U	NA		1	U	1	U
4-Methyl-2-pentanone		5	U	NA		5	U	5	U
2-Hexanone		5	U	NA		5	U	5	U
Tetrachloroethene		1	U	NA		1	U	1	U
Toluene		1	U	NA		1	U	1	U
1,1,2,2-Tetrachloroethane		1	U	NA		1	U	1	U

*= Outside of EPA CLP QC limits.

Cust ID:	UVB-IW	UVB-IW	TRIP BLANK	VBLKAI
RFW#:	001	001 DL	002	96LVN061-MB1
Chlorobenzene	1 U	NA	1 U	1 U
Ethylbenzene	1 U	NA	1 U	1 U
Styrene	1 U	NA	1 U	1 U
Xylene (total)	1 U	NA	1 U	1 U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS

Report Date: 03/25/96 18:59

RFW Batch Number: 9603L337 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 3a

Cust ID:	69-GW-19IW		69-GW-19IW		69-GW-19VW		69-GW-21IW		69-GW-21VW		69-GW-TB	
Sample Information RFW#:	007		007 DL		008		009		010		011	
Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
D.F.:	1.00		5.00		1.00		1.00		1.00		1.00	
Units:	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
Surrogate Recovery 1,2-Dichloroethane-d4	113	%	111	%	110	%	107	%	114	%	114	%
Toluene-d8	106	%	100	%	103	%	105	%	104	%	101	%
Bromofluorobenzene	104	%	98	%	102	%	104	%	105	%	102	%
		fl		fl		fl		fl		fl		fl
Chloromethane	0.2	J	NA		2	U	2	U	2	U	2	U
Bromomethane	2	U	NA		2	U	2	U	2	U	2	U
Vinyl Chloride	2	U	NA		2	U	2	U	1	J	2	U
Chloroethane	2	U	NA		2	U	2	U	2	U	2	U
Methylene Chloride	0.5	JB	NA		0.4	JB	0.4	JB	0.4	JB	1	JB
Acetone		E	68	B	16	B	3	JB	5	B	4	JB
Carbon Disulfide	0.4	J	NA		1	U	1	U	1	U	1	U
1,1-Dichloroethene	1	U	NA		1	U	1	U	1	U	1	U
1,1-Dichloroethane	1	U	NA		1	U	1	U	1	U	1	U
1,2-Dichloroethene (total)	9		NA		26		0.3	J	6		1	U
Chloroform	0.1	J	NA		1	U	1	U	1	U	1	U
1,2-Dichloroethane	1	U	NA		1	U	1	U	1	U	1	U
2-Butanone	7		NA		5	U	5	U	5	U	5	U
1,1,1-Trichloroethane	1	U	NA		1	U	1	U	1	U	1	U
Carbon Tetrachloride	1	U	NA		1	U	1	U	1	U	1	U
Bromodichloromethane	1	U	NA		1	U	1	U	1	U	1	U
1,2-Dichloropropane	1	U	NA		1	U	1	U	1	U	1	U
cis-1,3-Dichloropropene	1	U	NA		1	U	1	U	1	U	1	U
Trichloroethene	18		NA		6		1	U	0.5	J	1	U
Dibromochloromethane	1	U	NA		1	U	1	U	1	U	1	U
1,1,2-Trichloroethane	1	U	NA		1	U	1	U	1	U	1	U
Benzene	0.2	J	NA		0.1	J	1	U	1	U	1	U
Trans-1,3-Dichloropropene	1	U	NA		1	U	1	U	1	U	1	U
Bromoform	1	U	NA		1	U	1	U	1	U	1	U
4-Methyl-2-pentanone	5	U	NA		5	U	5	U	5	U	5	U
2-Hexanone	5	U	NA		5	U	5	U	5	U	5	U
Tetrachloroethene	1	U	NA		1	U	1	U	1	U	1	U
Toluene	0.1	J	NA		0.4	J	1	U	0.2	J	1	U
1,1,2,2-Tetrachloroethane	1	U	NA		1	U	1	U	1	U	1	U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9603L337 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 3b

	Cust ID:	69-GW-19IW		69-GW-29IW	69-GW-19VW		69-GW-21IW		69-GW-21VW		69-GW-TB	
	RFW#:	007		007 DL	008		009		010		011	
Chlorobenzene		1	U	NA	1	U	1	U	1	U	1	U
Ethylbenzene		1	U	NA	1	U	1	U	1	U	1	U
Styrene		1	U	NA	1	U	1	U	1	U	1	U
Xylene (total)		1	U	NA	0.2	J	1	U	1	U	1	U

*= Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS

Report Date: 03/25/96 18:59

RFW Batch Number: 9603L337 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 4a

	Cust ID:	RINSE BLANK		VBLKWY		VBLKWY BS		VBLKXY		VBLKXY BS		VBLKXO	
Sample Information	RFW#:	012		96LVM045-MB1		96LVM045-MB1		96LVM046-MB1		96LVM046-MB1		96LVM048-MB1	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	D.F.:	1.00		1.00		1.00		1.00		1.00		1.00	
	Units:	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
	1,2-Dichloroethane-d4	109	%	107	%	99	%	95	%	100	%	105	%
Surrogate	Toluene-d8	104	%	105	%	104	%	101	%	99	%	101	%
Recovery	Bromofluorobenzene	101	%	102	%	99	%	95	%	96	%	98	%
			fl		fl		fl		fl		fl		fl
Chloromethane		2	U	2	U	2	U	2	U	2	U	2	U
Bromomethane		2	U	2	U	2	U	2	U	2	U	2	U
Vinyl Chloride		2	U	2	U	2	U	2	U	2	U	2	U
Chloroethane		2	U	2	U	2	U	2	U	2	U	2	U
Methylene Chloride		0.8	JB	0.6	J	0.7	JB	2		2	B	1	J
Acetone		11	B	2	J	2	JB	2	J	2	JB	2	J
Carbon Disulfide		1	U	1	U	1	U	1	U	1	U	1	U
1,1-Dichloroethene		1	U	1	U	86	%	1	U	79	%	1	U
1,1-Dichloroethane		1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethene (total)		1	U	1	U	1	U	1	U	1	U	1	U
Chloroform		3		1	U	1	U	1	U	1	U	1	U
1,2-Dichloroethane		1	U	1	U	1	U	1	U	1	U	1	U
2-Butanone		5	U	5	U	5	U	5	U	5	U	5	U
1,1,1-Trichloroethane		1	U	1	U	1	U	1	U	1	U	1	U
Carbon Tetrachloride		1	U	1	U	1	U	1	U	1	U	1	U
Bromodichloromethane		6		1	U	1	U	1	U	1	U	1	U
1,2-Dichloropropane		1	U	1	U	1	U	1	U	1	U	1	U
cis-1,3-Dichloropropene		1	U	1	U	1	U	1	U	1	U	1	U
Trichloroethene		1	U	1	U	108	%	1	U	103	%	1	U
Dibromochloromethane		12		1	U	1	U	1	U	1	U	1	U
1,1,2-Trichloroethane		1	U	1	U	1	U	1	U	1	U	1	U
Benzene		1	U	1	U	105	%	1	U	101	%	1	U
Trans-1,3-Dichloropropene		1	U	1	U	1	U	1	U	1	U	1	U
Bromoform		12		1	U	1	U	1	U	1	U	1	U
4-Methyl-2-pentanone		5	U	5	U	5	U	5	U	5	U	5	U
2-Hexanone		5	U	5	U	5	U	5	U	5	U	5	U
Tetrachloroethene		1	U	1	U	1	U	1	U	1	U	1	U
Toluene		0.1	J	1	U	112	%	1	U	105	%	1	U
1,1,2,2-Tetrachloroethane		1	U	1	U	1	U	1	U	1	U	1	U

*= Outside of EPA CLP QC limits.

RFW Batch Number: 9603L337 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 4b

Cust ID:	RINSE BLANK		VBLKWY		VBLKWY BS		VBLKXY		VBLKXY BS		VBLKXO	
RFW#:	012		96LVN045-MB1		96LVN045-MB1		96LVN046-MB1		96LVN046-MB1		96LVN048-MB1	
Chlorobenzene	1	U	1	U	114	*	1	U	107	*	1	U
Ethylbenzene	1	U	1	U	1	U	1	U	1	U	1	U
Styrene	1	U	1	U	1	U	1	U	1	U	1	U
Xylene (total)	1	U	1	U	1	U	1	U	1	U	1	U

* = Outside of EPA CLP QC limits.

Roy F. Weston, Inc. - Lionville Laboratory
Volatiles by GC/MS

Report Date: 03/25/96 18:54

RFW Batch Number: 9603L337 Client: SBP CAMP LEJEUNE Work Order: 11431002001 Page: 5a

	Cust ID:	VBLKXO BS
Sample Information	RFW#:	96LVN048-MB1
	Matrix:	WATER
	D.F.:	1.00
	Units:	UG/L

	1,2-Dichloroethane-d4	108	%
Surrogate	Toluene-d8	101	%
Recovery	Bromofluorobenzene	98	%

===fl=============fl=============fl=============fl=============fl=============fl

Chloromethane	2	U
Bromomethane	2	U
Vinyl Chloride	2	U
Chloroethane	2	U
Methylene Chloride	0.8	JB
Acetone	5	U
Carbon Disulfide	1	U
1,1-Dichloroethene	72	%
1,1-Dichloroethane	1	U
1,2-Dichloroethene (total)	1	U
Chloroform	1	U
1,2-Dichloroethane	1	U
2-Butanone	5	U
1,1,1-Trichloroethane	1	U
Carbon Tetrachloride	1	U
Bromodichloromethane	1	U
1,2-Dichloropropane	1	U
cis-1,3-Dichloropropene	1	U
Trichloroethene	103	%
Dibromochloromethane	1	U
1,1,2-Trichloroethane	1	U
Benzene	100	%
Trans-1,3-Dichloropropene	1	U
Bromoform	1	U
4-Methyl-2-pentanone	5	U
2-Hexanone	5	U
Tetrachloroethene	1	U
Toluene	104	%
1,1,2,2-Tetrachloroethane	1	U

*= Outside of EPA CLP QC limits.

Cust ID: VBLKXO BS

RFW#: 96LVW048-MB1

Chlorobenzene	109	%
Ethylbenzene	1	U
Styrene	1	U
Xylene (total)	1	U

*= Outside of EPA CLP QC limits.

000016

Appendix E

VOCs Analysis of UVB-400 Well Development Water
07/02/97

Client #: MOB-97-070801
Address: SBP Technologies Inc.
105 Gregory Square
Pensacola, FL 32501
Attn: Fayaz Lakhwala

Date: 07/07/97
Log #: L21238-2

Sample Description:

Goundwater Analysis

Label: Purge Water
Date Sampled: 07/02/97
Time Sampled: 15:00
Date Received: 07/03/97
Collected By: Client

Parameter	Results	Units	Method	Reportable Limit	Extr. Date	Analysis Date	Analyst
Volatile Organic Compounds							
Acrolein	BDL	ug/l	5030/8260	250	07/04	07/04	KS
Acrylonitrile	BDL	ug/l	5030/8260	250	07/04	07/04	KS
Benzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
romobenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
mochloromethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
modichloromethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Bromoform	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Bromomethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
sec-Butylbenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
tert-Butylbenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
n-Butylbenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Carbon Tetrachloride	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Chlorobenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Chloroethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
2-Chloroethylvinyl Ether	BDL	ug/l	5030/8260	250	07/04	07/04	KS
Chloroform	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Chloromethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
2-Chlorotoluene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
4-Chlorotoluene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,2-Dibromo-3-Chloropropane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Dibromochloromethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Dibromomethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,2-Dibromoethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,2-Dichlorobenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,3-Dichlorobenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,4-Dichlorobenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Dichlorodifluoromethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,1-Dichloroethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
,2-Dichloroethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1-Dichloroethene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS

Client #: MOB-97-070801
Address: SBP Technologies Inc.
105 Gregory Square
Pensacola, FL 32501
Attn: Fayaz Lakhwala

Date: 07/07/97
Log #: L21238-2

Sample Description:

Goundwater Analysis

Label: Purge Water
Date Sampled: 07/02/97
Time Sampled: 15:00
Date Received: 07/03/97
Collected By: Client

Parameter	Results	Units	Method	Reportable Limit	Extr. Date	Analysis Date	Analyst
Volatile Organic Compounds	**(continued)**						
Cis-1,2-Dichloroethene	120	ug/l	5030/8260	5.0	07/04	07/04	KS
trans-1,2-Dichloroethene	9.4	ug/l	5030/8260	5.0	07/04	07/04	KS
1,2-Dichloropropane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,3-Dichloropropane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
2,2-Dichloropropane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,1-Dichloropropene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
trans-1,3-Dichloropropene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Cis-1,3-Dichloropropene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Ethylbenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Hexachlorobutadiene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Isopropyl Benzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
4-Isopropyl Toluene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
MTBE	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
ethylene Chloride	BDL	ug/l	5030/8260	20	07/04	07/04	KS
hthalene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
ropylbenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Styrene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,1,1,2-Tetrachloroethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,1,2,2-Tetrachloroethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Tetrachloroethene	BDL	ug/l	5030/8260	50	07/04	07/04	KS
Toluene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,2,3-Trichlorobenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,2,4-Trichlorobenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,1,1-Trichloroethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Trichloroethene	11	ug/l	5030/8260	5.0	07/04	07/04	KS
1,1,2-Trichloroethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,2,3-Trichloropropane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Trichlorofluoromethane	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,2,4-Trimethylbenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
1,3,5-Trimethylbenzene	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Vinyl Chloride	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Total Xylenes	BDL	ug/l	5030/8260	5.0	07/04	07/04	KS
Dilution Factor	5.0		5030/8260		07/04	07/04	KS
Surrogate Recoveries:							
4-Bromofluorobenzene	112	%	5030/8260	76-130	07/04	07/04	KS
Dibromofluoromethane	88.0	%	5030/8260	58-146	07/04	07/04	KS
Toluene-D8	101	%	5030/8260	76-119	07/04	07/04	KS
General Chemistry							
tal Dissolved Solids	1200	mg/l	160.1	10	07/03	07/03	RH

Date: 07/07/97
Log #: L21238-2

Client #: MOB-97-070801
Address: SBP Technologies Inc.
105 Gregory Square
Pensacola, FL 32501
Attn: Fayaz Lakhwala

Sample Description:

Goundwater Analysis

Label: Purge Water
Date Sampled: 07/02/97
Time Sampled: 15:00
Date Received: 07/03/97
Collected By: Client

Parameter	Results	Units	Method	Reportable Limit	Extr. Date	Analysis Date	Analyst
General Chemistry (continued)							
Total Suspended Solids	8.0	mg/l	160.2	8.0	07/03	07/03	RH

BDL = Below Detection Limits
* Compounds are Screened Only, with an estimated detection limit.
All analyses were performed using EPA, ASTM, USGS, or Standard Methods.
All analyses were performed within EPA holding times unless otherwise noted.
Analyses are reported in dry weight unless otherwise indicated by units.

QAP# 900376G	HRS# E86240,86356	NC CERT# 444
SUB HRS# 86122,86109,E86048	ADEM ID# 40850	ND CERT# R-148
SC CERT# 96031	TN CERT# 02985	CT CERT# PH-0122
ELPAT# 13801	CA CERT# I-1068	USACE CERT
VA CERT# 00395	AZ CERT# AZ0529	MA CERT# M-FL449

Respectfully submitted,

Project Manager
L21238-2

Appendix E

VOCs Analysis of UVB-400 Monitoring Well Samples
08/27/97

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

15IW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866678

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066678A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 500.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	250	U
75-01-4	Vinyl Chloride	660	
75-00-3	Chloroethane	250	U
75-09-2	Methylene Chloride	170	JB
75-35-4	1,1-Dichloroethene	380	U
75-34-3	1,1-Dichloroethane	250	U
67-66-3	Chloroform	380	U
107-06-2	1,2-Dichloroethane	380	U
71-55-6	1,1,1-Trichloroethane	380	U
56-23-5	Carbon Tetrachloride	500	U
75-27-4	Bromodichloromethane	250	U
10061-01-5	cis-1,3-Dichloropropene	250	U
79-01-6	Trichloroethene	620	
124-48-1	Dibromochloromethane	250	U
79-00-5	1,1,2-Trichloroethane	380	U
71-43-2	Benzene	380	U
10061-02-6	trans-1,3-Dichloropropene	380	U
75-25-2	Bromoform	250	U
127-18-4	Tetrachloroethene	380	U
79-34-5	1,1,2,2-Tetrachloroethane	250	U
108-88-3	Toluene	380	U
108-90-7	Chlorobenzene	250	U
100-41-4	Ethylbenzene	250	U
100-42-5	Styrene	250	U
78-87-5	1,2-Dichloropropane	380	U
74-87-3	Chloromethane	500	U
75-15-0	Carbon disulfide	250	U
67-64-1	Acetone	2500	U
108-10-1	4-Methyl-2-pentanone	1000	U
591-78-6	2-hexanone	1000	U
78-93-3	2-butanone	1500	U
156-60-5	trans-1,2-Dichloroethene	380	U
156-59-2	cis-1,2-Dichloroethene	8700	

FORM I VOA

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

15IW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866678

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066678A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 500.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	Xylene (total)	250	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.

15IW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866678

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066678A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 500.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

FORM I VOA-TIC

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

17IW

Lab Name: COMPUCHEM ENV. CORP.   Contract: 501144

Lab Code: COMPU   Case No.: 33127   SAS No.:   SDG No.: 0001V

Matrix: (soil/water) WATER   Lab Sample ID: 866680

Sample wt/vol: 25.0 (g/mL) ML   Lab File ID: CN066680A54.D

Level: (low/med) LOW   Date Received: 08/28/97

% Moisture: not dec. ______   Date Analyzed: 09/02/97

GC Column:DB624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: ______(uL)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	0.5	U
75-01-4	Vinyl Chloride	5	
75-00-3	Chloroethane	0.5	U
75-09-2	Methylene Chloride	15	U
75-35-4	1,1-Dichloroethene	0.8	U
75-34-3	1,1-Dichloroethane	0.5	U
67-66-3	Chloroform	0.8	U
107-06-2	1,2-Dichloroethane	0.8	U
71-55-6	1,1,1-Trichloroethane	0.8	U
56-23-5	Carbon Tetrachloride	1	U
75-27-4	Bromodichloromethane	0.5	U
10061-01-5	cis-1,3-Dichloropropene	0.5	U
79-01-6	Trichloroethene	0.8	U
124-48-1	Dibromochloromethane	0.5	U
79-00-5	1,1,2-Trichloroethane	0.8	U
71-43-2	Benzene	0.8	U
10061-02-6	trans-1,3-Dichloropropene	0.8	U
75-25-2	Bromoform	0.5	U
127-18-4	Tetrachloroethene	0.8	U
79-34-5	1,1,2,2-Tetrachloroethane	0.5	U
108-88-3	Toluene	0.8	U
108-90-7	Chlorobenzene	0.5	U
100-41-4	Ethylbenzene	0.5	U
100-42-5	Styrene	0.5	U
78-87-5	1,2-Dichloropropane	0.8	U
74-87-3	Chloromethane	1	U
75-15-0	Carbon disulfide	0.5	U
67-64-1	Acetone	5	U
108-10-1	4-Methyl-2-pentanone	2	U
591-78-6	2-hexanone	2	U
78-93-3	2-butanone	3	U
156-60-5	trans-1,2-Dichloroethene	0.9	
156-59-2	cis-1,2-Dichloroethene	4	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

17IW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866680

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066680A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	-------Xylene (total)	0.5	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.

17IW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866680

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066680A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
3.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

17UW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866682

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066682A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 500.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	250	U
75-01-4	Vinyl Chloride	480	J
75-00-3	Chloroethane	250	U
75-09-2	Methylene Chloride	180	JB
75-35-4	1,1-Dichloroethene	380	U
75-34-3	1,1-Dichloroethane	250	U
67-66-3	Chloroform	380	U
107-06-2	1,2-Dichloroethane	380	U
71-55-6	1,1,1-Trichloroethane	380	U
56-23-5	Carbon Tetrachloride	500	U
75-27-4	Bromodichloromethane	250	U
10061-01-5	cis-1,3-Dichloropropene	250	U
79-01-6	Trichloroethene	380	U
124-48-1	Dibromochloromethane	250	U
79-00-5	1,1,2-Trichloroethane	380	U
71-43-2	Benzene	380	U
10061-02-6	trans-1,3-Dichloropropene	380	U
75-25-2	Bromoform	250	U
127-18-4	Tetrachloroethene	380	U
79-34-5	1,1,2,2-Tetrachloroethane	250	U
108-88-3	Toluene	380	U
108-90-7	Chlorobenzene	250	U
100-41-4	Ethylbenzene	250	U
100-42-5	Styrene	250	U
78-87-5	1,2-Dichloropropane	380	U
74-87-3	Chloromethane	500	U
75-15-0	Carbon disulfide	250	U
67-64-1	Acetone	2500	U
108-10-1	4-Methyl-2-pentanone	1000	U
591-78-6	2-hexanone	1000	U
78-93-3	2-butanone	1500	U
156-60-5	trans-1,2-Dichloroethene	880	
156-59-2	cis-1,2-Dichloroethene	9800	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

17UW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866682

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066682A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 500.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	Xylene (total)	250	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.

17UW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866682

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066682A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 500.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CONCENTRATION UNITS:
Number TICs found: 0 (ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

FORM I VOA-TIC

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

20IW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866679

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066679A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	0.5	U
75-01-4	Vinyl Chloride	1	U
75-00-3	Chloroethane	0.5	U
75-09-2	Methylene Chloride	0.3	JB
75-35-4	1,1-Dichloroethene	0.8	U
75-34-3	1,1-Dichloroethane	0.5	U
67-66-3	Chloroform	0.8	U
107-06-2	1,2-Dichloroethane	0.8	U
71-55-6	1,1,1-Trichloroethane	0.8	U
56-23-5	Carbon Tetrachloride	1	U
75-27-4	Bromodichloromethane	0.5	U
10061-01-5	cis-1,3-Dichloropropene	0.5	U
79-01-6	Trichloroethene	0.8	U
124-48-1	Dibromochloromethane	0.5	U
79-00-5	1,1,2-Trichloroethane	0.8	U
71-43-2	Benzene	0.8	U
10061-02-6	trans-1,3-Dichloropropene	0.8	U
75-25-2	Bromoform	0.5	U
127-18-4	Tetrachloroethene	0.8	U
79-34-5	1,1,2,2-Tetrachloroethane	0.5	U
108-88-3	Toluene	0.8	U
108-90-7	Chlorobenzene	0.5	U
100-41-4	Ethylbenzene	0.5	U
100-42-5	Styrene	0.5	U
78-87-5	1,2-Dichloropropane	0.8	U
74-87-3	Chloromethane	1	U
75-15-0	Carbon disulfide	0.5	U
67-64-1	Acetone	5	U
108-10-1	4-Methyl-2-pentanone	2	U
591-78-6	2-hexanone	2	U
78-93-3	2-butanone	3	U
156-60-5	trans-1,2-Dichloroethene	1	
156-59-2	cis-1,2-Dichloroethene	5	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

20IW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866679

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066679A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ______ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	Xylene (total)	0.5	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.

20IW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866679

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066679A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ______ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______(uL) Soil Aliquot Volume: ______(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

FORM I VOA-TIC

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

20UW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866681

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CR066681A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column: DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ________ (uL) Soil Aliquot Volume: ______ (uL)

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND	CONCENTRATION	Q
74-83-9	Bromomethane	0.5	U
75-01-4	Vinyl Chloride	0.8	J
75-00-3	Chloroethane	0.5	U
75-09-2	Methylene Chloride	0.3	JB
75-35-4	1,1-Dichloroethene	0.8	U
75-34-3	1,1-Dichloroethane	0.5	U
67-66-3	Chloroform	0.8	U
107-06-2	1,2-Dichloroethane	0.3	J
71-55-6	1,1,1-Trichloroethane	0.8	U
56-23-5	Carbon Tetrachloride	1	U
75-27-4	Bromodichloromethane	0.5	U
10061-01-5	cis-1,3-Dichloropropene	0.5	U
79-01-6	Trichloroethene	0.8	J
124-48-1	Dibromochloromethane	0.5	U
79-00-5	1,1,2-Trichloroethane	0.8	U
71-43-2	Benzene	0.8	U
10061-02-6	trans-1,3-Dichloropropene	0.8	U
75-25-2	Bromoform	0.5	U
127-18-4	Tetrachloroethene	0.8	U
79-34-5	1,1,2,2-Tetrachloroethane	0.5	U
108-88-3	Toluene	0.8	U
108-90-7	Chlorobenzene	0.5	U
100-41-4	Ethylbenzene	0.5	U
100-42-5	Styrene	0.5	U
78-87-5	1,2-Dichloropropane	0.8	U
74-87-3	Chloromethane	1	U
75-15-0	Carbon disulfide	0.5	U
67-64-1	Acetone	5	U
108-10-1	4-Methyl-2-pentanone	2	U
591-78-6	2-hexanone	2	U
78-93-3	2-butanone	3	U
156-60-5	trans-1,2-Dichloroethene	2	
156-59-2	cis-1,2-Dichloroethene	12	

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

20UW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866681

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CR066681A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	-------Xylene (total)	0.5	U

FORM I VOA

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.

20UW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866681

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CR066681A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

FORM I VOA-TIC

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

21UW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866683

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066683A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ______ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	0.5	U
75-01-4	Vinyl Chloride	0.3	J
75-00-3	Chloroethane	0.5	U
75-09-2	Methylene Chloride	0.3	JB
75-35-4	1,1-Dichloroethene	0.8	U
75-34-3	1,1-Dichloroethane	0.5	U
67-66-3	Chloroform	0.8	U
107-06-2	1,2-Dichloroethane	0.8	U
71-55-6	1,1,1-Trichloroethane	0.8	U
56-23-5	Carbon Tetrachloride	1	U
75-27-4	Bromodichloromethane	0.5	U
10061-01-5	cis-1,3-Dichloropropene	0.5	U
79-01-6	Trichloroethene	0.4	J
124-48-1	Dibromochloromethane	0.5	U
79-00-5	1,1,2-Trichloroethane	0.8	U
71-43-2	Benzene	0.8	U
10061-02-6	trans-1,3-Dichloropropene	0.8	U
75-25-2	Bromoform	0.5	U
127-18-4	Tetrachloroethene	0.8	U
79-34-5	1,1,2,2-Tetrachloroethane	0.5	U
108-88-3	Toluene	0.8	U
108-90-7	Chlorobenzene	0.5	U
100-41-4	Ethylbenzene	0.5	U
100-42-5	Styrene	0.5	U
78-87-5	1,2-Dichloropropane	0.8	U
74-87-3	Chloromethane	1	U
75-15-0	Carbon disulfide	0.5	U
67-64-1	Acetone	5	U
108-10-1	4-Methyl-2-pentanone	2	U
591-78-6	2-hexanone	2	U
78-93-3	2-butanone	3	U
156-60-5	trans-1,2-Dichloroethene	0.4	J
156-59-2	cis-1,2-Dichloroethene	3	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

21UW

Lab Name: COMPUCHEM ENV. CORP.   Contract: 501144

Lab Code: COMPU   Case No.: 33127   SAS No.:   SDG No.: 0001V

Matrix: (soil/water) WATER   Lab Sample ID: 866683

Sample wt/vol: 25.0 (g/mL) ML   Lab File ID: CN066683A54.D

Level: (low/med) LOW   Date Received: 08/28/97

% Moisture: not dec. ________   Date Analyzed: 09/02/97

GC Column:DB624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: _______(uL)   Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	Xylene (total)	0.5	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.

21UW

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866683

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066683A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

FORM I VOA-TIC

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

UVB-IN

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866674

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066674A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	0.5	U
75-01-4	Vinyl Chloride	1	U
75-00-3	Chloroethane	0.5	U
75-09-2	Methylene Chloride	0.4	JB
75-35-4	1,1-Dichloroethene	0.8	U
75-34-3	1,1-Dichloroethane	0.5	U
67-66-3	Chloroform	0.8	U
107-06-2	1,2-Dichloroethane	0.8	U
71-55-6	1,1,1-Trichloroethane	0.8	U
56-23-5	Carbon Tetrachloride	1	U
75-27-4	Bromodichloromethane	0.5	U
10061-01-5	cis-1,3-Dichloropropene	0.5	U
79-01-6	Trichloroethene	0.8	U
124-48-1	Dibromochloromethane	0.5	U
79-00-5	1,1,2-Trichloroethane	0.8	U
71-43-2	Benzene	0.8	U
10061-02-6	trans-1,3-Dichloropropene	0.8	U
75-25-2	Bromoform	0.5	U
127-18-4	Tetrachloroethene	0.8	U
79-34-5	1,1,2,2-Tetrachloroethane	0.5	U
108-88-3	Toluene	0.8	U
108-90-7	Chlorobenzene	0.5	U
100-41-4	Ethylbenzene	0.5	U
100-42-5	Styrene	0.5	U
78-87-5	1,2-Dichloropropane	0.8	U
74-87-3	Chloromethane	1	U
75-15-0	Carbon disulfide	0.5	U
67-64-1	Acetone	9	
108-10-1	4-Methyl-2-pentanone	2	U
591-78-6	2-hexanone	2	U
78-93-3	2-butanone	3	U
156-60-5	trans-1,2-Dichloroethene	0.3	J
156-59-2	cis-1,2-Dichloroethene	3	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

UVB-IN

Lab Name: COMPUCHEM ENV. CORP.   Contract: 501144

Lab Code: COMPU   Case No.: 33127   SAS No.:   SDG No.: 0001V

Matrix: (soil/water) WATER   Lab Sample ID: 866674

Sample wt/vol: 25.0 (g/mL) ML   Lab File ID: CN066674A54.D

Level: (low/med) LOW   Date Received: 08/28/97

% Moisture: not dec. ________   Date Analyzed: 09/02/97

GC Column:DB624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: ______(uL)   Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	-------Xylene (total)	0.5	U

SAMPLE NO.

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET

TENTATIVELY IDENTIFIED COMPOUNDS

UVB-IN

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866674

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066674A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

FORM I VOA-TIC

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

UVB-OUT

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866677

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066677A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	0.5	U
75-01-4	Vinyl Chloride	1	U
75-00-3	Chloroethane	0.5	U
75-09-2	Methylene Chloride	0.3	JB
75-35-4	1,1-Dichloroethene	0.8	U
75-34-3	1,1-Dichloroethane	0.5	U
67-66-3	Chloroform	0.8	U
107-06-2	1,2-Dichloroethane	0.8	U
71-55-6	1,1,1-Trichloroethane	0.8	U
56-23-5	Carbon Tetrachloride	1	U
75-27-4	Bromodichloromethane	0.5	U
10061-01-5	cis-1,3-Dichloropropene	0.5	U
79-01-6	Trichloroethene	0.8	U
124-48-1	Dibromochloromethane	0.5	U
79-00-5	1,1,2-Trichloroethane	0.8	U
71-43-2	Benzene	0.8	U
10061-02-6	trans-1,3-Dichloropropene	0.8	U
75-25-2	Bromoform	0.5	U
127-18-4	Tetrachloroethene	0.8	U
79-34-5	1,1,2,2-Tetrachloroethane	0.5	U
108-88-3	Toluene	0.8	U
108-90-7	Chlorobenzene	0.5	U
100-41-4	Ethylbenzene	0.5	U
100-42-5	Styrene	0.5	U
78-87-5	1,2-Dichloropropane	0.8	U
74-87-3	Chloromethane	1	U
75-15-0	Carbon disulfide	0.5	U
67-64-1	Acetone	8	
108-10-1	4-Methyl-2-pentanone	2	U
591-78-6	2-hexanone	2	U
78-93-3	2-butanone	3	U
156-60-5	trans-1,2-Dichloroethene	0.8	U
156-59-2	cis-1,2-Dichloroethene	0.7	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

UVB-OUT

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866677

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066677A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	Xylene (total)	0.5	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.

UVB-OUT

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0001V

Matrix: (soil/water) WATER Lab Sample ID: 866677

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN066677A54.D

Level: (low/med) LOW Date Received: 08/28/97

% Moisture: not dec. ________ Date Analyzed: 09/02/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				
21.				
22.				
23.				
24.				
25.				
26.				
27.				
28.				
29.				
30.				

FORM I VOA-TIC

Appendix E

VOCs Analysis of UVB-400 Monitoring Well Samples
12/16/97

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

IW-15

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878726

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: C3R78726B54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ________ Date Analyzed: 12/29/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 500.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	250	U
75-01-4	Vinyl Chloride	340	J
75-00-3	Chloroethane	250	U
75-09-2	Methylene Chloride	490	JB
75-35-4	1,1-Dichloroethene	380	U
75-34-3	1,1-Dichloroethane	250	U
67-66-3	Chloroform	380	U
107-06-2	1,2-Dichloroethane	380	U
71-55-6	1,1,1-Trichloroethane	380	U
56-23-5	Carbon Tetrachloride	500	U
75-27-4	Bromodichloromethane	250	U
10061-01-5	cis-1,3-Dichloropropene	250	U
79-01-6	Trichloroethene	500	
124-48-1	Dibromochloromethane	250	U
79-00-5	1,1,2-Trichloroethane	380	U
71-43-2	Benzene	380	U
10061-02-6	trans-1,3-Dichloropropene	380	U
75-25-2	Bromoform	250	U
127-18-4	Tetrachloroethene	380	U
79-34-5	1,1,2,2-Tetrachloroethane	250	U
108-88-3	Toluene	380	U
108-90-7	Chlorobenzene	250	U
100-41-4	Ethylbenzene	250	U
100-42-5	Styrene	250	U
78-87-5	1,2-Dichloropropane	380	U
74-87-3	Chloromethane	500	U
75-15-0	Carbon disulfide	250	U
67-64-1	Acetone	2500	U
108-10-1	4-Methyl-2-pentanone	1000	U
591-78-6	2-hexanone	1000	U
78-93-3	2-butanone	1500	U
156-60-5	trans-1,2-Dichloroethene	380	U
156-59-2	cis-1,2-Dichloroethene	7900	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

IW-15

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878726

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: C3R78726B54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ________ Date Analyzed: 12/29/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 500.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	Xylene (total)	250	U

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

IW-17

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878720

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN078720B54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ______ Date Analyzed: 12/23/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	0.5	U
75-01-4	Vinyl Chloride	2	
75-00-3	Chloroethane	0.5	U
75-09-2	Methylene Chloride	1	JB
75-35-4	1,1-Dichloroethene	0.8	U
75-34-3	1,1-Dichloroethane	0.5	U
67-66-3	Chloroform	0.8	U
107-06-2	1,2-Dichloroethane	0.8	U
71-55-6	1,1,1-Trichloroethane	0.8	U
56-23-5	Carbon Tetrachloride	1	U
75-27-4	Bromodichloromethane	0.5	U
10061-01-5	cis-1,3-Dichloropropene	0.5	U
79-01-6	Trichloroethene	0.8	U
124-48-1	Dibromochloromethane	0.5	U
79-00-5	1,1,2-Trichloroethane	0.8	U
71-43-2	Benzene	0.8	U
10061-02-6	trans-1,3-Dichloropropene	0.8	U
75-25-2	Bromoform	0.5	U
127-18-4	Tetrachloroethene	0.8	U
79-34-5	1,1,2,2-Tetrachloroethane	0.5	U
108-88-3	Toluene	0.8	U
108-90-7	Chlorobenzene	0.5	U
100-41-4	Ethylbenzene	0.5	U
100-42-5	Styrene	0.5	U
78-87-5	1,2-Dichloropropane	0.8	U
74-87-3	Chloromethane	1	U
75-15-0	Carbon disulfide	0.5	U
67-64-1	Acetone	5	U
108-10-1	4-Methyl-2-pentanone	2	U
591-78-6	2-hexanone	2	U
78-93-3	2-butanone	3	U
156-60-5	trans-1,2-Dichloroethene	2	
156-59-2	cis-1,2-Dichloroethene	6	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

IW-17

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878720

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN078720B54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ______ Date Analyzed: 12/23/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	-------Xylene (total)	0.5	U

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

IW-17MS

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878721

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN078721B54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ________ Date Analyzed: 12/24/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	4	
75-01-4	Vinyl Chloride	6	
75-00-3	Chloroethane	4	
75-09-2	Methylene Chloride	5	JB
75-35-4	1,1-Dichloroethene	5	
75-34-3	1,1-Dichloroethane	5	
67-66-3	Chloroform	5	
107-06-2	1,2-Dichloroethane	6	
71-55-6	1,1,1-Trichloroethane	5	
56-23-5	Carbon Tetrachloride	5	
75-27-4	Bromodichloromethane	6	
10061-01-5	cis-1,3-Dichloropropene	6	
79-01-6	Trichloroethene	5	
124-48-1	Dibromochloromethane	6	
79-00-5	1,1,2-Trichloroethane	7	
71-43-2	Benzene	5	
10061-02-6	trans-1,3-Dichloropropene	6	
75-25-2	Bromoform	6	
127-18-4	Tetrachloroethene	5	
79-34-5	1,1,2,2-Tetrachloroethane	6	
108-88-3	Toluene	6	
108-90-7	Chlorobenzene	5	
100-41-4	Ethylbenzene	5	
100-42-5	Styrene	5	
78-87-5	1,2-Dichloropropane	6	
74-87-3	Chloromethane	3	
75-15-0	Carbon disulfide	5	
67-64-1	Acetone	19	
108-10-1	4-Methyl-2-pentanone	30	
591-78-6	2-hexanone	27	
78-93-3	2-butanone	26	
156-60-5	trans-1,2-Dichloroethene	6	
156-59-2	cis-1,2-Dichloroethene	11	

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

IW-17MS

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878721

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN078721B54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ________ Date Analyzed: 12/24/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	Xylene (total)	16	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

IW-17MSD

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878722

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN078722B54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ________ Date Analyzed: 12/24/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ________(uL) Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	4	
75-01-4	Vinyl Chloride	6	
75-00-3	Chloroethane	4	
75-09-2	Methylene Chloride	5	JB
75-35-4	1,1-Dichloroethene	4	
75-34-3	1,1-Dichloroethane	5	
67-66-3	Chloroform	5	
107-06-2	1,2-Dichloroethane	6	
71-55-6	1,1,1-Trichloroethane	5	
56-23-5	Carbon Tetrachloride	5	
75-27-4	Bromodichloromethane	6	
10061-01-5	cis-1,3-Dichloropropene	6	
79-01-6	Trichloroethene	5	
124-48-1	Dibromochloromethane	6	
79-00-5	1,1,2-Trichloroethane	8	
71-43-2	Benzene	5	
10061-02-6	trans-1,3-Dichloropropene	6	
75-25-2	Bromoform	6	
127-18-4	Tetrachloroethene	6	
79-34-5	1,1,2,2-Tetrachloroethane	6	
108-88-3	Toluene	5	
108-90-7	Chlorobenzene	5	
100-41-4	Ethylbenzene	5	
100-42-5	Styrene	5	
78-87-5	1,2-Dichloropropane	6	
74-87-3	Chloromethane	3	
75-15-0	Carbon disulfide	5	
67-64-1	Acetone	23	
108-10-1	4-Methyl-2-pentanone	33	
591-78-6	2-hexanone	28	
78-93-3	2-butanone	27	
156-60-5	trans-1,2-Dichloroethene	6	
156-59-2	cis-1,2-Dichloroethene	10	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

IW-17MSD

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878722

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN078722B54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ________ Date Analyzed: 12/24/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	-------Xylene (total)	16	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

IW-20

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878724

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN078724B54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ________ Date Analyzed: 12/23/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	0.5	U
75-01-4	Vinyl Chloride	1	U
75-00-3	Chloroethane	0.5	U
75-09-2	Methylene Chloride	15	U
75-35-4	1,1-Dichloroethene	0.8	U
75-34-3	1,1-Dichloroethane	0.5	U
67-66-3	Chloroform	0.8	U
107-06-2	1,2-Dichloroethane	0.8	U
71-55-6	1,1,1-Trichloroethane	0.8	U
56-23-5	Carbon Tetrachloride	1	U
75-27-4	Bromodichloromethane	0.5	U
10061-01-5	cis-1,3-Dichloropropene	0.5	U
79-01-6	Trichloroethene	0.8	U
124-48-1	Dibromochloromethane	0.5	U
79-00-5	1,1,2-Trichloroethane	0.8	U
71-43-2	Benzene	0.8	U
10061-02-6	trans-1,3-Dichloropropene	0.8	U
75-25-2	Bromoform	0.5	U
127-18-4	Tetrachloroethene	0.8	U
79-34-5	1,1,2,2-Tetrachloroethane	0.5	U
108-88-3	Toluene	0.8	U
108-90-7	Chlorobenzene	0.5	U
100-41-4	Ethylbenzene	0.5	U
100-42-5	Styrene	0.5	U
78-87-5	1,2-Dichloropropane	0.8	U
74-87-3	Chloromethane	1	U
75-15-0	Carbon disulfide	0.5	U
67-64-1	Acetone	5	U
108-10-1	4-Methyl-2-pentanone	2	U
591-78-6	2-hexanone	2	U
78-93-3	2-butanone	3	U
156-60-5	trans-1,2-Dichloroethene	0.8	U
156-59-2	cis-1,2-Dichloroethene	5	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

IW-20

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878724

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN078724B54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ________ Date Analyzed: 12/23/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	Xylene (total)	0.5	U

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

UW-17

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878723

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CR078723A54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ________ Date Analyzed: 12/24/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 833.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	420	U
75-01-4	Vinyl Chloride	340	J
75-00-3	Chloroethane	420	U
75-09-2	Methylene Chloride	830	JB
75-35-4	1,1-Dichloroethene	620	U
75-34-3	1,1-Dichloroethane	420	U
67-66-3	Chloroform	620	U
107-06-2	1,2-Dichloroethane	620	U
71-55-6	1,1,1-Trichloroethane	620	U
56-23-5	Carbon Tetrachloride	830	U
75-27-4	Bromodichloromethane	420	U
10061-01-5	cis-1,3-Dichloropropene	420	U
79-01-6	Trichloroethene	260	J
124-48-1	Dibromochloromethane	420	U
79-00-5	1,1,2-Trichloroethane	620	U
71-43-2	Benzene	620	U
10061-02-6	trans-1,3-Dichloropropene	620	U
75-25-2	Bromoform	420	U
127-18-4	Tetrachloroethene	620	U
79-34-5	1,1,2,2-Tetrachloroethane	420	U
108-88-3	Toluene	620	U
108-90-7	Chlorobenzene	420	U
100-41-4	Ethylbenzene	420	U
100-42-5	Styrene	420	U
78-87-5	1,2-Dichloropropane	620	U
74-87-3	Chloromethane	830	U
75-15-0	Carbon disulfide	420	U
67-64-1	Acetone	4200	U
108-10-1	4-Methyl-2-pentanone	1700	U
591-78-6	2-hexanone	1700	U
78-93-3	2-butanone	2500	U
156-60-5	trans-1,2-Dichloroethene	1000	
156-59-2	cis-1,2-Dichloroethene	13000	

FORM I VOA

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

UW-17

Lab Name: COMPUCHEM ENV. CORP.   Contract: 501144

Lab Code: COMPU   Case No.: 33127   SAS No.:   SDG No.: 0002V

Matrix: (soil/water) WATER   Lab Sample ID: 878723

Sample wt/vol: 25.0 (g/mL) ML   Lab File ID: CR078723A54.D

Level: (low/med) LOW   Date Received: 12/19/97

% Moisture: not dec. ______   Date Analyzed: 12/24/97

GC Column:DB624   ID: 0.53 (mm)   Dilution Factor: 833.0

Soil Extract Volume: ______(uL)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	-------Xylene (total)	420	U

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

UW-20

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878725

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN078725B54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ______ Date Analyzed: 12/24/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______ (uL) Soil Aliquot Volume: ______ (uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	0.5	U
75-01-4	Vinyl Chloride	4	
75-00-3	Chloroethane	0.5	U
75-09-2	Methylene Chloride	1	JB
75-35-4	1,1-Dichloroethene	0.8	U
75-34-3	1,1-Dichloroethane	0.5	U
67-66-3	Chloroform	0.8	U
107-06-2	1,2-Dichloroethane	0.8	U
71-55-6	1,1,1-Trichloroethane	0.8	U
56-23-5	Carbon Tetrachloride	1	U
75-27-4	Bromodichloromethane	0.5	U
10061-01-5	cis-1,3-Dichloropropene	0.5	U
79-01-6	Trichloroethene	0.8	U
124-48-1	Dibromochloromethane	0.5	U
79-00-5	1,1,2-Trichloroethane	0.8	U
71-43-2	Benzene	0.8	U
10061-02-6	trans-1,3-Dichloropropene	0.8	U
75-25-2	Bromoform	0.5	U
127-18-4	Tetrachloroethene	0.8	U
79-34-5	1,1,2,2-Tetrachloroethane	0.5	U
108-88-3	Toluene	0.8	U
108-90-7	Chlorobenzene	0.5	U
100-41-4	Ethylbenzene	0.5	U
100-42-5	Styrene	0.5	U
78-87-5	1,2-Dichloropropane	0.8	U
74-87-3	Chloromethane	1	U
75-15-0	Carbon disulfide	0.5	U
67-64-1	Acetone	5	U
108-10-1	4-Methyl-2-pentanone	2	U
591-78-6	2-hexanone	2	U
78-93-3	2-butanone	3	U
156-60-5	trans-1,2-Dichloroethene	0.8	
156-59-2	cis-1,2-Dichloroethene	4	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

UW-20

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878725

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN078725B54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ________ Date Analyzed: 12/24/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: ______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	Xylene (total)	0.5	U

FORM I VOA

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

UW-21

Lab Name: COMPUCHEM ENV. CORP.   Contract: 501144

Lab Code: COMPU   Case No.: 33127   SAS No.:   SDG No.: 0002V

Matrix: (soil/water) WATER   Lab Sample ID: 878727

Sample wt/vol: 25.0 (g/mL) ML   Lab File ID: CN078727B54.D

Level: (low/med) LOW   Date Received: 12/19/97

% Moisture: not dec. ________   Date Analyzed: 12/24/97

GC Column:DB624   ID: 0.53 (mm)   Dilution Factor: 1.0

Soil Extract Volume: ________(uL)   Soil Aliquot Volume: ______(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-83-9	Bromomethane	0.5	U
75-01-4	Vinyl Chloride	1	U
75-00-3	Chloroethane	0.5	U
75-09-2	Methylene Chloride	1	JB
75-35-4	1,1-Dichloroethene	0.8	U
75-34-3	1,1-Dichloroethane	0.5	U
67-66-3	Chloroform	0.8	U
107-06-2	1,2-Dichloroethane	0.8	U
71-55-6	1,1,1-Trichloroethane	0.8	U
56-23-5	Carbon Tetrachloride	1	U
75-27-4	Bromodichloromethane	0.5	U
10061-01-5	cis-1,3-Dichloropropene	0.5	U
79-01-6	Trichloroethene	0.3	J
124-48-1	Dibromochloromethane	0.5	U
79-00-5	1,1,2-Trichloroethane	0.8	U
71-43-2	Benzene	0.8	U
10061-02-6	trans-1,3-Dichloropropene	0.8	U
75-25-2	Bromoform	0.5	U
127-18-4	Tetrachloroethene	0.8	U
79-34-5	1,1,2,2-Tetrachloroethane	0.5	U
108-88-3	Toluene	0.8	U
108-90-7	Chlorobenzene	0.5	U
100-41-4	Ethylbenzene	0.5	U
100-42-5	Styrene	0.5	U
78-87-5	1,2-Dichloropropane	0.8	U
74-87-3	Chloromethane	1	U
75-15-0	Carbon disulfide	0.5	U
67-64-1	Acetone	5	U
108-10-1	4-Methyl-2-pentanone	2	U
591-78-6	2-hexanone	2	U
78-93-3	2-butanone	3	U
156-60-5	trans-1,2-Dichloroethene	0.3	J
156-59-2	cis-1,2-Dichloroethene	3	

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

UW-21

Lab Name: COMPUCHEM ENV. CORP. Contract: 501144

Lab Code: COMPU Case No.: 33127 SAS No.: SDG No.: 0002V

Matrix: (soil/water) WATER Lab Sample ID: 878727

Sample wt/vol: 25.0 (g/mL) ML Lab File ID: CN078727B54.D

Level: (low/med) LOW Date Received: 12/19/97

% Moisture: not dec. ________ Date Analyzed: 12/24/97

GC Column:DB624 ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: _______(uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
1330-20-7	Xylene (total)	0.5	U

page 2 of 2 FORM I VOA

Appendix F: Off-gas VOCs Analytical Reports

KGB T4

CLIENT SAMPLE ID'S:			69KGB-AIR-VOC-1-5	69KGB-AIR-VOC-0-5	69KGB-AIR-VOC-0-5B
ESE FIELD GROUP:			SBPTT14	SBPTT14	SBPTT14
ESE SEQUENCE #:			17	18	19
DATE COLLECTED:			11/14/96	11/14/96	11/26/96
TIME COLLECTED:					
PARAMETERS	UNITS	METHOD			
BENZENE	PPBV	EPA TO-14	<0.50	NRQ	1.11
BENZYL CHLORIDE	PPBV	EPA TO-14	<0.50	NRQ	<0.10
BROMOMETHANE	PPBV	EPA TO-14	<0.50	NRQ	<0.10
CARBON TETRACHLORIDE	PPBV	EPA TO-14	<0.50	NRQ	0.10
CHLOROBENZENE	PPBV	EPA TO-14	<0.50	NRQ	20.6
CHLOROETHANE	PPBV	EPA TO-14	<0.50	NRQ	<0.10
CHLOROFORM	PPBV	EPA TO-14	<0.50	NRQ	<0.10
CHLOROMETHANE	PPBV	EPA TO-14	3.15	NRQ	1.23
1,2-DIBROMOETHANE(EDB)	PPBV	EPA TO-14	<0.50	NRQ	0.25
1,2-DICHLOROBENZENE	PPBV	EPA TO-14	<0.50	NRQ	1.88
1,3,DICHLOROBENZENE	PPBV	EPA TO-14	<0.50	NRQ	10.9
1,4-DICHLOROBENZENE	PPBV	EPA TO-14	<0.50	NRQ	34.3
DICHLORODIFLUOROMETHANE	PPBV	EPA TO-14	<0.50	NRQ	0.61
1,1-DICHLOROETHANE	PPBV	EPA TO-14	<0.50	NRQ	<0.10
1,2-DICHLOROETHANE	PPBV	EPA TO-14	<0.50	NRQ	0.38
1,1-DICHLOROETHYLENE	PPBV	EPA TO-14	<0.50	NRQ	0.34
CIS-1,2-DICHLOROETHENE	PPBV	EPA TO-14	<0.50	NRQ	107
1,2-DICHLOROPROPANE	PPBV	EPA TO-14	<0.50	NRQ	<0.10
CIS-1,3-DICHLOROPROPENE	PPBV	EPA TO-14	<0.50	NRQ	<0.10
TRANS-1,3-DICHLOROPROPENE	PPBV	EPA TO-14	<0.50	NRQ	0.14
ETHYLBENZENE	PPBV	EPA TO-14	<0.50	NRQ	0.17
FREON 113	PPBV	EPA TO-14	<0.50	NRQ	<0.10
FREON 114	PPBV	EPA TO-14	<0.50	NRQ	<0.10
HEXACHLOROBUTADIENE	PPBV	EPA TO-14	<0.50	NRQ	<0.10
M,P-XYLENE	PPBV	EPA TO-14	<0.50	NRQ	0.40
METHYLENE CHLORIDE	PPBV	EPA TO-14	<0.50	NRQ	1.06
O-XYLENE	PPBV	EPA TO-14	<0.50	NRQ	<0.10
STYRENE	PPBV	EPA TO-14	<0.50	NRQ	<0.10
1,1,2,2-TETRACHLOROETHANE	PPBV	EPA TO-14	<0.50	NRQ	421
TETRACHLOROETHENE	PPBV	EPA TO-14	<0.50	NRQ	3.95

NRQ - Analysis not requested.

CLIENT SAMPLE ID'S:			69KGB-AIR-VOC-1-5	69KGB-AIR-VOC-0-5	69KGB-AIR-VOC-0-SB
ESE FIELD GROUP:			SBPTT14	SBPTT14	SBPTT14
ESE SEQUENCE #:			17	18	19
DATE COLLECTED:			11/14/96	11/14/96	11/26/96
TIME COLLECTED:					
PARAMETERS	UNITS	METHOD			
TOLUENE	PPBV	EPA TO-14	<0.50	NRQ	0.76
1,2,4-TRICHLOROBENZENE	PPBV	EPA TO-14	<0.50	NRQ	34.6
1,1,1-TRICHLOROETHANE	PPBV	EPA TO-14	<0.50	NRQ	<0.10
1,1,2-TRICHLOROETHANE	PPBV	EPA TO-14	<0.50	NRQ	2.18
TRICHLOROETHENE	PPBV	EPA TO-14	<0.50	NRQ	52.0
TRICHLOROFLUOROMETHANE	PPBV	EPA TO-14	<0.50	NRQ	0.33
1,2,4-TRIMETHYLBENZENE	PPBV	EPA TO-14	<0.50	NRQ	0.40
1,3,5-TRIMETHYLBENZENE	PPBV	EPA TO-14	<0.50	NRQ	<0.10
VINYL CHLORIDE	PPBV	EPA TO-14	1.38	NRQ	40.2
TRANS-1,2-DICHLOROETHENE	PPBV	EPA TO-14	<0.50	NRQ	48.5

NRQ - Analysis not requested.

UVB

Environmental Science & Engineering 11/12/96 STATUS :FINAL PAGE 1
PROJECT NUMBER 1296002V L201 PROJECT NAME SBP TECHNOLOGIES
FIELD GROUP SBPTT14 LAB COORDINATOR BARBARA RITTER

CLIENT SAMPLE ID'S:			69KGB-AIR-VOC-1-5	69UVB-AIR-VOC-1-5	69KGB-AIR-VOC-0-5	69UVB-AIR-VOC-0-5
ESE FIELD GROUP:			SBPTT14	SBPTT14	SBPTT14	SBPTT14
ESE SEQUENCE #:			13	14	15	16
DATE COLLECTED:			10/22/96	10/23/96	10/22/96	10/23/96
TIME COLLECTED:						
PARAMETERS	UNITS	METHOD				
BENZENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
BENZYL CHLORIDE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
BROMOMETHANE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
CARBON TETRACHLORIDE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
CHLOROBENZENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
CHLOROETHANE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
CHLOROFORM	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
CHLOROMETHANE	PPBV	EPA TO-14	NRQ	3.68	NRQ	3.25
'BROMOETHANE (EDB)	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
CHLOROBENZENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
,,DICHLOROBENZENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
1,4-DICHLOROBENZENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
DICHLORODIFLUOROMETHANE	PPBV	EPA TO-14	NRQ	0.93	NRQ	0.57
1,1-DICHLOROETHANE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
1,2-DICHLOROETHANE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
1,1-DICHLOROETHYLENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
CIS-1,2-DICHLOROETHENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
1,2-DICHLOROPROPANE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
CIS-1,3-DICHLOROPROPENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
TRANS-1,3-DICHLOROPROPENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
ETHYLBENZENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
FREON 113	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
FREON 114	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
HEXACHLOROBUTADIENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
M.P-XYLENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
LENE CHLORIDE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
.ENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
STYRENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
1,1,2,2-TETRACHLOROETHANE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
TETRACHLOROETHENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50

CLIENT SAMPLE ID'S:			69KGB-AIR-VOC-1-5	69UVB-AIR-VOC-1-5	69KGB-AIR-VOC-0-5	69UVB-AIR-VOC-0-5
ESE FIELD GROUP:			SBPTT14	SBPTT14	SBPTT14	SBPTT14
ESE SEQUENCE #:			13	14	15	16
DATE COLLECTED:			10/22/96	10/23/96	10/22/96	10/23/96
TIME COLLECTED:						
PARAMETERS	UNITS	METHOD				
TOLUENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
1,2,4-TRICHLOROBENZENE	PPBV	EPA TO-14	NRQ	5.80	NRQ	<0.50
1,1,1-TRICHLOROETHANE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
1,1,2-TRICHLOROETHANE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
TRICHLOROETHENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
TRICHLOROFLUOROMETHANE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
1,2,4-TRIMETHYLBENZENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
1,3,5-TRIMETHYLBENZENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
VINYL CHLORIDE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.50
TRANS-1,2-DICHLOROETHENE	PPBV	EPA TO-14	NRQ	<0.50	NRQ	<0.5

Environmental Science & Engineering 06/20/96 STATUS :FINAL PAGE 1
PROJECT NUMBER 1296002V L201 PROJECT NAME SBP TECHNOLOGIES
FIELD GROUP SBPTT14 LAB COORDINATOR BARBARA RITTER

UVB } M2
KGB }

			IN	IN	EFF	EFF
CLIENT SAMPLE ID'S:			69UVB-1-2	69KGB-1-2	69UVB-0-2	69KGB-0-2
ESE FIELD GROUP:			SBPTT14	SBPTT14	SBPTT14	SBPTT14
ESE SEQUENCE #:			5	6	7	8
DATE COLLECTED:			05/23/96	05/23/96	05/23/96	05/23/96
TIME COLLECTED:						
PARAMETERS	UNITS	METHOD				
BENZENE	PPBV	EPA TO-14	0.10	0.27	0.18	0.19
BENZYL CHLORIDE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
BROMOMETHANE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
CARBON TETRACHLORIDE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	0.10
CHLOROBENZENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
CHLOROETHANE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
CHLOROFORM	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
CHLOROMETHANE	PPBV	EPA TO-14	1.16	1.29	0.84	0.87
1,2-DIBROMOETHANE (EDB)	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
1,2-DICHLOROBENZENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
1,3,DICHLOROBENZENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
1,4-DICHLOROBENZENE	PPBV	EPA TO-14	0.13	<0.10	<0.10	0.36
DICHLORODIFLUOROMETHANE	PPBV	EPA TO-14	0.57	0.51	0.50	0.50
1,1-DICHLOROETHANE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
1,2-DICHLOROETHANE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
1,1-DICHLOROETHYLENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
CIS-1,2-DICHLOROETHENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	0.50
1,2-DICHLOROPROPANE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
CIS-1,3-DICHLOROPROPENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
TRANS-1,3-DICHLOROPROPENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
ETHYLBENZENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
FREON 113	PPBV	EPA TO-14	0.17	7.21	0.15	<0.10
FREON 114	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
HEXACHLOROBUTADIENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
M,P-XYLENE	PPBV	EPA TO-14	0.23	0.22	<0.10	0.17
METHYLENE CHLORIDE	PPBV	EPA TO-14	2.05	1.47	0.37	0.54
O-XYLENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
STYRENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
1,1,2,2-TETRACHLOROETHANE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	0.50
TETRACHLOROETHENE	PPBV	EPA TO-14	3.22	<0.10	0.34	<0.10

PROJECT NUMBER 1296002V L201 PROJECT NAME SBP TECHNOLOGIES
FIELD GROUP SBPTT14 LAB COORDINATOR BARBARA RITTER

CLIENT SAMPLE ID'S:			69UVB-1-2	69KGB-1-2	69UVB-0-2	69KGB-0-2
ESE FIELD GROUP:			SBPTT14	SBPTT14	SBPTT14	SBPTT14
ESE SEQUENCE #:			5	6	7	8
DATE COLLECTED:			05/23/96	05/23/96	05/23/96	05/23/96
TIME COLLECTED:						
PARAMETERS	UNITS	METHOD				
TOLUENE	PPBV	EPA TO-14	3.65	1.35	0.55	0.25
1,2,4-TRICHLOROBENZENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	0.45
1,1,1-TRICHLOROETHANE	PPBV	EPA TO-14	<0.10	6.87	0.18	0.11
1,1,2-TRICHLOROETHANE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	0.17
TRICHLOROETHENE	PPBV	EPA TO-14	0.58	0.17	<0.10	0.51
TRICHLOROFLUOROMETHANE	PPBV	EPA TO-14	0.12	0.27	0.22	0.25
1,2,4-TRIMETHYLBENZENE	PPBV	EPA TO-14	0.14	0.14	<0.10	<0.10
1,3,5-TRIMETHYLBENZENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	<0.10
VINYL CHLORIDE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	0.14
TRANS-1,2-DICHLOROETHENE	PPBV	EPA TO-14	<0.10	<0.10	<0.10	0.51

Environmental Science & Engineering, Inc.
A CILCORP Company

KGB Mo

FACSIMILE

DATE: 5/6/96 TIME:

TO: FAYAZ LAKHWALA SBP TECHNOLOGIES

FROM: Barbara Ritter 352-333-1624

FAX NO: 904-934-2420 JOB #:

SUBJECT: Prelim. Data Summary

NUMBER OF PAGES (including this cover sheet) 9

ADDITIONAL MESSAGE:

Fayaz -

Hard copy deliverables will follow

If you experience any problems receiving this fax, please call (352) 332-3318 Extension 0.

PLEASE NOTE THAT OUR FAX NUMBER IS NOW (352) 333-6622

Main Fax for Gainesville

Environmental Science & Engineering 05/06/96 STATUS :FINAL PAGE 1
PROJECT NUMBER 1296002V L201 PROJECT NAME SBP TECHNOLOGIES
FIELD GROUP SBPTT14 LAB COORDINATOR BARBARA RITTER

CLIENT SAMPLE ID'S:			EFFLUENT SAMPLE PORT	
ESE FIELD GROUP:			SBPTT14	SBPTT14
ESE SEQUENCE #:			3	4
DATE COLLECTED:			04/05/96	04/05/96
TIME COLLECTED:				
PARAMETERS	UNITS	METHOD		
BENZENE	PPBV	EPA TO-14	0.16	0.29
CARBON TETRACHLORIDE	PPBV	EPA TO-14	--	0.13
CHLOROMETHANE	PPBV	EPA TO-14	1.09	1.05
DICHLORODIFLUOROMETHANE	PPBV	EPA TO-14	0.47	0.48
M,P-XYLENE	PPBV	EPA TO-14	0.27	--
METHYLENE CHLORIDE	PPBV	EPA TO-14	0.46	0.55
O-XYLENE	PPBV	EPA TO-14	0.11	--
TETRACHLOROETHENE	PPBV	EPA TO-14	--	0.16
TOLUENE	PPBV	EPA TO-14	0.61	0.25
1,1,1-TRICHLOROETHANE	PPBV	EPA TO-14	--	0.11
TRICHLOROFLUOROMETHANE	PPBV	EPA TO-14	--	0.32
VINYL CHLORIDE	PPBV	EPA TO-14	0.19	--

Environmental Science & Engineering   05/06/96   STATUS :FINAL PAGE 1
PROJECT NUMBER 1296002V L201   PROJECT NAME   SBP TECHNOLOGIES
FIELD GROUP   SBPTT14   LAB COORDINATOR BARBARA RITTER

KGB Mo

CLIENT SAMPLE ID'S:			EFFLUENT	SAMPLE PORT
ESE FIELD GROUP:			SBPTT14	SBPTT14
ESE SEQUENCE #:			3	4
DATE COLLECTED:			04/05/96	04/05/96
TIME COLLECTED:				
PARAMETERS	UNITS	METHOD		
BENZENE	PPBV	EPA TO-14	0.16	0.29
BENZYL CHLORIDE	PPBV	EPA TO-14	<0.10	<0.10
BROMOMETHANE	PPBV	EPA TO-14	<0.10	<0.10
CARBON TETRACHLORIDE	PPBV	EPA TO-14	<0.10	0.13
CHLOROBENZENE	PPBV	EPA TO-14	<0.10	<0.10
CHLOROETHANE	PPBV	EPA TO-14	<0.10	<0.10
CHLOROFORM	PPBV	EPA TO-14	<0.10	<0.10
CHLOROMETHANE	PPBV	EPA TO-14	1.09	1.05
1,2-DIBROMOETHANE(EDB)	PPBV	EPA TO-14	<0.10	<0.10
1,2-DICHLOROBENZENE	PPBV	EPA TO-14	<0.10	<0.10
1,3,DICHLOROBENZENE	PPBV	EPA TO-14	<0.10	<0.10
1,4-DICHLOROBENZENE	PPBV	EPA TO-14	<0.10	<0.10
DICHLORODIFLUOROMETHANE	PPBV	EPA TO-14	0.47	0.48
1,1-DICHLOROETHANE	PPBV	EPA TO-14	<0.10	<0.10
1,2-DICHLOROETHANE	PPBV	EPA TO-14	<0.10	<0.10
1,1-DICHLOROETHYLENE	PPBV	EPA TO-14	<0.10	<0.10
CIS-1,2-DICHLOROETHENE	PPBV	EPA TO-14	<0.10	<0.10
1,2-DICHLOROPROPANE	PPBV	EPA TO-14	<0.10	<0.10
CIS-1,3-DICHLOROPROPENE	PPBV	EPA TO-14	<0.10	<0.10
TRANS-1,3-DICHLOROPROPENE	PPBV	EPA TO-14	<0.10	<0.10
ETHYLBENZENE	PPBV	EPA TO-14	<0.10	<0.10
FREON 113	PPBV	EPA TO-14	<0.10	<0.10
FREON 114	PPBV	EPA TO-14	<0.10	<0.10
HEXACHLOROBUTADIENE	PPBV	EPA TO-14	<0.10	<0.10
M,P-XYLENE	PPBV	EPA TO-14	0.27	<0.10
METHYLENE CHLORIDE	PPBV	EPA TO-14	0.46	0.55
O-XYLENE	PPBV	EPA TO-14	0.11	<0.10
STYRENE	PPBV	EPA TO-14	<0.10	<0.10
1,1,2,2-TETRACHLOROETHANE	PPBV	EPA TO-14	<0.10	<0.10
TETRACHLOROETHENE	PPBV	EPA TO-14	<0.10	0.16

KGB Mo

			EFFLUENT SAMPLE PORT	
CLIENT SAMPLE ID'S:				
ESE FIELD GROUP:			SBPTT14	SBPTT14
ESE SEQUENCE #:			3	4
DATE COLLECTED:			04/05/96	04/05/96
TIME COLLECTED:				
PARAMETERS	UNITS	METHOD		
TOLUENE	PPBV	EPA TO-14	0.61	0.25
1,2,4-TRICHLOROBENZENE	PPBV	EPA TO-14	<0.10	<0.10
1,1,1-TRICHLOROETHANE	PPBV	EPA TO-14	<0.10	0.11
1,1,2-TRICHLOROETHANE	PPBV	EPA TO-14	<0.10	<0.10
TRICHLOROETHENE	PPBV	EPA TO-14	<0.10	<0.10
TRICHLOROFLUOROMETHANE	PPBV	EPA TO-14	<0.10	0.32
1,2,4-TRIMETHYLBENZENE	PPBV	EPA TO-14	<0.10	<0.10
1,3,5-TRIMETHYLBENZENE	PPBV	EPA TO-14	<0.10	<0.10
VINYL CHLORIDE	PPBV	EPA TO-14	0.19	<0.10
TRANS-1,2-DICHLOROETHENE	PPBV	EPA TO-14	<0.10	<0.10

Batch Narrative - G69986 Analysis: EPA TO-14

Updated by 3395, 3395, 3395, 3577

GENERAL COMMENTS:

BATCH NARRATIVE

Batch G69986
Client/Samples: SBP TECH
Analyst: NORMAN STAUBLY/1962
Date: 04/10/96

Sample Number	Client ID	Canister Number	Date Collected	Date Received	Date Analyzed	Intial Pressure
SBPTT14*3		GL104	04/05/96	04/09/96	04/10/96	-13.6"Hg
SBPTT14*4		GL026	04/05/96	04/09/96	04/10/96	-14.3"Hg

All canisters were diluted 2x with UPC helium upon receipt by ESE. Further dilutions were made in clean canisters using UPC helium.

EXPLANATION OF QC FAILURES: Reference is within acceptance criteria which allows two compounds within 40% recovery. Method blank shows hits on some compounds due to low volume in canister.

PROBLEM:

RF not within acceptance criteria:
34010*TO14-G

EXPLANATION:

See batch narrative above.

ESE BATCH : G69986
ANALYSIS : EPA TO-14

METHOD BLANK CORRECTION METHOD : NONE

SAMPLE CODE	CLIENT ID	DATE ANALYZED	TIME ANALYZED
SBPTT14*3	EFFLUENT	04/10/96	06:06PM
SBPTT14*4	SAMPLE PORT	04/10/96	07:35PM

Method Blank Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	FOUND	DET LMT
04/10/96	MB*041096*1	34668*T014-G	DICHLORODIFLUOROMETHANE	PPBV	0.08	0.05
04/10/96	MB*041096*1	34418*T014-G	CHLOROMETHANE	PPBV	0.34	0.05
04/10/96	MB*041096*1	96776*T014-G	FREON 114	PPBV	0.004	0.05
04/10/96	MB*041096*1	39175*T014-G	VINYL CHLORIDE	PPBV	0.003	0.05
04/10/96	MB*041096*1	34413*T014-G	BROMOMETHANE	PPBV	0.01	0.05
04/10/96	MB*041096*1	34311*T014-G	CHLOROETHANE	PPBV	0.007	0.05
04/10/96	MB*041096*1	34488*T014-G	TRICHLOROFLUOROMETHANE	PPBV	0.06	0.05
04/10/96	MB*041096*1	34501*T014-G	1,1-DICHLOROETHYLENE	PPBV	0.002	0.05
04/10/96	MB*041096*1	34423*T014-G	METHYLENE CHLORIDE	PPBV	3.96	0.05
04/10/96	MB*041096*1	77647*T014-G	FREON 113	PPBV	0.29	0.05
04/10/96	MB*041096*1	95034*T014-G	TRANS-1,2-DICHLOROETHENE	PPBV	ND	0.05
04/10/96	MB*041096*1	34496*T014-G	1,1-DICHLOROETHANE	PPBV	ND	0.05
04/10/96	MB*041096*1	77093*T014-G	CIS-1,2-DICHLOROETHENE	PPBV	0.003	0.05
04/10/96	MB*041096*1	32106*T014-G	CHLOROFORM	PPBV	1.24	0.05
04/10/96	MB*041096*1	34531*T014-G	1,2-DICHLOROETHANE	PPBV	ND	0.05
04/10/96	MB*041096*1	34506*T014-G	1,1,1-TRICHLOROETHANE	PPBV	0.05	0.05
04/10/96	MB*041096*1	34030*T014-G	BENZENE	PPBV	0.06	0.05
04/10/96	MB*041096*1	32102*T014-G	CARBON TETRACHLORIDE	PPBV	0.02	0.05
04/10/96	MB*041096*1	34541*T014-G	1,2-DICHLOROPROPANE	PPBV	ND	0.05
04/10/96	MB*041096*1	39180*T014-G	TRICHLOROETHENE	PPBV	0.008	0.05
04/10/96	MB*041096*1	34704*T014-G	CIS-1,3-DICHLOROPROPENE	PPBV	ND	0.05
04/10/96	MB*041096*1	34699*T014-G	TRANS-1,3-DICHLOROPROPENE	PPBV	ND	0.05
04/10/96	MB*041096*1	34511*T014-G	1,1,2-TRICHLOROETHANE	PPBV	ND	0.05
04/10/96	MB*041096*1	34010*T014-G	TOLUENE	PPBV	0.17	0.05
04/10/96	MB*041096*1	77651*T014-G	1,2-DIBROMOETHANE(EDB)	PPBV	0.003	0.05
04/10/96	MB*041096*1	34475*T014-G	TETRACHLOROETHENE	PPBV	0.36	0.05
/10/96	MB*041096*1	34301*T014-G	CHLOROBENZENE	PPBV	0.003	0.05
10/96	MB*041096*1	34371*T014-G	ETHYLBENZENE	PPBV	0.02	0.05
,10/96	MB*041096*1	97234*T014-G	M,P-XYLENE	PPBV	0.08	0.05
04/10/96	MB*041096*1	77128*T014-G	STYRENE	PPBV	0.02	0.05
04/10/96	MB*041096*1	34516*T014-G	1,1,2,2-TETRACHLOROETHANE	PPBV	0.002	0.05
04/10/96	MB*041096*1	97235*T014-G	O-XYLENE	PPBV	0.04	0.05
04/10/96	MB*041096*1	77226*T014-G	1,3,5-TRIMETHYLBENZENE	PPBV	0.01	0.05
04/10/96	MB*041096*1	77222*T014-G	1,2,4-TRIMETHYLBENZENE	PPBV	0.03	0.05
04/10/96	MB*041096*1	97754*T014-G	BENZYL CHLORIDE	PPBV	ND	0.05
04/10/96	MB*041096*1	34566*T014-G	1,3,DICHLOROBENZENE	PPBV	ND	0.05
04/10/96	MB*041096*1	34571*T014-G	1,4-DICHLOROBENZENE	PPBV	0.01	0.05
04/10/96	MB*041096*1	34536*T014-G	1,2-DICHLOROBENZENE	PPBV	0.003	0.05
04/10/96	MB*041096*1	34551*T014-G	1,2,4-TRICHLOROBENZENE	PPBV	ND	0.05
04/10/96	MB*041096*1	34391*T014-G	HEXACHLOROBUTADIENE	PPBV	ND	0.05

Reference Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	KNOWN	FOUND	%RECY
04/10/96	RF*041096*1	39175*T014-G	VINYL CHLORIDE	PPBV	0.53	0.44	83.0
04/10/96	RF*041096*1	34488*T014-G	TRICHLOROFLUOROMETHANE	PPBV	0.53	0.50	94.3
04/10/96	RF*041096*1	34423*T014-G	METHYLENE CHLORIDE	PPBV	0.53	0.55	104
04/10/96	RF*041096*1	32106*T014-G	CHLOROFORM	PPBV	0.52	0.52	100.0
04/10/96	RF*041096*1	34531*T014-G	1,2-DICHLOROETHANE	PPBV	0.52	0.52	100.0
04/10/96	RF*041096*1	34506*T014-G	1,1,1-TRICHLOROETHANE	PPBV	0.51	0.50	98.0
04/10/96	RF*041096*1	34030*T014-G	BENZENE	PPBV	0.52	0.49	94.2
04/10/96	RF*041096*1	32102*T014-G	CARBON TETRACHLORIDE	PPBV	0.52	0.50	96.2
04/10/96	RF*041096*1	34541*T014-G	1,2-DICHLOROPROPANE	PPBV	0.52	0.50	96.2
04/10/96	RF*041096*1	39180*T014-G	TRICHLOROETHENE	PPBV	0.52	0.52	100.0
04/10/96	RF*041096*1	34010*T014-G	TOLUENE	PPBV	0.51	0.65	127
04/10/96	RF*041096*1	34475*T014-G	TETRACHLOROETHENE	PPBV	0.52	0.56	108
04/10/96	RF*041096*1	34301*T014-G	CHLOROBENZENE	PPBV	0.52	0.60	115
04/10/96	RF*041096*1	34371*T014-G	ETHYLBENZENE	PPBV	0.53	0.51	96.2
04/10/96	RF*041096*1	97235*T014-G	O-XYLENE	PPBV	0.55	0.65	118

E[illegible]ronmental Science & Engineering, Inc. 02-19-96 *** FIELD LOGSHEET *** FIELD GROUP: **SBPTT14**
PROJECT NUMBER 1296002V 0201 FG NAME: SBP TECHNOLOGIES LAB COORD. BARBARA RITTER

ESE #	SITE/STA	HAZ?	FRACTIONS (CIRCLE)	DATE	TIME	PARAMETER LIST	
*1			AC			SBPTT14	
*2			AC			SBPTT14	
*3	Effluent		AC	4/5/96		SBPTT14	GL104
*4	Sample Port		AC	↓		SBPTT14	GL026
*5			AC			SBPTT14	
*6			AC			SBPTT14	
*7			AC			SBPTT14	
*8			AC			SBPTT14	
*9			AC			SBPTT14	
*10			AC			SBPTT14	

NOTE -CHANGE OR ENTER SITE ID AS NECESSARY; UP TO 9 ALPHANUMERIC CHARACTERS MAY BE USED
-CIRCLE FRACTIONS COLLECTED. ENTER DATE, TIME, FIELD DATA (IF REQUIRED), HAZARD CODE AND NOTES
-HAZARD CODES: I-IGNITABLE C-CORROSIVE R-REACTIVE T-TOXIC WASTE H-OTHER ACUTE HAZARD; IDENTIFY SPECIFICS IF KNOWN
-PLEASE RETURN COMPLETED LOGSHEETS WITH SAMPLES TO Environmental Science & Engineering, Inc.

RELINQUISHED BY: (NAME/ORGANIZATION/DATE/TIME)	VIA:	REC'D BY (NAME/ORGANIZATION/DATE/TIME)
1		[illegible] ESE 4/8/96 1040
2		
3		

SAMPLER: Shipped on Ice? Yes/No; I anticipate shipping ____ (#) more samples on __/__
SAMPLE CUSTODIAN: Custody Seals Used? Yes/No; If Yes, Seals Intact? Yes/No Interior Temp? N/A Deg C
Preservatives Audited? Yes/No Any Problems? Yes/No; If Yes, describe:

CANISTER SHIPPING AND SAMPLING DOCUMENT

Environmental Science & Engineering, Inc. (ESE)
14220 Newberry Road
Gainesville, FL 32607

Site Location: Ø69-KGB-Sample Port

Canister Serial No: 6L026

Shipping Address: ROY F. WESTON
1000 PERIMETER PARK DRIVE
SUITE E
MORRISVILLE NC 27560
ATTN: DAVID BREWSTER
919-462-6941

ESE Contact: BARBARA RITTER (904) 333-1624

ESE Project No: 1296002 V 0201

Shipping Date: 4/3/96

Laboratory				Field				Laboratory		
ESE Sample No.	Date Cleaned	Gauge (in Hg) (psi)	Initials	Date Sampled	Gauge (in.Hg) (psi) Initial	Final	Initials	Date Received	Gauge (in.Hg) (psi)	Initials
SBPTT14 #4	4/1/96	-30	NTS	4/5/96	-3Ø		LMC			

Notes: CAUTION! FLOW CONTROLLERS SET FOR ~~8 HR~~ 1 HR SAMPLING TO -10 psi. PLEASE MONITOR TIME AND PRESSURE TO AVOID EXCEEDING THESE PARAMETERS. PRESSURES MORE POSITIVE THAN -10psi MAY COMPROMISE DATA QUALITY.

This canister is certified clean. It has been batch cleaned using an Entech 3000 Canister Cleaning System. Alternating evacuations and pressurizations occur over a 4-hour period while the canisters are heated to 100°C. One canister per batch of eight is analyzed for cleanliness (no target analyte greater than its reporting limit) by GC/MS and a record of the analysis is maintained at ESE.

CANISTER SHIPPING AND SAMPLING DOCUMENT

Environmental Science & Engineering, Inc. (ESE)
14220 Newberry Road
Gainesville, FL 32607

Site Location: Ø69-KGB-GAC1 Efflment

Canister Serial No: GL104

Shipping Address: ROY F. WESTON
1000 PERIMETER PARK DRIVE
SUITE E
MORRISVILLE NC 27560
ATTN: DAVID BREWSTER
919-462-6941

ESE Contact: BARBARA RITTER (904) 333-1624

ESE Project No: 1296002V 0201

Shipping Date: 4/3/96

Laboratory				Field				Laboratory		
ESE Sample No.	Date Cleaned	Gauge (in.Hg) (psi)	Initials	Date Sampled	Gauge (in.Hg) (psi) Initial	Final	Initials	Date Received	Gauge (in.Hg) (psi)	Initials
FBITT14 *3	4/1/96	-30	NJS.	4/5/96	-30	-12.5	JMC			

Notes: CAUTION! FLOW CONTROLLERS SET FOR ~~8 HR~~ 1 HR SAMPLING TO -10 psi. PLEASE MONITOR TIME AND PRESSURE TO AVOID EXCEEDING THESE PARAMETERS. PRESSURES MORE POSITIVE THAN -10 psi MAY COMPROMISE DATA QUALITY.

This canister is certified clean. It has been batch cleaned using an Entech 3000 Canister Cleaning System. Alternating evacuations and pressurizations occur over a 4-hour period while the canisters are heated to 100°C. One canister per batch of eight is analyzed for cleanliness (no target analyte greater than its reporting limit) by GC/MS and a record of the analysis is maintained at ESE.

Environmental Science & Engineering, Inc.

A CILCORP Company

UVB
MO

FACSIMILE

DATE: 4/4/96 TIME:

TO: Fayg3 ~~[illegible]~~ SBP Technologies FROM: Barbara Rotter

FAX NO: 904-934-2420 JOB #:

SUBJECT: Preliminary Data Summary

NUMBER OF PAGES (including this cover sheet) 6

ADDITIONAL MESSAGE:

Fayg3 –

Hard copy deliverable will follow.

If you experience any problems receiving this fax, please call (352) 332-3318 Extension 0.

PLEASE NOTE THAT OUR FAX NUMBER IS NOW (352) 333-6622

Main Fax for Gainesville

Environmental Science & Engineering 04/04/96 STATUS :FINAL PAGE 1
PROJECT NUMBER 1296002V 0201 PROJECT NAME SBP TECHNOLOGIES
FIELD GROUP SBPTT14 LAB COORDINATOR BARBARA RITTER

REPORT OF HITS ONLY

CLIENT SAMPLE ID'S:			GL026 69-INLET	GL158 69-OUTLET	FOOTNOTE
ESE FIELD GROUP:			SBPTT14	SBPTT14	
ESE SEQUENCE #:			1	2	
DATE COLLECTED:			03/14/96	03/14/96	
TIME COLLECTED:			12:00	12:00	
PARAMETERS	UNITS	METHOD			
BENZENE	PPBV	EPA TO-14	0.27	--	
CHLOROFORM	PPBV	EPA TO-14	0.28	--	
CHLOROMETHANE	PPBV	EPA TO-14	--	1.31	
1,2-DIBROMOETHANE(EDB)	PPBV	EPA TO-14	0.23	--	
DICHLORODIFLUOROMETHANE	PPBV	EPA TO-14	0.69	0.64	
CIS-1,2-DICHLOROETHENE	PPBV	EPA TO-14	0.62	--	
FREON 113	PPBV	EPA TO-14	0.46	--	
M,P-XYLENE	PPBV	EPA TO-14	0.71	--	*
O-XYLENE	PPBV	EPA TO-14	0.31	--	*
METHYLENE CHLORIDE	PPBV	EPA TO-14	1.45	0.87	
TETRACHLOROETHENE	PPBV	EPA TO-14	0.28	--	
TOLUENE	PPBV	EPA TO-14	0.80	0.30	*
TRICHLOROETHENE	PPBV	EPA TO-14	0.26	--	
TRICHLOROFLUOROMETHANE	PPBV	EPA TO-14	0.38	--	
1,2,4-TRIMETHYLBENZENE	PPBV	EPA TO-14	--	0.20	

FOOTNOTE:

RECOVERIES FOR XYLENES AND TOLUENE IN THE REFERENCE WERE HIGH DUE TO THE PRESENCE OF THESE COMPOUNDS IN THE METHOD BLANK. REPORTED VALUES SHOULD BE EVALUATED WITH THIS IN MIND.

Environmental Science & Engineering 04/04/96 STATUS :FINAL PAGE 1
PROJECT NUMBER 1296002V 0201 PROJECT NAME SBP TECHNOLOGIES
FIELD GROUP SBPTT14 LAB COORDINATOR BARBARA RITTER

OVB Mo

CLIENT SAMPLE ID'S:			GL026 69-INLET	GL158 69-OUTLET	FOOTNOTE
ESE FIELD GROUP:			SBPTT14	SBPTT14	
ESE SEQUENCE #:			1	2	
DATE COLLECTED:			03/14/96	03/14/96	
TIME COLLECTED:			12:00	12:00	
PARAMETERS	UNITS	METHOD			
BENZENE	PPBV	EPA TO-14	0.27	<0.20	
BENZYL CHLORIDE	PPBV	EPA TO-14	<0.20	<0.20	
BROMOMETHANE	PPBV	EPA TO-14	<0.20	<0.20	
CARBON TETRACHLORIDE	PPBV	EPA TO-14	<0.20	<0.20	
CHLOROBENZENE	PPBV	EPA TO-14	<0.20	<0.20	
CHLOROETHANE	PPBV	EPA TO-14	<0.20	<0.20	
CHLOROFORM	PPBV	EPA TO-14	0.28	<0.20	
CHLOROMETHANE	PPBV	EPA TO-14	<0.20	1.31	
1,2-DIBROMOETHANE(EDB)	PPBV	EPA TO-14	0.23	<0.20	
1,2-DICHLOROBENZENE	PPBV	EPA TO-14	<0.20	<0.20	
1,3,DICHLOROBENZENE	PPBV	EPA TO-14	<0.20	<0.20	
1,4-DICHLOROBENZENE	PPBV	EPA TO-14	<0.20	<0.20	
DICHLORODIFLUOROMETHANE	PPBV	EPA TO-14	0.69	0.64	
1,1-DICHLOROETHANE	PPBV	EPA TO-14	<0.20	<0.20	
1,2-DICHLOROETHANE	PPBV	EPA TO-14	<0.20	<0.20	
1,1-DICHLOROETHYLENE	PPBV	EPA TO-14	<0.20	<0.20	
CIS-1,2-DICHLOROETHENE	PPBV	EPA TO-14	0.62	<0.20	
1,2-DICHLOROPROPANE	PPBV	EPA TO-14	<0.20	<0.20	
CIS-1,3-DICHLOROPROPENE	PPBV	EPA TO-14	<0.20	<0.20	
TRANS-1,3-DICHLOROPROPENE	PPBV	EPA TO-14	<0.20	<0.20	
ETHYLBENZENE	PPBV	EPA TO-14	<0.20	<0.20	
FREON 113	PPBV	EPA TO-14	0.46	<0.20	
FREON 114	PPBV	EPA TO-14	<0.20	<0.20	
HEXACHLOROBUTADIENE	PPBV	EPA TO-14	<0.20	<0.20	
M,P-XYLENE	PPBV	EPA TO-14	0.71	<0.20	*
O-XYLENE	PPBV	EPA TO-14	0.31	<0.20	*
METHYLENE CHLORIDE	PPBV	EPA TO-14	1.45	0.87	
STYRENE	PPBV	EPA TO-14	<0.20	<0.20	
1,1,2,2-TETRACHLOROETHANE	PPBV	EPA TO-14	<0.20	<0.20	
TETRACHLOROETHENE	PPBV	EPA TO-14	0.28	<0.20	

Environmental Science & Engineering 04/04/96 STATUS :FINAL PAGE 2
PROJECT NUMBER 1296002V 0201 PROJECT NAME SBP TECHNOLOGIES
FIELD GROUP SBPTT14 LAB COORDINATOR BARBARA RITTER

UVB Mo

CLIENT SAMPLE ID'S:			GL026 69-INLET	GL158 69-OUTLET	FOOTNOTE
ESE FIELD GROUP:			SBPTT14	SBPTT14	
ESE SEQUENCE #:			1	2	
DATE COLLECTED:			03/14/96	03/14/96	
TIME COLLECTED:			12:00	12:00	
PARAMETERS	UNITS	METHOD			
TOLUENE	PPBV	EPA TO-14	0.80	0.30	*
1,2,4-TRICHLOROBENZENE	PPBV	EPA TO-14	<0.20	<0.20	
1,1,1-TRICHLOROETHANE	PPBV	EPA TO-14	<0.20	<0.20	
1,1,2-TRICHLOROETHANE	PPBV	EPA TO-14	<0.20	<0.20	
TRICHLOROETHENE	PPBV	EPA TO-14	0.26	<0.20	
TRICHLOROFLUOROMETHANE	PPBV	EPA TO-14	0.38	<0.20	
1,2,4-TRIMETHYLBENZENE	PPBV	EPA TO-14	<0.20	0.20	
1,3,5-TRIMETHYLBENZENE	PPBV	EPA TO-14	<0.20	<0.20	
VINYL CHLORIDE	PPBV	EPA TO-14	<0.20	<0.20	
TRANS-1,2-DICHLOROETHENE	PPBV	EPA TO-14	<0.20	<0.20	

FOOTNOTE:

RECOVERIES FOR XYLENES AND TOLUENE IN THE REFERENCE WERE HIGH DUE TO THE PRESENCE OF THESE COMPOUNDS IN THE METHOD BLANK. REPORTED VALUES SHOULD BE EVALUATED WITH THIS IN MIND.

ESE BATCH : G69433
ANALYSIS : EPA TO-14

METHOD BLANK CORRECTION METHOD : NONE

MPLE #	CLIENT ID	
PTT14*1	GL026	SITE 69-INLET
SBPTT14*2	GL158	SITE 69-OUTLET

Method Blank Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	FOUND	DET LMT
03/18/96	MB*031896*1	34668*TO14-G	DICHLORODIFLUOROMETHANE	PPBV	ND	0.10
03/18/96	MB*031896*1	34418*TO14-G	CHLOROMETHANE	PPBV	ND	0.10
03/18/96	MB*031896*1	96776*TO14-G	FREON 114	PPBV	ND	0.10
03/18/96	MB*031896*1	39175*TO14-G	VINYL CHLORIDE	PPBV	ND	0.10
03/18/96	MB*031896*1	34413*TO14-G	BROMOMETHANE	PPBV	ND	0.10
03/18/96	MB*031896*1	34311*TO14-G	CHLOROETHANE	PPBV	ND	0.10
03/18/96	MB*031896*1	34488*TO14-G	TRICHLOROFLUOROMETHANE	PPBV	ND	0.10
03/18/96	MB*031896*1	34501*TO14-G	1,1-DICHLOROETHYLENE	PPBV	ND	0.10
03/18/96	MB*031896*1	34423*TO14-G	METHYLENE CHLORIDE	PPBV	0.03	0.10
03/18/96	MB*031896*1	77647*TO14-G	FREON 113	PPBV	0.05	0.10
03/18/96	MB*031896*1	95034*TO14-G	TRANS-1,2-DICHLOROETHENE	PPBV	ND	0.10
03/18/96	MB*031896*1	34496*TO14-G	1,1-DICHLOROETHANE	PPBV	ND	0.10
03/18/96	MB*031896*1	77093*TO14-G	CIS-1,2-DICHLOROETHENE	PPBV	ND	0.10
03/18/96	MB*031896*1	32106*TO14-G	CHLOROFORM	PPBV	0.005	0.10
03/18/96	MB*031896*1	34531*TO14-G	1,2-DICHLOROETHANE	PPBV	ND	0.10
03/18/96	MB*031896*1	34506*TO14-G	1,1,1-TRICHLOROETHANE	PPBV	ND	0.10
03/18/96	MB*031896*1	34030*TO14-G	BENZENE	PPBV	0.005	0.10
03/18/96	MB*031896*1	32102*TO14-G	CARBON TETRACHLORIDE	PPBV	ND	0.10
03/18/96	MB*031896*1	34541*TO14-G	1,2-DICHLOROPROPANE	PPBV	ND	0.10
03/18/96	MB*031896*1	39180*TO14-G	TRICHLOROETHENE	PPBV	ND	0.10
03/18/96	MB*031896*1	34704*TO14-G	CIS-1,3-DICHLOROPROPENE	PPBV	ND	0.10
03/18/96	MB*031896*1	34699*TO14-G	TRANS-1,3-DICHLOROPROPENE	PPBV	ND	0.10
03/18/96	MB*031896*1	34511*TO14-G	1,1,2-TRICHLOROETHANE	PPBV	ND	0.10
03/18/96	MB*031896*1	34010*TO14-G	TOLUENE	PPBV	0.11	0.10
03/18/96	MB*031896*1	77651*TO14-G	1,2-DIBROMOETHANE(EDB)	PPBV	ND	0.10
03/18/96	MB*031896*1	34475*TO14-G	TETRACHLOROETHENE	PPBV	ND	0.10
03/18/96	MB*031896*1	34301*TO14-G	CHLOROBENZENE	PPBV	ND	0.10
03/18/96	MB*031896*1	34371*TO14-G	ETHYLBENZENE	PPBV	0.01	0.10
/18/96	MB*031896*1	97234*TO14-G	M,P-XYLENE	PPBV	0.10	0.10
8/96	MB*031896*1	77128*TO14-G	STYRENE	PPBV	ND	0.10
.8/96	MB*031896*1	34516*TO14-G	1,1,2,2-TETRACHLOROETHANE	PPBV	ND	0.10
/18/96	MB*031896*1	97235*TO14-G	O-XYLENE	PPBV	0.06	0.10
03/18/96	MB*031896*1	77226*TO14-G	1,3,5-TRIMETHYLBENZENE	PPBV	ND	0.10
03/18/96	MB*031896*1	77222*TO14-G	1,2,4-TRIMETHYLBENZENE	PPBV	ND	0.10
03/18/96	MB*031896*1	97754*TO14-G	BENZYL CHLORIDE	PPBV	ND	0.10
03/18/96	MB*031896*1	34566*TO14-G	1,3,DICHLOROBENZENE	PPBV	ND	0.10
03/18/96	MB*031896*1	34571*TO14-G	1,4-DICHLOROBENZENE	PPBV	ND	0.10
03/18/96	MB*031896*1	34536*TO14-G	1,2-DICHLOROBENZENE	PPBV	ND	0.10
03/18/96	MB*031896*1	34551*TO14-G	1,2,4-TRICHLOROBENZENE	PPBV	0.06	0.10
03/18/96	MB*031896*1	34391*TO14-G	HEXACHLOROBUTADIENE	PPBV	ND	0.10

Reference Sample Summary

DATE	SAMPLE	STORET	PARAMETER	UNITS	KNOWN	FOUND	%RECV
03/18/96	RF*031896*1	39175*TO14-G	VINYL CHLORIDE	PPBV	0.53	0.46	86.8
03/18/96	RF*031896*1	34488*TO14-G	TRICHLOROFLUOROMETHANE	PPBV	0.53	0.52	98.1
03/18/96	RF*031896*1	34423*TO14-G	METHYLENE CHLORIDE	PPBV	0.53	0.58	109
03/18/96	RF*031896*1	32106*TO14-G	CHLOROFORM	PPBV	0.52	0.52	100.0
03/18/96	RF*031896*1	34531*TO14-G	1,2-DICHLOROETHANE	PPBV	0.52	0.56	108
03/18/96	RF*031896*1	34506*TO14-G	1,1,1-TRICHLOROETHANE	PPBV	0.51	0.49	96.1
03/18/96	RF*031896*1	34030*TO14-G	BENZENE	PPBV	0.52	0.50	96.2
03/18/96	RF*031896*1	32102*TO14-G	CARBON TETRACHLORIDE	PPBV	0.52	0.51	98.1
03/18/96	RF*031896*1	34541*TO14-G	1,2-DICHLOROPROPANE	PPBV	0.52	0.54	104
03/18/96	RF*031896*1	39180*TO14-G	TRICHLOROETHENE	PPBV	0.52	0.50	96.2
03/18/96	RF*031896*1	34010*TO14-G	TOLUENE	PPBV	0.51	0.68	133
03/18/96	RF*031896*1	34475*TO14-G	TETRACHLOROETHENE	PPBV	0.52	0.56	108
03/18/96	RF*031896*1	34301*TO14-G	CHLOROBENZENE	PPBV	0.52	0.57	110
03/18/96	RF*031896*1	34371*TO14-G	ETHYLBENZENE	PPBV	0.53	0.52	98.1
03/18/96	RF*031896*1	97235*TO14-G	O-XYLENE	PPBV	0.55	0.74	135

Batch Narrative - G69433 Analysis: EPA TO-14

Updated by 3395, 2087

GENERAL COMMENTS:

BATCH NARRATIVE
Batch G69433
Client/Samples:
Analyst: NORMAN STAUBLY/1962
Date: 03/18/96

Sample Number	Client ID	Canister Number	Date Collected	Date Received	Date Analyzed	Intial Pressure
SBPTT14*1		GL026	03/14/95	03/16/96	03/18/96	-18.5 "Hg
SBPTT14*2		GL158	03/14/96	03/16/96	03/18/96	-17.0 "Hg

Samples SBPTT14*1,SBPTT14*2 were diluted X2 with helium upon arrival.

EXPLANATION OF QC FAILURES:

Initial Calibration:
Toluene has a high %RSD due to the presence of this compound in the blank.
Reference Standard (NIST):
Toluene and o-Xylene have high recoveries due to the presence of these compounds in the blank.

Appendix G: Groundwater Inorganics Analytical Reports

YORK
ANALYTICAL LABORATORIES, INC.
ONE RESEARCH DRIVE STAMFORD CT 06906
142 TEMPLE STREET NEW HAVEN CT 06510

THIS FACSIMILE WAS SENT FROM: ☐ Stamford, CT LAB
203-325-1371
FAX 203-357-0166

Fax Transmittal Cover Sheet

This transmittal is being sent to:

Name	Fayaz Lakhwala
Company	SBP
Fax Number	904/934-~~9282~~ 2420

This transmittal is being sent from:

Name	LAURIE ROGERS
Date & Time	3/12/96
Reference	Camp Le Jeune, 69

This transmittal is 5 page(s), including this cover sheet

96020255

If problems with this transmission contact: ☐ Stamford

YORK
ANALYTICAL LABORATORIES, INC.

Technical Report

prepared for

SBP Technologies, Inc.
1 Sabine Island Drive
Gulf Breeze, FL 32561
Attention: Fayaz Lakhwala

Report Date: 03/01/96

Re: Client Project ID: Camp LeJeune, 69
York Project No.: 96020255

Report Date: 03/01/96
Client Project ID: Camp LeJeune, 69

York Project No.: 96020255

SBP Technologies, Inc.
1 Sabine Island Drive
Gulf Breeze, FL 32561
Attention: Fayaz Lakhwala

Purpose and Results

This report contains the analytical data for the sample(s) identified on the attached chain-of-custody received in our laboratory on 02/27/96. The project was identifed as your project "Camp LeJeune, 69".

The analysis was conducted utilizing appropriate EPA, Standard Methods, and ASTM methods as detailed in the data summary tables .

The results of the analysis are summarized in the following table(s).

Analysis Results

Client Sample ID			69-GW-15VW - A		69-GW-15VW - B	
York ID			96020255-01		96020255-02	
Matrix			WATER		WATER	
Parameter	Method	Units	Results	MDL	Results	MDL
Magnesium	SW846-6010	mg/L	20.3	0.020		
Manganese	SW846-6010	mg/L	0.598	0.005		
Sodium	SW846-6010	mg/L	83.8	0.10		
Potassium	SW846-6010	mg/L	8.48	0.500		
Calcium	SW846-6010	mg/L	127.	0.020		
Chloride	SM407B	mg/L			737	1.0
Sulfate	EPA375.3	mg/L			Not detected	10.0
Total Suspended Solids	SM209C	mg/L			137	0.5
Total Dissolved Solids	SM209B	mg/L			959	1.0
Bicarbonate	SM	mg/L			50	1.0
Iron, Dissolved	SW846-6010	mg/L			22.6	0.005
Sulfide, Dissolved	SM	mg/L			Not detected	1.0
Carbon Dioxide, Dissolved	SM	mg/L			35.2	1.0

Approved By: Robert Q. Bradley

Robert Q. Bradley
Managing Director

Date: 03/01/96

YORK

KKHARD

YORK
ANALYTICAL LABORATORIES, INC.

ONE RESEARCH DRIVE STAMFORD, CT 06906
(203) 325-1371 FAX (203) 357-0166

Field Chain-of-Custody Record

Company Name	Report To:	Invoice To:	Samples Collected By (signature) / Name (printed)
SBP TECHNOLOGIES	904-934-9352 FAYAZ LAKHWALA	SBP TECHNOLOGIES	DAVID V BREWSTER
			Project No./I.D. CAMP LEJEUNE, SITE 69

Sample No.	Location/I.D.	Date Sampled	Sample Matrix: Water	Soil	Air	Other	ANALYSES REQUESTED	Container Description(s)
1	69-GW-15VW	-22 -96	X				INORGANIC	1 L AMBER
2	↓						↓	↓
3	↓						↓	250 mL HPDE

Chain-of-Custody Record

	Date/Time		Date/Time		Date/Time
Bottles Relinquished from Lab by		Samples Relinquished by: David Brewster	2-23-96	Samples Received by	
Bottles Received in Field by		Samples Relinquished by		Samples Received by	
		Samples Relinquished by		Samples Received in LAB by: Linda A. LeBlanc	2/26/96 1500

Comments/Special Instructions

3 WEEK TURNAROUND (8 / 3/15/96)

YORK
ANALYTICAL LABORATORIES, INC.
ONE RESEARCH DRIVE STAMFORD, CT 06906
(203)325-1371 FAX (203)357-0166

Fax Transmittal Cover Sheet

This transmittal is being sent to:

Name	R. Willis
Company	SBP TECHNOLOGIES
Fax Number	904-934-2420

This transmittal is being sent from:

Name	LAURIE ROGERS
Date & Time	11/13/96
Reference	9610L936/LaJeune

This transmittal is 6 page(s), including this cover sheet

96100361

(Hard copy will be mailed)

If problems with this transmission contact the sender at 203-325-1371

YORK
ANALYTICAL LABORATORIES, INC.

Technical Report

prepared for

SBP Technologies, Inc.
1 Sabine Island Drive
Gulf Breeze, FL 32561
Attention: R. Willis

Report Date: 11/12/96

Re: Client Project ID: 9610L936/LaJeune
York Project No.: 96100361

ONE RESEARCH DRIVE STAMFORD, CT 06906 (203) 325-1371 FAX (203) 357-0166

Report Date: 11/12/96
Client Project ID: 9610L936/LaJeune

York Project No.: 96100361

SBP Technologies, Inc.
1 Sabine Island Drive
Gulf Breeze, FL 32561
Attention: R. Willis

Purpose and Results

This report contains the analytical data for the sample(s) identified on the attached chain-of-custody received in our laboratory on 10/29/96. The project was identifed as your project "9610L936/LaJeune ".

The analysis was conducted utilizing appropriate EPA, Standard Methods, and ASTM methods as detailed in the data summary tables .

The results of the analysis are summarized in the following table(s).

Analysis Results

Client Sample ID			9610L936-015		9610L936-015 Duplicate	
York ID			96100361-01		96100361-02	
Matrix			WATER		WATER	
Parameter	Method	Units	Results	MDL	Results	MDL
Magnesium	SW846-6010	mg/L	30.0	0.020	30.0	0.020
Manganese	SW846-6010	mg/L	0.975	0.005	0.967	0.005
Sodium	SW846-6010	mg/L	54.2	0.10	54.9	0.10
Potassium	SW846-6010	mg/L	6.91	0.500	6.44	0.500
Calcium	SW846-6010	mg/L	127	0.020	129	0.020
Chloride	SM407B	mg/L	470	1.0		
Sulfate	EPA375.3	mg/L	4.58	10.0		
Total Suspended Solids	SM209C	mg/L	11	0.5		
Total Dissolved Solids	SM	mg/L	1475	0.5		
Bicarbonate	SM	mg/L	20	1.0		
Iron, Dissolved	SW846-6010	mg/L	71.8	0.005		
Sulfide, Dissolved	SM	mg/L	Not detected	1.0		
Carbon Dioxide, Dissolved	SM	mg/L	158	1.0		

Units Key:

For Waters/Liquids: mg/L = ppm ; ug/L = ppb   For Soils/Solids: mg/kg = ppm ; ug/kg = ppb

Approved By: ____________ **Date: 11/12/96**
Robert Q. Bradley
Managing Director

YORK

STON Analytics Use Only
9610L936

Custody Transfer Record/Lab Work Request

Page 1 of 3

Client SBP Camp [illegible] Est. Final Proj. Sampling Date 10-23-96
Work Order # 11400-011-001-0008-00
Project Contact/Phone # R Willis (719) 462-6924
AD Project Manager Gail [illegible]
QC [illegible] Del Special TAT Standard 21 Day
Date Rec'd 10-26-96 Date Due 11/16/96
Account # SBPtech

Refrigerator #
#/Type Container: Liquid 2; Solid
Volume: Liquid; Solid
Preservatives: HCl
ANALYSES REQUESTED → ORGANIC: VOA, BNA, Pest/PCB, Herb; INORG: Metal, CN

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen MS	MSD	Matrix	Date Collected	Time Collected	8240
001	69GW-UVB1			W	10-23-96	1120	X
002	69GW-UVB2			↓	↓	1130	X
003	69GW-02IW					1455	X
004	69GW-16IW					1220	X
005	69GW-16UW					1210	X
006	69GW-17IW					1055	X
007	69GW-17UW					1107	X
008	69GW-18IW					1655	X
009	69GW-18UW					1035	X
010	69GW-19IW			↓	↓	1000	X

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Special Instructions:
* 23B, 25B, 18IW & 21IW contain no HCL. Dye reacted w/ preservative
# N/A
temp 3.7°c

DATE/REVISIONS:
1. Air bubbles in #s 8, 16
10/28/96 2. Cancelled #015 metals & wetchem
3. analyses changed WO# 11431-002-001-9999-00
4. person # 96PM0762
11/28/96 5. Metals, wetchem analyses subbed
6. to York LAB

WESTON Analytics Use Only

Samples were:
1) Shipped ✓ or Hand Delivered
Airbill # 1904 [illegible]
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Labels Indicate Properly Preserved Y or N
5) Received Within Holding Times Y or N

COC Tape was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N
COC Record Present Upon Sample Rec't Y or N

Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time
R Willis		10-24-96		Fed Ex	I [illegible]	10-26-96	9:30

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:

RFW 21-21-001/A-7/91 L372 L373 L375 L377 L378 Ref# 3325 Cooler# 381-596a

NOV-13-1996 12:21 FROM YORK SERVICES/LAB TO 19049342420 P.04

I Analytics Use Only

96LCL936

Custody Transfer Record/Lab Work Request

Page of 3

NOV-13-1996 12:22 FROM YORK SERVICES/LAB TO :9049342420 P.05

Client SBP Camp Lejeune

Est. Final Proj. Sampling Date 10-23-96

Work Order # 11100-011-001-0002

Project Contact/Phone # R. Willis

AD Project Manager

QC ___ Del ___ TAT Standard

Date Rec'd 10-26-96 Date Due

Account #

Refrigerator #

#/Type Container	Liquid	2						2	1	1		
	Solid											
Volume	Liquid											
	Solid											
Preservatives		HCl										
ANALYSES REQUESTED		ORGANIC: VOA	BNA	Pest/PCB	Herb	INORG: Metal	CN				Cancelled	

WESTON Analytics Use Only

MATRIX CODES: S - Soil; SE - Sediment; SO - Solid; SL - Sludge; W - Water; O - Oil; A - Air; DS - Drum Solids; DL - Drum Liquids; L - EP/TCLP Leachate; WI - Wipe; X - Other; F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected	VOA
011	69GW-19UW			W	10-23-96	0953	✓
012	69GW 20IW					1442	✓
013	69GW 20UW					1425	✓
014	69GW 15IW					1250	✓
015	69GW 15UW					1240	✓
016	69GW 21IW					1603	✓
017	69GW 21UW					1148	✓
018	69GW 22A				10-22-96	1650	✓
019	69GW 22B					1702	✓
020	69GW 23A					1720	✓

cancel

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Special Instructions:

* 23B, 25B, 18IW & 21IW contain no HCL. Dye reacted w HCL

15UW analyze for Chloride, Sulfide, TSS, TDS, Bicarbonate, Diss Iron, Diss CO2

DATE/REVISIONS:

1.
2.
3.
4.
5.
6.

WESTON Analytics Use Only

Samples were:
1) Shipped ___ or Hand Delivered
Airbill #
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Labels Indicate Properly Preserved Y or N
5) Received Within Holding Times Y or N

COC Tape was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N
COC Record Present Upon Sample Rec't Y or N

Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time
Fed Ex	I. Rennie	10-26-96	9:30				

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:

RFW 21-21-001/A-7/91 ___ L372 ___ L373 ___ L375 ___ L377 ___ L378 Ref# ___ Cooler# ___ 381-596a

WESTON Analytics Use Only
9610L936

Custody Transfer Record/Lab Work Request

Page 2 of 2

Client SCP
Est. Final Proj. Sampling Date 10-23-96
Work Order # 11100-011-001-0002
Project Contact/Phone # R. Willis 919 462-6926
AD Project Manager
QC ______ Del ______ TAT Standard
Date Rec'd 10-26-96 Date Due
Account #

Refrigerator # 1
#/Type Container: Liquid 2; Solid
Volume: Liquid 40ml; Solid
Preservatives HCL

ANALYSES REQUESTED →
ORGANIC: VOA, BNA, Pest/PCB, Herb
INORG: Metal, CN

WESTON Analytics Use Only

MATRIX CODES:
S - Soil
SE - Sediment
SO - Solid
SL - Sludge
W - Water
O - Oil
A - Air
DS - Drum Solids
DL - Drum Liquids
L - EP/TCLP Leachate
WI - Wipe
X - Other
F - Fish

Lab ID	Client ID/Description	Matrix QC Chosen (✓) MS	MSD	Matrix	Date Collected	Time Collected	VOA 8260
021	69GW-23B			W	10-23-96	1505	X
022	69GW-24A			↓	10-24-96	1725	X
023	69GW-24B				↓	1705	X
024	69GW-25A				↓	1642	X
025	69GW-25B			↓	10-20-96	1525	X

FIELD PERSONNEL: COMPLETE ONLY SHADED AREAS

Special Instructions:
* 23B, 25B, 18IW & 21IW do not contain HCL.

DATE/REVISIONS:
1.
2.
3.
4.
5.
6.

WESTON Analytics Use Only

Samples were:
1) Shipped ___ or Hand Delivered ___
Airbill # See Page One
2) Ambient or Chilled
3) Received in Good Condition Y or N
4) Labels Indicate Properly Preserved Y or N
5) Received Within Holding Times Y or N

COC Tape was:
1) Present on Outer Package Y or N
2) Unbroken on Outer Package Y or N
3) Present on Sample Y or N
4) Unbroken on Sample Y or N
COC Record Present Upon Sample Rec'd Y or N

Relinquished by	Received by	Date	Time	Relinquished by	Received by	Date	Time
Fed Ex	I. Berrios	10-26-96	9:30				

Discrepancies Between Samples Labels and COC Record? Y or N
NOTES:

RFW 21-21-001/A-7/91 ____ L372 ____ L373 ____ L375 ____ L377 ____ L378 Ref# ________ Cooler# ________ 381-596a

NOV-13-1996 12:22 FROM YORK SERVICES/LAB TO 19049342420 P.06

TOTAL P.06

Appendix H

Phase II Study Field Monitoring Data Sheets

IEG Technologies Trip Logs for Camp Lejeune

Camp Lejuene Site Visit on 7/2/97

KGB

1) Replaced compressor with new ½ HP compressor
2) Took base line groundwater(Table 1), conductivity, dissolved oxygen, groundwater temp. and pH (Table 2).
3) Developed KGB well
4) Restarted KGB system (Table 3)
5) Sampled KGB wells for base line (Table 4)

UVB

1) Partially installed UVB-400 cannister system and moved UVB equipment to new location
2) Took base line groundwater (Table 1), conductivity, dissolved oxygen, groundwater temp., and pH. (Table 2)
3) Sampled UVB wells for base line (Table 4)
4) completed information for UVB, as built, schematic.

Development Water Samples

1) Took water samples from Steel Tanker and overnighted to Lab.
2) Took water samples from yellow Poly Tank and overnighted to Lab.

Camp Lejeune Site Visit on 7/16/97

KGB

1) Restarted blower (breaker tripped)
2) Adjusted KGB System (Table 5)
3) Sampled and analyzed KGB off-gas (Table 5)

UVB

Down hole piping broke, unable to retrieve , thus, unable to start UVB system.

General

Added 4 gallons of Clorox to yellow poly tank.

TABLE 1

BASE LINE WATER LEVELS
AND PURGE WATER AMOUNTS FOR
BASELINE SAMPLES
(7/2/97)
CAMP LEJEUNE, NC

SYSTEM	Well ID	Total Depth in Feet from Top of Casing	Depth to water in Feet from Top of Casing	Purge Volume in Gallons
UVB	15 IW	61	30.40	15
	17 IW	76	32.35	22
	17 UW	48	32.25	8.6
	20 IW	77	30.73	23
	20 UW	48	30.59	9.6
	21 UW	46	29.85	8.6
KGB	22 A	14	6.61	Purged Dry 2 gallons
	22 B	12	6.28	3.3
	23 A	15	6.50	Purged Dry 1.5 gallons
	24 A	15	6.43	Purged Dry 3 gallons
	24 B	12	7.06	Purged Dry 2 gallons
	25 A	12	6.91	Purged Dry 2 gallons

TABLE 2

BASE LINE TEMPERATURE, D.O., AND CONDUCTIVITY
(7/2/97)
CAMP LEJEUNE, NC

SYSTEM	Well ID	Conductivity	Temperature °C	pH	D.O.
UVB	15 IW	507	0.05	6.77	17.50
	17 IW	326	18.00	6.60	0.05
	17 UW	568	18.00	6.32	0.05
	20 IW	316	17.60	6.79	0.12
	20 UW	395	17.50	6.42	0.12
	21 UW	106	17.50	6.82	0.10
KGB	22 A	247	17.25	5.56	0.00
	22 B	224	19.00	4.68	0.00
	24 A	534	18.00	5.91	0.12
	24 B	412	17.00	5.90	0.10

TABLE 3

FIELD GAS CHROMATOGRAPH ANALYSIS
CAMP LEJEUNE, N.C.

KGB SYSTEM START-UP MEASUREMENTS
7/2/1997

System Exhaust Sample # 1 - Collected prior to making any adjustments to system. Vacuum blower not in operation, air compressor injecting air into KGB system at 6.0 CFM.

KGB SYSTEM EXHAUST ANALYSIS

LOCATION	TCE IN PPM (PPM-V)	UNIDENTIFIED VOLATILES (PPM-V)	TOTAL VOLATILES (PPM-V)
KGB Exhaust Sample # 1 (collected at well head)	0.99	2.91	3.90

KGB Operating Conditions Prior to Leaving Site (7/3/97)

System Influent (bleed-in air) = 3946 LFM, 86 CFM

System Effluent = 3270 LFM, 90 CFM

Vacuum at Well Head = -14 mbars

Air Compressor Flow Rate = 6.0 CFM

Air Compressor Pressure = 4 psi

Depth to static water 5.55 ft. below top of casing

Total depth 14.07 ft. below top of casing

TABLE 4

FIELD GAS CHROMATOGRAPH ANALYSIS
CAMP LEJEUNE, N.C.

BASELINE SITE MEASUREMENTS - 7/2/1997

KGB GROUNDWATER HEADSPACE MEASUREMENTS

LOCATION	TCE IN PPM (PPM-V)	UNIDENTIFIED VOLATILES (PPM-V)	TOTAL VOLATILES (PPM-V)
22-A	8.5	29.6	38.1
22-B	8.3	42.8	51.1
23-B	1.5	24.1	25.6
24-A	9.2	83.4	92.6
24-B	17	94	111
25-A	16.2	62.1	78.3
KGB Well Headspace (pre-startup)	1.3	8.8	10.1

UVB GROUNDWATER HEADSPACE MEASUREMENTS

15-IW	20.7	27.6	48.3
17-IW	ND	6.56	6.56
17-UW	3.00	22.4	25.4
20-UW	0.42	2.32	2.74
20-IW	ND	2.49	2.49
21-UW	40.5	0.7	41.2

TABLE 5

FIELD GAS CHROMATOGRAPH ANALYSIS
CAMP LEJEUNE, N.C.

SYSTEM MEASUREMENTS FOLLOWING 2 WEEKS OF KGB OPERATION
7/16/1997

System Exhaust Sample # 1 - Collected prior to making any adjustments to system. Vacuum blower not in operation, air compressor injecting air into KGB system at 6.2 CFM.

System Exhaust Sample # 2 - Collected sample approximatly after KGB system restart (breaker kicked off). Restarted system, air compressor injecting air into KGB system at 6.0 CFM. Collected air sample prior to hooking up vacuum blower.

KGB SYSTEM EXHAUST ANALYSIS

LOCATION	TCE IN PPM (PPM-V)	UNIDENTIFIED VOLATILES (PPM-V)	TOTAL VOLATILES (PPM-V)
System Exhaust Sample # 1 KGB Exhaust (collected at well head prior to making any system adjustments)	ND	0.04	0.04
System Exhaust Sample # 2 KGB Exhaust (collected at well head following system restart)	0.49	1.31	1.80

KGB Operating Conditions Prior to Leaving Site

System Influent (bleed-in air) = 3375 LFM, 73 CFM

System Effluent = 3310 LFM, 91 CFM

Vacuum at Well Head = -10 mbars

Air Compressor Flow Rate = 6.0 CFM

Air Compressor Pressure = 7.5 psi

TABLE 6

FIELD GAS CHROMATOGRAPH ANALYSIS
CAMP LEJEUNE, N.C.

SITE MEASUREMENTS FOLLOWING 2 WEEKS OF KGB OPERATION
7/16/1997

KGB GROUNDWATER HEADSPACE MEASUREMENTS

LOCATION	TCE IN PPM (PPM-V)	UNIDENTIFIED VOLATILES (PPM-V)	TOTAL VOLATILES (PPM-V)
22-A	15.0	30.0	45.0
22-B	12.7	49.7	62.4
23-B	0.90	46.7	47.6
24-A	18.3	94.7	113.0
24-B	18.2	99.7	117.9
25-A	21.0	47.8	68.8

IEG Technologie's Trip Logs For Camp Lejeune

Camp Lejeune Site Visit on 7/31/1997

KGB

1) The KGB system was airlifting water and sand inside two inch diameter pipe when arrived. Shut down KGB system and packed around air line binding it in place. Using air compressor and rigid air line air lifted sand around KGB and freed unit. Continued to remove some sand, but could not remove enough sand to free KGB. KGB was not operating when we left the site.

UVB

1) The UVB 400 system broken piping was replaced.

2) The UVB 400 system was reinstalled with a submersible pump which had a flow capacity to overcome the approximately 30 foot of head while still capable of yielding 20 gpm equal to the recirculation rate of the old UVB 250 system. The 20 gpm pumping rate was too high for the geology of the new location and the pump over heated and tripped the thermal overload after 5 minutes. The pump was flow was restricted 3 times down to 3/4 of an inch at a flow rate of 14.81 gpm but still overheated and tripped the thermal overload after 15 to twenty minutes. Because of the intermittent operation of the submersible pump the decision was made to purchase another submersible pump with a 8 gpm capacity but with enough pressure to over come the thirty foot of head pressure and install this pump on the next trip.

3) The UVB 400 system groundwater influent (Table 7) and Off-gas effluent (Table 8) was sampled at 1minute and 10 minute intervals. The physical measurement (Table 8) were also taken during operation of the 400 UVB system. The sampling analysis and physical measurements taken indicate the 400 UVB system to be operating as designed and removing chlorinated hydrocarbons from the groundwater.

Camp Lejeune Site Visit on 8/12 /97

KGB

1) The sand in the two inch diameter KGB pipe has sealed off the formation water and the new hand vacuum pump to remove sand only worked while there was water available to introduce to the two inch KGB pipe. About four feet of sand was removed as the new vacuum hand pump worked very well, but could not pump sand alone. It was decided to use the redi-flow grundfos pump to pump water from the UVB to the KGB to aid in removing the sand on the next trip.

2) A relief valve was added to the compressor. Both the compressor and the 1/5 blower were working fine.

UVB

1) The new Grundfos 1/3 HP pump was installed and ran at 7.8 gpm the UVB 400 system ran overnight with no difficulties and no significant change in physical parameters (Table 8).

2) The UVB 400 analysis from 7/31/97 (Table 7 and 8) are the start-up analysis for the system and the first two week sampling event will be the week of 8/25/97.

TABLE 7

FIELD GAS CHROMATOGRAPH ANALYSIS
CAMP LEJEUNE, N.C.

UVB TEMPORARY START-UP
7/31/1997

UVB INFLUENT GROUNDWATER HEADSPACE MEASUREMENTS

LOCATION	[illegible] (PPB)	[illegible]	TOTAL [illegible]
UVB Influent (1 Minute of Operation)	10.5	74.2	84.7
UVB Influent (10 Minutes of Operation)	3.7	26.5	30.2

* UVB operating in a standard flow configuration with the assistance of a mechanical pump. Pumping rate measured at 14.81 gallons per minute during temporary start-up period.

TABLE 8

FIELD GAS CHROMATOGRAPH ANALYSIS
CAMP LEJEUNE, N.C.

UVB SYSTEM MEASUREMENTS DURING TEMPORARY START-UP
7/31/1997

UVB SYSTEM EXHAUST ANALYSIS

[illegible]	[illegible]	[illegible]	[illegible]
System Exhaust Sample (1 Minute of Operation)	**0.38**	**11.0**	**11.38**
System Exhaust Sample (10 Minute of Operation)	**0.10**	**6.69**	**6.79**

UVB Operating Conditions 7/31/97

System Influent (bleed-in air) = 5528 LFM, 335 m3/hr

System Exhaust = 2095 LFM, 271 m3/h *

Vacuum at Well Head = 46 mbars

Pumping Rate = 14.81 GPM, 3.38 m3/hr

UVB Operating Conditions 8/12/97

System Influent (bleed-in air) = 6139 LFM, 372 m3/hr

System Exhaust = 2195 LFM, 284 m3/h *

Vacuum at Well Head = 49 mbars

Pumping Rate = 7.8 GPM, 1.77 m3/hr.

*** Effluent low because of possible turbulence caused by activated carbon cannisters.**

IEG Technologies's Trip Logs For Camp Lejeune Visit on 8/25/97 - 8/26/97

KGB System

1) Installed new Pattons ½ H.P. air compressor on KGB system.

2) Redeveloped KGB system removing approximately 4 to 5 feet of sand from inside the well casing prior to reassembling system. This was accomplished by using a submersible pump to pump water into the KGB system, then using this water to help suspend the sand within the casing, allowing field personnel to pump the sand slury out of the well. Using this method, the existing sand was removed from the KGB casing. The system was restarted on 8/25/97.

3) KGB system was in operation when field personnel left the site on the evening of 8/26/97. KGB samples were not collected as a result of system not being in operation prior to arrival on site. KGB operating parameters are given in Table 1.

UVB 400 System

1) The UVB 400 system was in operation when field personnel arrived on the site on 8/25/97.

2) An effluent water collection port was installed inside the UVB 400 system, allowing effluent water samples to be collected for analysis.

3) The system was restarted on 8/25/97 and allowed to run overnight prior to samples (groundwater and off-gas) being collected.

4) Monitoring wells used to monitor the UVB 400 system performance were gauged and purged prior to sampling (Table 2). Samples were then collected for both on-site portable gas chromatography and off-site analytical laboratory analysis (Table 3). In addition, influent and effluent UVB water samples and effluent UVB air samples were also collected and analyzed. The samples collected represent two weeks of UVB operation (restarted on 8/12/97) at the new location (Tables 4, and 5).

5) The UVB 400 system was operating as designed when field personnel left the site on the evening of 8/26/97.

IEG Technologies's Trip Logs For Camp Lejeune Visit on 9/9/97 - 9/10/97

KGB System

1) KGB system was not in operation when field personnel arrived on the site on 9/9/97.

2) After checking on/off switches for both the compressor and blower, and checking breakers in electrical panel located outside fenced area, it was determined that an electrical problem originating from either the pole mounted transformers or one of the electrical panels was responsible for the shutdown of the system. Based on hourmeter readings on the affected equipment, it was determined that the system had run approximately 8.5 days from our last hourmeter reading the evening of 8/25/97.

3) During the day, numerous phone calls were made to Baker Environmental Inc., SBP Technologies Inc. and Base Maintenance personnel to keep them informed of the situation and progress to date. It was requested that an electrician confirm source of electrical problems prior to Base Maintenance checking out electrical problem.

4) IEG personnel arranged for and met local electrician and had electrical panels inspected. Electrician confirmed that a faulty pole mounted transformer was responsible for power outage on the site and was probably the result of a lightning strike knocking out the transformer.

5) IEG left site midday on 9/10/97 without power restored to site (or a set time for Base Maintenance to repair the damaged transformer). KGB was not and will not be restarted until IEG personnel arrive back on the site in approximately two weeks. Site sampling was not performed due to inoperation of equipment and time involved in checking out electrical systems and arranging for repair.

UVB 400 System

1) The UVB 400 system was not in operation when field personnel arrived on-site on 9/9/97, for the same reasons as stated above.

2) The UVB 400 system was not operating when field personnel left the site, however detailed startup instructions were left with Baker Environmental Inc. personnel so that system will be restarted ASAP. Baker personnel responsible for system restart will the record time and date, at time of system restart. Site sampling was not performed due to inoperation of equipment and time involved in checking out electrical systems and arranging for repair.

TABLE 1

KGB SYSTEM RESTART MEASUREMENTS
CAMP LEJEUNE, N.C.
(8/26/97)

KGB Operating Conditons Prior to Leaving Site on 8/26/97

System Influent (bleed-in) air = 4006 LFM, 87 CFM

System Effluent = 4523 LFM, 124 CFM

Air Compressor Flow Rate = 6.2 CFM

Air Comresssor Pressure = 6 PSI

Total Depth 14.07 ft. below top of casing

TABLE 2

WATER LEVEL MEASUREMENTS AND PURGE WATER AMOUNTS FOR UVB MONITORING WELLS CAMP LEJEUNE, NC (8/26/97)

SYSTEM	Well ID	Total Depth in Feet from Top of Casing	Depth to Water in Feet from Top of Casing	Purge Water Amount Gallons
UVB	15 IW	61	30.52	14.6
	17 IW	76	32.48	21
	17 UW	48	32.36	8
	20 IW	77	30.83	22.5
	20 UW	48	30.68	8.5
	21 UW	46	29.91	8

TABLE 3

FIELD GAS CHROMATOGRAPH ANALYSIS OF UVB MONITORING WELLS CAMP LEJEUNE, NC (8/26/97)

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20 IW	ND	0.14	0.17	ND	0.06	0.37
20 UW	0.61	0.34	0.42	0.02	1.09	2.48
17 IW	2.59	0.17	0.14	ND	0.18	3.08
17 UW	11.58	14.24	26.58	1.40	1.7	55.5
15 IW	13.93	5.44	27.94	15.89	2.8	66.0
21 UW	ND	0.06	0.20	0.01	0.02	0.29
COMPOSITE SOIL SAMPLE	1.28	4.76	11.31	0.52	1.04	18.94

*Composite soil sample analyzed was a composite soil sample collected from 4, 55 gallon drums located onsite, and was run at the request of Baker Environmental Inc. personnel.

TABLE 4

FIELD GAS CHROMATOGRAPH ANALYSIS
UVB-400 SYSTEM EXHAUST
CAMP LEJEUNE, NC
(8/26/97)

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UVB-400 System Exhaust	ND	ND	ND	ND	ND	ND

UVB Operating Conditions 8/26/97

System Influent air = 4006 LFM, 243 m^3/hr

System Effluent = 2509 LFM, 325 m^3/hr

Vacuum at Well Head = -45 mbars

Pumping Rate = 7.8 GPM, 1.78 m^3/hr

TABLE 5

FIELD GAS CHROMATOGRAPH ANALYSIS
UVB INFLUENT AND EFFLUENT GROUNDWATER SAMPLES
CAMP LEJEUNE, NC
(8/26/97)

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UVB-400 System Influent	ND	0.06	0.48	ND	0.01	0.55
UVB-400 System Effluent	ND	ND	ND	ND	ND	ND

*UVB-400 operating in a standard flow configuration with the assistance of a mechanical pump. Pumping rate measured at 7.8 gallons per minute at the time of start-up (8/12/97)

TABLE 1

KGB SYSTEM RESTART MEASUREMENTS
CAMP LEJEUNE, N.C.
(8/26/97)

KGB Operating Conditons Prior to Leaving Site on 8/26/97

System Influent (bleed-in) air = 4006 LFM, 87 CFM

System Effluent = 4523 LFM, 124 CFM

Air Compressor Flow Rate = 6.2 CFM

Air Comresssor Pressure = 6 PSI

Total Depth 14.07 ft. below top of casing

TABLE 2

WATER LEVEL MEASUREMENTS AND PURGE WATER AMOUNTS FOR UVB MONITORING WELLS CAMP LEJEUNE, NC (8/26/97)

SYSTEM	Well ID	Total Depth in Feet from Top of Casing	Depth to water in Feet from Top of Casing	Purge Volume in Gallons
UVB	15 IW	61	30.52	14.6
	17 IW	76	32.48	21
	17 UW	48	32.36	8
	20 IW	77	30.83	22.5
	20 UW	48	30.68	8.5
	21 UW	46	29.91	8

TABLE 3

FIELD GAS CHROMATOGRAPH ANALYSIS OF UVB MONITORING WELLS CAMP LEJEUNE, NC (8/26/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
20 IW	ND	0.14	0.17	ND	0.06	0.37
20 UW	0.61	0.34	0.42	0.02	1.09	2.48
17 IW	2.59	0.17	0.14	ND	0.18	3.08
17 UW	11.58	14.24	26.58	1.40	1.7	55.5
15 IW	13.93	5.44	27.94	15.89	2.8	66.0
21 UW	ND	0.06	0.20	0.01	0.02	0.29
COMPOSITE SOIL SAMPLE	1.28	4.76	11.31	0.52	1.04	18.94

*Composite soil sample analyzed was a composite soil sample collected from 4, 55 gallon drums located onsite, and was run at the request of Baker Environmental Inc. personnel.

TABLE 4

FIELD GAS CHROMATOGRAPH ANALYSIS
UVB-400 SYSTEM EXHAUST
CAMP LEJEUNE, NC
(8/26/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 System Exhaust	ND	ND	ND	ND	ND	ND

UVB Operating Conditions 8/26/97

System Influent air = 4006 LFM, 243 m^3/hr

System Effluent = 2509 LFM, 325 m^3/hr

Vacuum at Well Head = -45 mbars

Pumping Rate = 7.8 GPM, 1.78 m^3/hr

TABLE 5

FIELD GAS CHROMATOGRAPH ANALYSIS
UVB INFLUENT AND EFFLUENT GROUNDWATER SAMPLES
CAMP LEJEUNE, NC
(8/26/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 System Influent	ND	0.06	0.48	ND	0.01	0.55
UVB-400 System Effluent	ND	ND	ND	ND	ND	ND

*UVB-400 operating in a standard flow configuration with the assistance of a mechanical pump. Pumping rate measured at 7.8 gallons per minute at the time of start-up (8/12/97)

IEG Technologies's Trip Logs For Camp Lejeune Visit on 9/23/97 - 9/24/97

KGB System

1) The KGB system was not in operation when IEG personal arrived on site (off since pole mounted power transformer failed on 9/3/97).

2) Redeveloped KGB system removing approximately 3 to 4 feet of sand from inside the well casing prior to reassembling system. Installed new HDPE, air line in KGB system, and restarted on 9/24/97.

3) KGB system was in operation when field personnel left the site on the afternoon of 9/24/97. An effluent air sample was collected and analyzed using an on-site portable gas chromatograph, 5 minutes after system restart. KGB operating parameters are given in Table 1.

UVB 400 System

1) The UVB 400 system was in operation when field personnel arrived on the site on 9/23/97. The system had been off due to a failed power transformer from 9/3/97 till 9/12/97, when it was restarted by Baker Environmental Inc. personal following repair of the pole mounted transformer.

2) Monitoring wells used to monitor the UVB 400 system performance were gauged and purged prior to sampling (Table 2). Samples were then collected for on-site portable gas chromatography analysis (Table 3).

3) Numerous UVB 400 system influent, effluent and exhaust samples were collected and analyzed in the field using a portable gas chromatograph (Tables 4 and 5).

4) The UVB 400 system was operating as designed when field personnel left the site on the afternoon of 9/24/97.

TABLE 1

KGB SYSTEM RESTART MEASUREMENTS
CAMP LEJEUNE, N.C.
(9/24/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 System Exhaust	ND	0.11	0.14	0.04	ND	0.29

System Influent (bleed-in) air = 4253 LFM, 92 CFM

System Effluent = 4976 LFM, 136 CFM

Air Compressor Flow Rate = 6.4 CFM

Air Compressor Pressure = 7 PSI

Total Depth 14.75 ft. below top of casing

TABLE 2

WATER LEVEL MEASUREMENTS AND PURGE WATER AMOUNTS FOR UVB MONITORING WELLS CAMP LEJEUNE, NC (9/24/97)

SYSTEM	Well ID	Total Depth in Feet From Top of Casing	Depth to Water in Feet From Top of Casing	Purge Volume in Gallons
UVB	15 IW	61	30.64	15
	17 IW	76	32.67	15
	17 UW	48	32.50	8
	20 IW	77	31.16	15
	20 UW	48	31.00	8
	21 UW	46	30.11	8

TABLE 3

FIELD GAS CHROMATOGRAPH ANALYSIS OF UVB MONITORING WELLS CAMP LEJEUNE, NC (9/24/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2 DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
20 IW	ND	0.26	0.19	0.003	0.20	0.65
20 UW	0.99	0.18	0.25	0.01	0.09	1.52
17 IW	1.55	0.19	0.16	ND	0.02	1.92
17 UW	10.05	12.48	21.03	1.03	0.72	45.31
15 IW	12.66	4.99	24.70	12.73	1.41	56.49
21 UW	ND	0.03	0.07	0.01	ND	0.11

TABLE 4

FIELD GAS CHROMATOGRAPH ANALYSIS
UVB-400 SYSTEM EXHAUST
CAMP LEJEUNE, NC
(9/24/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 System Exhaust	ND	ND	ND	ND	ND	ND

System Influent Air = 7512 LFM, 455 m³/hr without carbon
System Effluent = 3388 LFM, 439 m³/hr without carbon
Vacuum at Well Head = - 50 mbars
Pumping Rate = 7.8 GPM, 1.78 m³/hr

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 System Exhaust	ND	ND	0.01	.003	0.72	0.733

System Influent Air = 6008 LFM, 364m³/hr with carbon
System Effluent = 2093 LFM at 6.0 cm dia. Plus 6465 LFM at 5.1 cm dia. = 349 m³/hr with carbon
Vacuum at Well Head = -45 mbars
Pumping Rate = 7.8 GPM, 1.78 m³/hr

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 System Exhaust	ND	ND	ND	ND	ND	ND

System Influent Air = 5800 LFM, 352 m³/hr with carbon
System Effluent = 2880 LFM, 373 m³/hr with carbon
Vacuum at Well Head = -45 mbars
Pumping Rate = 7.8 GPM, 1.78 m³/hr

TABLE 5

FIELD GAS CHROMATOGRAPH ANALYSIS
UVB INFLUENT AND EFFLUENT GROUNDWATER SAMPLES
CAMP LEJEUNE, NC
(9/23/97 -9/24/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 System Influent 1 9/23/97	0.55	0.40	1.64	0.02	0.10	2.71
UVB-400 System Influent 2 9/23/97	0.50	0.45	1.64	0.02	0.17	2.78
UVB-400 System Influent 9/24/97	ND	0.02	0.08	ND	ND	0.10
UVB-400 System Influent 9/24/97	ND	ND	0.05	0.003	0.73	0.78
UVB-400 System Influent Basin 9/24/97	ND	0.01	0.05	0.003	0.40	0.46
UVB-400 System Effluent 9/24/97	ND	ND	0.02	ND	ND	0.02

*UVB-400 operating in a standard flow configuration with the assistance of a mechanical pump. Pumping rate measured at 7.8 gallons per minute at the time of start-up (8/12/97)

IEG Technologies's Trip Logs For Camp Lejeune Visit on 10/21/97 - 10/22/97

KGB System
1) The KGB system was in operation when IEG personal arrived on site, however, no air was being injected into the KGB due continued silting in of well.

2) KGB system was shut down and was not in operation when field personnel left the site on the afternoon of 10/22/97.

UVB 400 System
1) The UVB 400 system was in operation when field personnel arrived on the site on 10/21/97.

2) Monitoring wells used to monitor the UVB 400 system performance were gauged and purged prior to sampling (Table 1). Samples were then collected for on-site portable gas chromatography analysis (Table 2).

3) Two UVB 400 system influent, effluent and exhaust samples were collected and analyzed in the field using a portable gas chromatograph (Tables 3 and 4).

4) The UVB 400 system was operating as designed when field personnel left the site on the afternoon of 10/22/97.

TABLE 1

WATER LEVEL MEASUREMENTS AND PURGE WATER AMOUNTS FOR UVB MONITORING WELLS CAMP LEJEUNE, NC (10/21/97)

SYSTEM	Well ID	Total Depth in Feet From Top of Casing	Depth to Water in Feet From Top of Casing	Purge Volume in Gallons
UVB	15 IW	61	30.07	15
	17 IW	76	31.85	15
	17 UW	48	31.88	8
	20 IW	77	30.41	15
	20 UW	48	30.24	8
	21 UW	46	29.45	8

TABLE 2

FIELD GAS CHROMATOGRAPH ANALYSIS OF UVB MONITORING WELLS CAMP LEJEUNE, NC (10/22/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
20 IW	ND	0.37	0.41	ND	0.03	0.84
20 UW	1.31	0.28	0.33	0.01	0.66	2.18
17 IW	3.34	1.16	0.82	ND	0.08	5.56
17 UW	12.50	12.95	20.25	1.35	1.51	48.15
15 IW	11.65	4.53	29.23	8.86	1.43	55.29
21 UW	ND	0.05	0.11	0.01	0.04	0.18

TABLE 3

FIELD GAS CHROMATOGRAPH ANALYSIS
UVB-400 SYSTEM EXHAUST
CAMP LEJEUNE, NC
(10/22/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 System Exhaust 1	ND	ND	ND	ND	ND	ND

System Influent Air = 5429 LFM, 329 m³/hr with carbon
System Effluent = 3879 LFM at 6.0 cm dia., Plus 6018 LFM at 5.1 cm dia. = 424 m³/hr with carbon
Vacuum at Well Head = - 50 mbars
Pumping Rate = 7.8 GPM, 1.78 m³/hr

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 System Exhaust 2	ND	ND	ND	ND	ND	ND

System Influent Air = 5429 LFM, 329 m³/hr with carbon
System Effluent = 3879 LFM at 6.0 cm dia., Plus 6018 LFM at 5.1 cm dia. = 424 m³/hr with carbon
Vacuum at Well Head = -50 mbars
Pumping Rate = 7.8 GPM, 1.78 m³/hr

TABLE 4

FIELD GAS CHROMATOGRAPH ANALYSIS
UVB INFLUENT AND EFFLUENT GROUNDWATER SAMPLES
CAMP LEJEUNE, NC
(10/22/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 System Influent 1	ND	ND	ND	ND	ND	ND
UVB-400 System Influent 2	ND	.004	ND	ND	0.18	0.18
UVB-400 System Effluent 1	ND	ND	ND	ND	ND	ND
UVB-400 System Effluent 2	ND	ND	ND	ND	ND	ND

*UVB-400 operating in a standard flow configuration with the assistance of a mechanical pump. Pumping rate measured at 7.8 gallons per minute at the time of start-up (8/12/97)

IEG Technologies's Trip Logs For Camp Lejeune Visit on 11/10/97

KGB System
1) The KGB system is not in operation at this time.

UVB 400 System
1) The UVB 400 system was in operation when field personnel arrived on the site on 11/10/97.

2) Monitoring wells used to monitor the UVB 400 system performance were gauged and purged prior to sampling (Table 1). Samples were then collected for on-site portable gas chromatography analysis (Table 2).

3) One UVB 400 system influent, effluent and exhaust sample was collected and analyzed in the field using a portable gas chromatograph (Tables 3 and 4).

4) The UVB 400 system was operating as designed when field personnel left the site on the evening of 11/10/97.

TABLE 1

WATER LEVEL MEASUREMENTS AND PURGE WATER AMOUNTS FOR UVB MONITORING WELLS CAMP LEJEUNE, NC (11/10/97)

SYSTEM	Well ID	Total Depth in Feet From Top of Casing	Depth to Water in Feet From Top of Casing	Purge Volume in Gallons
UVB	15 IW	61	29.36	15
	17 IW	76	31.86	15
	17 UW	48	30.99	8
	20 IW	77	29.39	15
	20 UW	48	29.49	8
	21 UW	46	28.83	8

TABLE 2

FIELD GAS CHROMATOGRAPH ANALYSIS OF UVB MONITORING WELLS CAMP LEJEUNE, NC (11/10/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
20 IW	ND	0.11	0.16	ND	ND	0.27
20 UW	0.94	0.16	0.17	0.01	0.76	2.05
17 IW	1.48	0.21	0.16	ND	0.30	2.16
17 UW	11.72	10.87	30.40	1.64	1.95	56.58
15 IW	11.94	4.45	22.79	12.51	1.80	53.50
21 UW	ND	0.04	0.07	0.01	0.10	0.22

TABLE 3

FIELD GAS CHROMATOGRAPH ANALYSIS
UVB-400 SYSTEM EXHAUST
CAMP LEJEUNE, NC
(11/10/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 System Exhaust	ND	ND	ND	ND	ND	ND

System Influent Air = 5056 LFM, 306 m^3/hr with carbon
System Effluent = 3793 LFM at 6.0 cm dia., Plus 5916 LFM at 5.1 cm dia. = 417 m^3/hr with carbon
Vacuum at Well Head = - 52.5 mbars
Pumping Rate = 7.8 GPM, 1.78 m^3/hr

TABLE 4

FIELD GAS CHROMATOGRAPH ANALYSIS
UVB INFLUENT AND EFFLUENT GROUNDWATER SAMPLES
CAMP LEJEUNE, NC
(11/10/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 System Influent	ND	ND	ND	ND	ND	ND
UVB-400 System Effluent	ND	ND	ND	ND	ND	ND

*UVB-400 operating in a standard flow configuration with the assistance of a mechanical pump. Pumping rate measured at 7.8 gallons per minute at the time of start-up (8/12/97)

IEG Technologies's Trip Logs For Camp Lejeune Visit on 12/16/97 - 12/17/97

KGB System

1) The KGB system is not in operation at this time.

UVB 400 System

1) The UVB 400 system was in operation when field personnel arrived on the site on 12/16/97.

2) Monitoring wells used to monitor the UVB 400 system performance were gauged and purged prior to sampling (Tables 1 and 2). Samples were then collected for on-site portable gas chromatography analysis (Table 3).

3) UVB 400 system influent, effluent and exhaust sample was collected and analyzed in the field using a portable gas chromatograph. (Tables 3 and 4).

4) The UVB 400 system was operating as designed when field personnel left the site on the afternoon of 12/17/97.

5) A slug test was performed on monitoring well MW 15-IW.

6) A transducer test was performed on well nest 17-IW and 17-UW

7) A Briefing was given to Randy of OHM on how the UVB-400 systems operates on 12/17/97.

TABLE 1

WATER LEVEL MEASUREMENTS AND PURGE WATER AMOUNTS FOR UVB MONITORING WELLS CAMP LEJEUNE, NC (12/16/97)

SYSTEM	Well ID	Total Depth in Feet From Top of Casing	Depth to Water in Feet From Top of Casing	Purge Volume in Gallons
UVB	15 IW	61	28.44	15
	17 IW	76	30.37	15
	17 UW	48	30.24	8
	20 IW	77	28.73	15
	20 UW	48	28.57	8
	21 UW	46	27.85	8

TABLE 2

HISTORIC WATER LEVEL MEASUREMENTS FOR UVB MONITORING WELLS CAMP LEJEUNE, NC

Monitoring Well Location	7/2/97 Baseline	8/26/97	9/24/97	10/21/97	11/10/97	12/16/97
15 IW	30.40	30.52	30.64	30.07	29.36	28.44
17 IW	32.35	32.48	32.67	31.85	31.86	30.37
17 UW	32.25	32.36	32.50	31.88	30.99	30.24
20 IW	30.73	30.83	31.16	30.41	29.39	28.73
20 UW	30.59	30.68	31.00	30.24	29.49	28.57
21 UW	29.85	29.91	30.11	29.45	28.83	27.85

TABLE 3

FIELD GAS CHROMATOGRAPH ANALYSIS OF UVB MONITORING WELLS CAMP LEJEUNE, NC (12/16/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
20 IW	ND	0.20	0.14	ND	0.74	1.08
20 UW	2.72	0.12	0.11	ND	0.61	3.45
17 IW	1.75	0.10	0.37	0.03	0.64	2.89
17 UW	13.42	13.75	32.54	1.70	1.31	62.72
15 IW	15.08	4.84	27.70	12.94	1.83	62.49
21 UW	ND	0.03	0.06	ND	0.21	0.30

TABLE 4

FIELD GAS CHROMATOGRAPH ANALYSIS
UVB-400 SYSTEM EXHAUST
CAMP LEJEUNE, NC
(12/16/97)

SAMPLE LOCATION	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2 DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 System Exhaust	ND	ND	ND	ND	ND	ND

System Influent Air = 5348 LFM, 324 m^3/hr with carbon
System Effluent = 2294 LFM at 6.0 cm dia., Plus 5531 LFM at 5.1 cm dia. = 325 m^3/hr with carbon
Vacuum at Well Head = - 52.5 mbars
Pumping Rate = 7.8 GPM, 1.78 m^3/hr

TABLE 5

FIELD GAS CHROMATOGRAPH ANALYSIS
UVB INFLUENT AND EFFLUENT GROUNDWATER SAMPLES
CAMP LEJEUNE, NC
(12/16/97 - 12/17/97)

SAMPLE LOCATION / DATE	VINYL CHLORIDE IN PPM-V	TRANS 1,2 DICHLORO ETHYLENE PPM-V	CIS 1,2,DICHLORO ETHYLENE PPM-V	TCE IN PPM-V	UNIDENTIFIED COMPOUNDS PPM-V	TOTAL VOLATILES PPM-V
UVB-400 Influent 12/16/97	ND	ND	ND	ND	ND	ND
UVB-400 Effluent 12/16/97	ND	ND	ND	ND	ND	ND
UVB-400 Influent "Pump Initial" (Blower not in operation) 12/16/97	ND	ND	ND	ND	ND	ND
UVB-400 Influent "Pump 5 Min" (Blower not in operation) 12/17/97	ND	0.014	0.025	ND	ND	0.039
UVB-400 Influent "Pump 5 Min, 2 Test" (Blower not in operation) 12/17/97	ND	0.083	0.189	0.085	ND	0.357
UVB-400 Influent "Pump 110 Min" (Blower not in operation) 12/17/97	ND	0.084	0.199	ND	ND	0.283

*UVB-400 operating in a standard flow configuration with the assistance of a mechanical pump.

FIELD GAS CHROMATOGRAPH ANALYSIS OF MONITORING WELL HEADSPACE SAMPLES

MW17-IW

Measurements in PPM-V

Compound	7/2/97 Baseline *	8/26/97	9/24/97	10/22/97	11/10/97	12/16/97
Vinyl Chloride	Coelution	2.59	1.55	3.34	1.48	1.75
Trans 1,2 Dichloroethylene	4.32	0.17	0.19	1.16	0.21	0.10
Cis 1,2 Dichloroethylene	3.60	0.14	0.16	0.82	0.16	0.37
TCE	ND	ND	ND	ND	ND	0.03
Unidentified	2.59	0.18	0.02	0.08	0.30	0.64
Total (ID +Unid.)	10.51	3.08	1.92	5.56	2.16	2.89

* Initial round of sampling (7/2/97) made using TCE only standard. Values back calculated, however unable to isolate Vinyl Chloride due to coelution.

FIELD GAS CHROMATOGRAPH ANALYSIS OF MONITORING WELL HEADSPACE SAMPLES

MW15-IW

Measurements in PPM-V

Compound	7/2/97 Baseline *	8/26/97	9/24/97	10/22/97	11/10/97	12/16/97
Vinyl Chloride	Coelution	13.93	12.66	11.65	11.94	15.08
Trans 1,2 Dichloroethylene	8.07	5.44	4.99	4.53	4.45	4.84
Cis 1,2 Dichloroethylene	31.49	27.94	24.70	29.23	22.79	27.70
TCE	20.68	15.89	12.73	8.86	12.51	12.94
Unidentified	8.01	2.8	1.41	1.43	1.80	1.83
Total (ID +Unid.)	68.25	66.00	56.49	55.29	53.50	62.49

* Initial round of sampling (7/2/97) made using TCE only standard. Values back calculated, however unable to isolate Vinyl Chloride due to coelution.

FIELD GAS CHROMATOGRAPH ANALYSIS OF MONITORING WELL HEADSPACE SAMPLES

MW17-UW

Measurements in PPM-V

Compound	7/2/97 Baseline *	8/26/97	9/24/97	10/22/97	11/10/97	12/16/97
Vinyl Chloride	Coelution	11.58	10.05	12.50	11.72	13.42
Trans 1,2 Dichloroethylene	14.41	14.24	12.48	12.95	10.87	13.75
Cis 1,2 Dichloroethylene	19.79	26.58	21.03	20.25	30.40	32.54
TCE	3.01	1.40	1.03	1.35	1.64	1.7
Unidentified	5.37	1.7	0.72	1.51	1.95	1.31
Total (ID +Unid.)	42.58	55.5	45.31	48.15	56.58	62.72

* Initial round of sampling (7/2/97) made using TCE only standard. Values back calculated, however unable to isolate Vinyl Chloride due to coelution.

FIELD GAS CHROMATOGRAPH ANALYSIS OF MONITORING WELL HEADSPACE SAMPLES

MW21-UW

Measurements in PPM-V

Compound	7/2/97 Baseline *	8/26/97	9/24/97	10/22/97	11/10/97	12/16/97
Vinyl Chloride	Coelution	ND	ND	ND	ND	ND
Trans 1,2 Dichloroethylene	0.35	0.06	0.03	0.05	0.04	0.03
Cis 1,2 Dichloroethylene	0.42	0.20	0.07	0.11	0.07	0.06
TCE	0.04	0.01	0.01	0.01	0.01	ND
Unidentified	0.29	0.02	ND	0.04	0.10	0.21
Total (ID +Unid.)	1.10	0.29	0.11	0.18	0.22	0.30

* Initial round of sampling (7/2/97) made using TCE only standard. Values back calculated, however unable to isolate Vinyl Chloride due to coelution.

FIELD GAS CHROMATOGRAPH ANALYSIS OF MONITORING WELL HEADSPACE SAMPLES

MW20-UW

Measurements in PPM-V

Compound	7/2/97 Baseline *	8/26/97	9/24/97	10/22/97	11/10/97	12/16/97
Vinyl Chloride	Coelution	0.61	0.99	1.31	0.94	2.72
Trans 1,2 Dichloroethylene	0.86	0.34	0.18	0.28	0.16	0.12
Cis 1,2 Dichloroethylene	1.31	0.42	0.25	0.33	0.17	0.11
TCE	0.42	0.02	0.01	0.01	0.01	ND
Unidentified	1.23	1.09	0.09	0.66	0.76	0.61
Total (ID +Unid.)	3.83	2.48	1.52	2.18	2.05	3.45

* Initial round of sampling (7/2/97) made using TCE only standard. Values back calculated, however unable to isolate Vinyl Chloride due to coelution.

FIELD GAS CHROMATOGRAPH ANALYSIS OF MONITORING WELL HEADSPACE SAMPLES

MW20-IW

Measurements in PPM-V

Compound	7/2/97 Baseline *	8/26/97	9/24/97	10/22/97	11/10/97	12/16/97
Vinyl Chloride	Coelution	ND	ND	ND	ND	ND
Trans 1,2 Dichloroethylene	0.88	0.14	0.26	0.37	0.11	0.20
Cis 1,2 Dichloroethylene	1.59	0.17	0.19	0.41	0.16	0.14
TCE	ND	ND	0.003	ND	ND	ND
Unidentified	0.82	0.06	0.20	0.03	ND	0.74
Total (ID +Unid.)	3.29	0.37	0.65	0.84	0.27	1.08

* Initial round of sampling (7/2/97) made using TCE only standard. Values back calculated, however unable to isolate Vinyl Chloride due to coelution.

Appendix I

Phase II Study Slug Test

Slug Test with UVB-400 System OFF

12/17/97

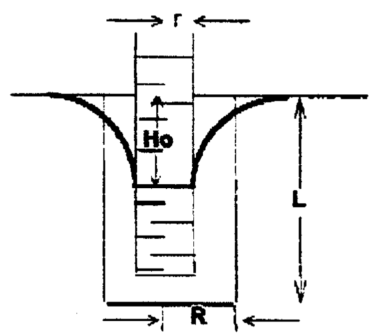
SLUG TEST ANALYSIS
HVORSLEV METHOD

Project Name: **IEG, MW-15**
Project No: **NA**
Well Number: **MW-15**

$K = r^2 \ln(L/R)/2LT_o$

where:

r=radius of casing (ft)	r (ft)	0.1666
L=length of screen (ft)	L (ft)	15
R=radius of screen including pack (ft)	R (ft)	0.333
To=time at 37% recovery (min)	To (graph)	3.77



$K = r^2 \ln(L/R)/2LTo$ K=

K =	9.35E-04	ft/min or	491	ft/year
=	4.75E-04	cm/sec or	1.346	ft/day

velocity = $Ki/n_{formation}$

where

i = hydraulic gradient	=	0.0375
$n_{formation}$ = porosity	=	0.325

velocity = 56.7 feet/year

Hvorslev, M.J., 1951, Time lag and soil permeability in groundwater observations, U.S. Army Corps of Engineers Waterway Experimentation Station, Bulletin 36.

Fetter, C.W., 1994, Applied Hydrogeology, Third Edition, New York, Macmillan Publishing Company.

IEG15B.XLS
Page 1

SLUG TEST ANALYSIS
HVORSLEV METHOD

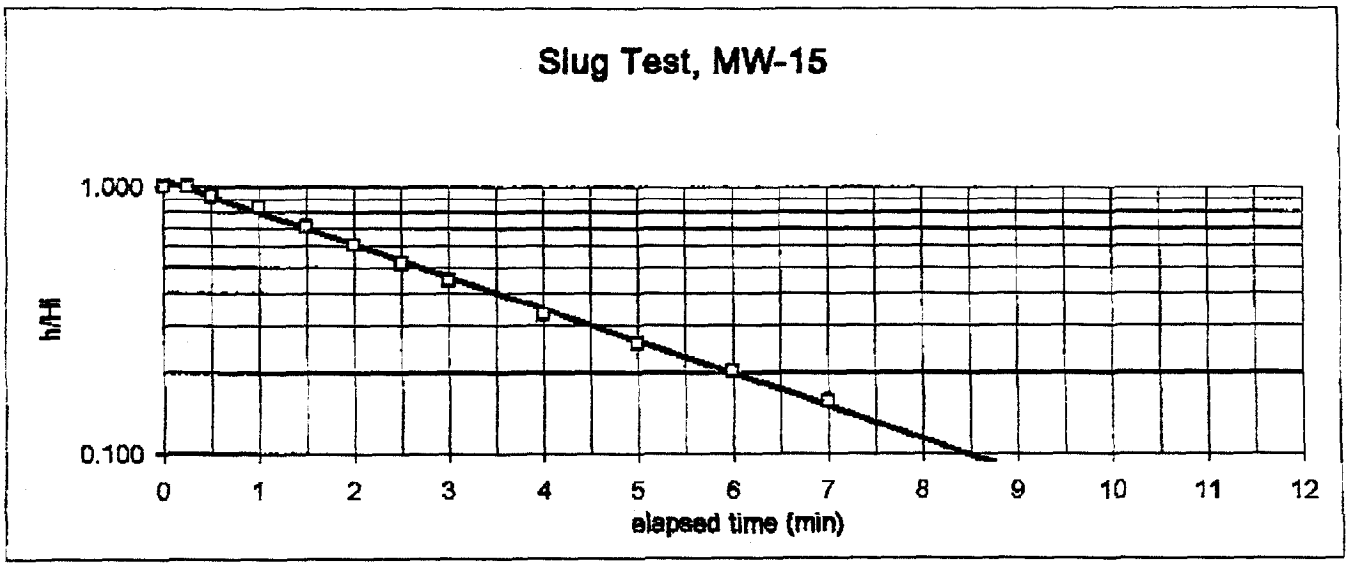
Project Name: **IEG, MW-15**
Project Number: **NA**
Well Number: **MW-15**

Date Conducted: 12/17/97

Static Level (H): 28.32
Depth of Well: 60

slope	y-int	GRAPH y-int	To
-1.21E-01	0.025	1.059	3.77

	Depth to Water	Elapsed time (min)	Change in Water Level (h) (feet)	Log of Change in Level	Best-Fit Line	h/Hi	Hi (Ho-H)
Ho	35.05	0	6.73		1.059	1.000	6.73
	35.05	0.25	6.73	0.00	0.988	1.000	
	34.49	0.5	6.17	-0.04	0.921	0.917	
	33.96	1	5.64	-0.08	0.801	0.838	
	33.10	1.5	4.78	-0.15	0.697	0.710	
	32.38	2	4.06	-0.22	0.606	0.603	
	31.78	2.5	3.46	-0.29	0.527	0.514	
	31.30	3	2.98	-0.35	0.459	0.443	
	30.56	4	2.24	-0.48	0.347	0.333	
	30.05	5	1.73	-0.59	0.262	0.257	
	29.68	6	1.36	-0.69	0.199	0.202	
	29.37	7	1.05	-0.81	0.150	0.156	
	28.83	12	0.51	-1.12	0.037	0.076	
	28.70	17	0.38	-1.25	0.009	0.056	
	28.63	22	0.31	-1.34	0.002	0.046	
	28.53	27	0.21	-1.51	0.001	0.031	



SLUG TEST ANALYSIS
BOUWER AND RICE METHOD

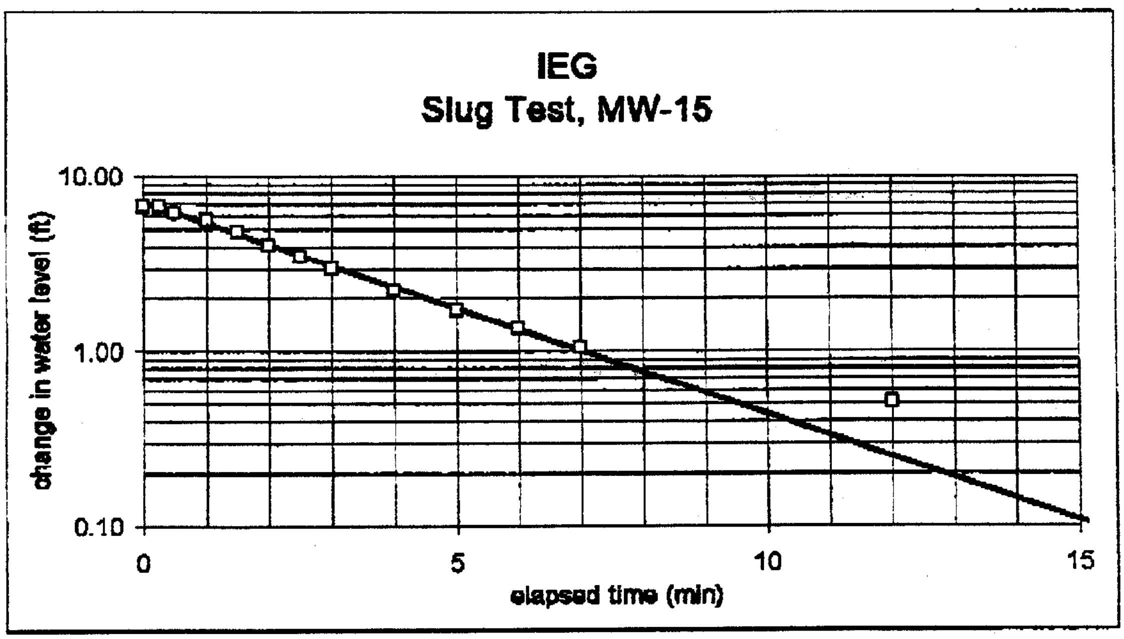
Project Name: **IEG MW-15b**
Project Number: **NA**
Well Number: **MW-15**

Date Conducted: 12/17/97

slope	y-int	GRAPH y-int
-1.2E-01	0.85	**7.128**

Static Level: 28.32
Depth of Well: 60

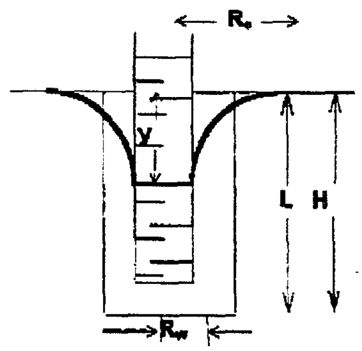
Depth to Water	Elapsed time (min)	Change in Water Level (feet)	Log of Change in Level	Best-Fit Line
35.05	0	6.73		7.128
35.05	0.25	6.73	0.83	6.648
34.49	0.5	6.17	0.79	6.200
33.96	1	5.64	0.75	5.392
33.10	1.5	4.78	0.68	4.690
32.38	2	4.06	0.61	4.079
31.78	2.5	3.46	0.54	3.548
31.30	3	2.98	0.47	3.086
30.56	4	2.24	0.35	2.335
30.05	5	1.73	0.24	1.766
29.68	6	1.36	0.13	1.336
29.37	7	1.05	0.02	1.011
28.83	12	0.51	-0.29	0.250
28.70	17	0.38	-0.42	0.062
28.63	22	0.31	-0.51	0.015
28.53	27	0.21	-0.68	0.004



SLUG TEST ANALYSIS
BOUWER AND RICE METHOD

Project Name: **IEG MW-15b**
Project No: **NA**
Well Number: **MW-15**

Date Conducted: 12/17/97



K= Hydraulic conductivity (ft/min)=		unknown
L=height of water column (ft)	=	31.68
n=porosity of filter pack(dimens'nless)		0.25
R_w=radius of borehole (ft)	=	0.33
R_c=radius of well (ft)	=	0.166
R_e=effective radius (ft)	=	in equation
C (from attached graph)		4
y_o=y intercept (from data plot)	=	7.13
y_t=drawdown (from data plot)	=	3.09
t=time in minutes (from data plot)	=	3
L/R_w	=	96.00

$K = [(R_c^2 * \ln(R_e/R_w)] / 2L)*1/t*\ln(y_o/y_t)$ K=

K =	7.46E-04	ft/min or	392	ft/year
=	3.79E-04	cm/sec or	1.075	ft/day

where $\ln(R_e/R_w) = 1/[1.1/\ln(L/R_w) + C/(L/R_w)]$ = 3.538

and $R_c = \mathrm{SQRT}\ [(1-n)R_c^2 + nR_w^2)]$ = 0.219

velocity = $Ki/n_{formation}$

where

i = hydraulic gradient	=	0.033	
$n_{formation}$ = porosity	=	0.25	0.0515

velocity = 51.8 feet/year

Bouwer, H., 1989, The Bouwer and Rice slug test - an update, Ground Water, v.27, no. 3, pp.304-309.

Bouwer, H. and R.C. Rice, 1976, A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, Water Resources Research, v.12, pp.423-428.

Slug Test with UVB-400 System ON

10/21/97

SLUG TEST DATA SHEET

DATE: 10/21/97

PROJECT: IEG MW-15 PROJ. NUMBER: NA

NAME: NA

BEGIN (TIME): NA

METHOD USED: BAIL: X VOL REMOVED: NA

END (TIME): NA

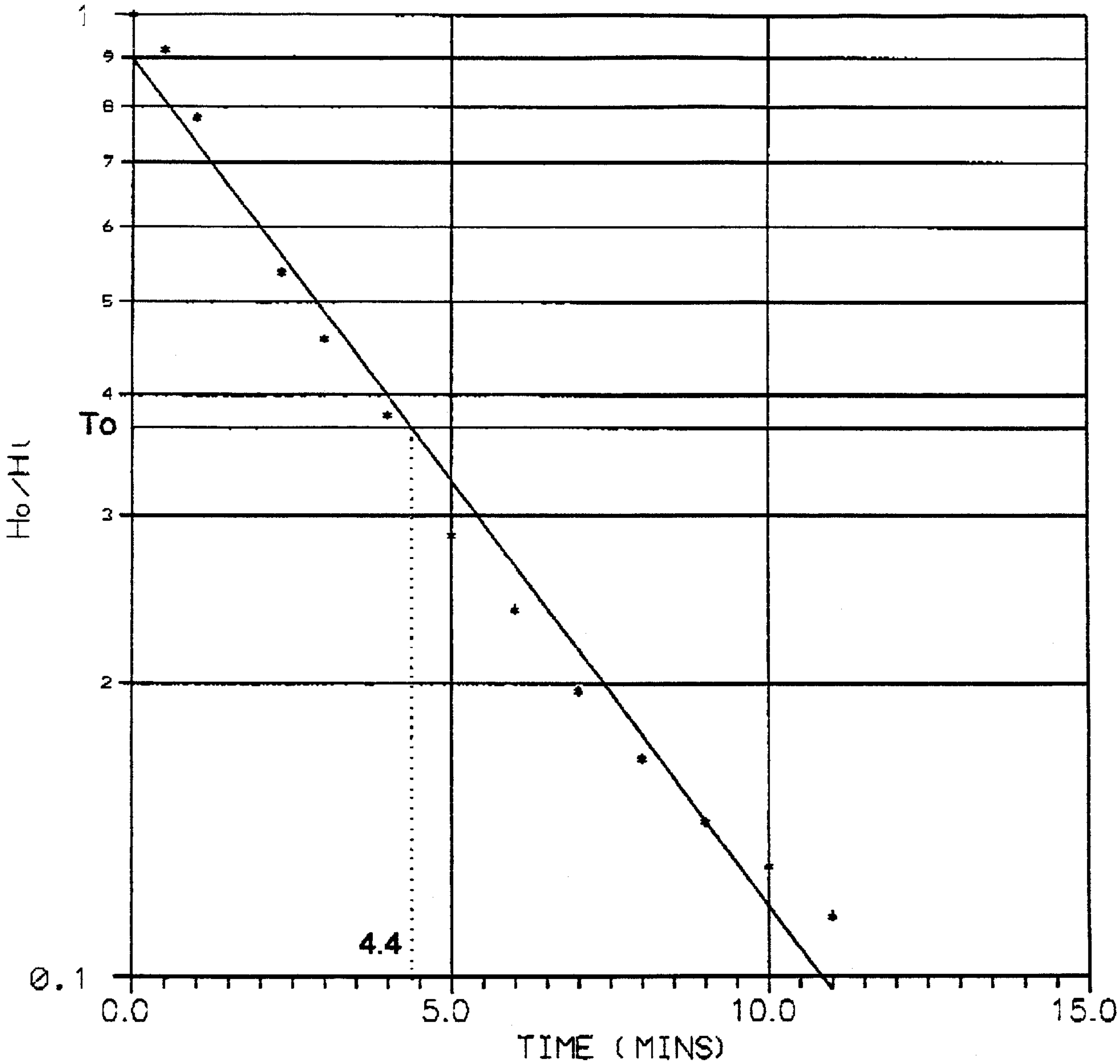
SLUG: VOL DISPLACED:

DEPTH OF WELL (ft.)	60	WELL #	MW-15
SCREEN LENGTH (ft.)	15	DEPTH OF SCREEN (ft.)	45-60 ft.
STATIC DEPTH TO WATER (H)	30.07	MEASURING POINT DESCRIPTION	TOC
DEPTH TO WATER at t=o (Ho)	37	CASING DIAMETER	4

REMARKS:

reading "0" (time 0) estimated at 37 ft.)

READING #	TIME (MIN) t	HEAD (ft) (h)	INITIAL HEAD CHANGE Hi = Ho - H	HEAD CHANGE Ho = h - H	Ho / Hi (for Hvorslev)
0	0.00	37.00	6.93	6.93	1.000
1	0.50	36.42		6.35	0.916
2	1.00	35.47		5.40	0.779
3	2.33	33.79		3.72	0.537
4	3.00	33.23		3.16	0.456
5	4.00	32.71		2.64	0.381
6	5.00	32.05		1.98	0.286
7	6.00	31.73		1.66	0.240
8	7.00	31.43		1.36	0.196
9	8.00	31.23		1.16	0.167
10	9.00	31.07		1.00	0.144
11	10.00	30.97		0.90	0.130
12	11.00	30.87		0.80	0.115



$$K = \frac{r^2 \ln(L/R)}{2LTo}$$

$$K = \frac{25.8064 \ln(45)}{241401.6}$$

$K = 4.07 \times 10^{-4}$ cm/sec

PARAMETERS

r = radius of casing = 2in = 5.08cm
L = length of screen = 15ft = 457.2cm
R = radius of screen = 4in = 10.16cm
To = time at 37% recovery = 4.4 min
= 264 sec

(Hvorslev, 1951)
(Fetter, 1988)

Project Number		SLUG TEST, MW-15 DRAWDOWN GRAPH, TIME vs Ho/Hi HVORSLEV METHOD	Nightingale Geologic Consultants, P.C.
Date 11/10/87	Layers Used		
Figure Identification No.	slug15.dw2		
Drawn	Scale		

SLUG TEST ANALYSIS
BOUWER AND RICE METHOD

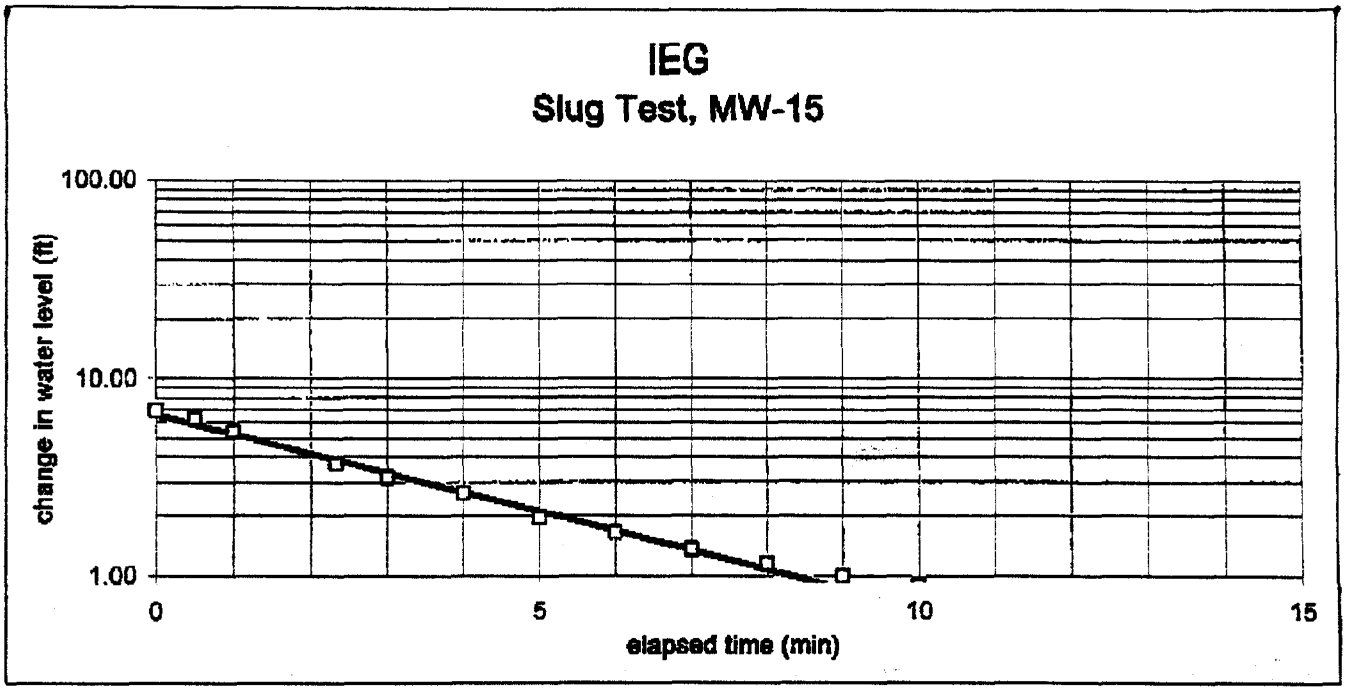
Project Name: **IEG MW-15**
Project Number: **NA**
Well Number: **MW-15**

Date Conducted: 10/21/97

slope	y-int	GRAPH y-int
-9.8E-02	0.82	**6.584**

Static Level: 30.07
Depth of Well: 60

Depth to Water	Elapsed time (min)	Change in Water Level (feet)	Log of Change in Level	Best-Fit Line
37.00	0	6.93		6.584
36.42	0.5	6.35	0.80	5.879
35.47	1	5.40	0.73	5.249
33.79	2.33	3.72	0.57	3.883
33.23	3	3.16	0.50	3.336
32.71	4	2.64	0.42	2.660
32.05	5	1.98	0.30	2.120
31.73	6	1.66	0.22	1.690
31.43	7	1.36	0.13	1.348
31.23	8	1.16	0.06	1.074
31.07	9	1.00	0.00	0.857
30.97	10	0.90	-0.05	0.683
30.87	11	0.80	-0.10	0.544



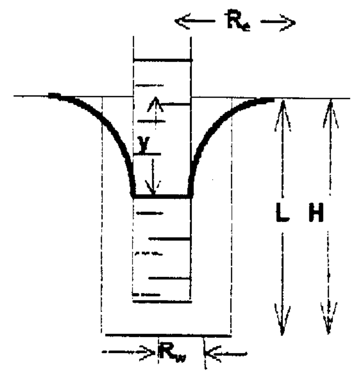
ENVIRONMENTAL ANSWERS, LLC

SLUG TEST ANALYSIS
BOUWER AND RICE METHOD

Project Name: **IEG MW-15**
Project No: **NA**
Well Number: **MW-15**

Date Conducted 10/21/97

K= Hydraulic conductivity (ft/min)=		unknown
L=height of water column (ft)	=	29.93
n=porosity of filter pack(dimens'nless)		0.25
R_w=radius of borehole (ft)	=	$\boxed{0.33}$
R_c=radius of well (ft)	=	$\boxed{0.166}$
R_e=effective radius (ft)	=	in equation
C (from attached graph)		$\boxed{4}$
y_o=y intercept (from data plot)	=	6.58
y_t=drawdown (from data plot)	=	1.69
t=time in minutes (from data plot)	=	6
L/R_w	=	90.70



$K = [(R_c^2 * \ln(R_e/R_w)] / 2L)*1/t*\ln(y_o/y_t)$ K=

K=	6.29E-04	ft/min or	331	ft/year
=	3.20E-04	cm/sec or	0.906	ft/day

where $\ln(R_e/R_w) = 1/[1.1/\ln(L/R_w) + C/(L/R_w)]$ = 3.471

and $R_c = SQRT [(1-n)R_c^2 + nR_w^2)]$ = 0.219

velocity = $Ki/n_{formation}$

Not Applicable to this site.

where

i = hydraulic gradient = 0.033

$n_{formation}$ = porosity = 0.25 0.051

velocity = 43.7 feet/year

Bouwer, H., 1989, The Bouwer and Rice slug test - an update, Ground Water, v.27, no. 3, pp.304-309.

Bouwer, H. and R.C. Rice, 1976, A slug test for determining hydraulic conductivity of unconfined aquifers
with completely or partially penetrating wells, Water Resources Research, v.12, pp.423-428.