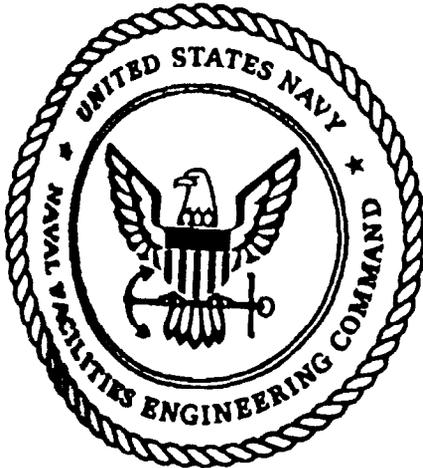


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RCRA FACILITY INVESTIGATION/SITE INSPECTION TECHNICAL MEMORANDUM NO. 2
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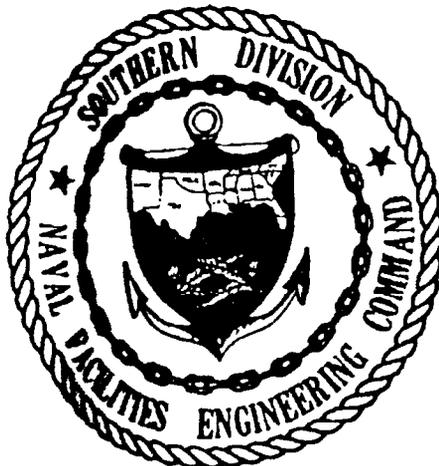


**RCRA FACILITY INVESTIGATION/SITE INSPECTION
TECHNICAL MEMORANDUM No. 2**

**NAVAL INSTALLATION RESTORATION PROGRAM
NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA**

CONTRACT NO. N62467-89-D-0317

JULY 1992



**SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA
29411-0068**

RELEASE OF THIS DOCUMENT REQUIRES
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**RCRA FACILITY INVESTIGATION/
SITE INSPECTION
TECHNICAL MEMORANDUM No. 2**

**NAVAL SUBMARINE BASE
KINGS BAY, GEORGIA**

Prepared for:

**Southern Division
Naval Facilities Engineering Command
Charleston, South Carolina 29411-0068**

Prepared by:

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July 1992

EXECUTIVE SUMMARY

ABB Environmental Services, Inc. (ABB-ES), under contract to Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), conducted site investigation activities at three of four former waste disposal sites at Naval Submarine Base (NSB), Kings Bay, Georgia. This technical memorandum is the second of five technical memoranda associated with the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and Site Inspection (SI) that will continue into calendar year 1993. The RFI/SI field program and preparation of this report were completed under the Comprehensive Long-Term Environmental Action Navy (CLEAN) contract (contract number N62467-89-D-0317, Contract Task Order [CTO] Number 041) between SOUTHNAVFACENGCOM and ABB-ES.

This Technical Memorandum No. 2 summarizes findings, results, and recommendations based on information and data collected as a result of groundwater sampling event No. 2, which was performed on May 4 through May 8, 1992. The three sites included in the groundwater monitoring program are identified as follows:

- Site 5, Army Reserve Disposal Area, Towhee Trail
- Site 11, Old Camden County Landfill
- Site 16, Army Reserve Disposal Area, Motor Missile Magazines

Groundwater sampling event No. 2 included collection of 22 groundwater samples, including two duplicate samples. Samples were submitted to CH2M HILL Laboratories in Montgomery, Alabama, for analysis of Appendix IX parameters. The following paragraphs summarize comparison of the analytical results for the first and second sampling events and the analytical program planned for groundwater sampling events Nos. 3 through 6.

No volatile organic compounds (VOCs) were detected in groundwater samples from Sites 5 or 16. VOCs detected in groundwater samples from Site 11 from the first groundwater sampling event were also present in groundwater samples from the second sampling event. VOCs will continue to be monitored at all three sites. The VOC analytes will be limited to include Target Compound List (TCL) VOCs, plus trichlorofluoromethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene.

At Site 11, vinyl chloride was detected in replicate groundwater samples from monitoring well KBA-11-2 at concentrations of 64 ug/l and 100 ug/l, which are 3 to 5 times the concentration detected in a sample from this monitoring well from groundwater sampling event No. 1. The Navy has elected to take immediate measures to determine whether vinyl chloride has migrated off base property. A preliminary plan of action has been developed that involves collection of groundwater samples using cone penetrometer testing (CPT) and on-site analysis of VOCs (ABB-ES, 1992b).

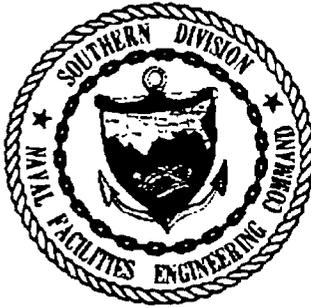
Site-related semivolatile organic compounds (SVOCs) were not detected in groundwater samples from Sites 5 or 16. At Site 11 1,4-dichlorobenzene was the only potentially site-related SVOC detected in groundwater samples. 1,4-Dichlorobenzene can also be analyzed as a VOC. SVOCs will be deleted from the monitoring program at Site 11 and Site 5. At Site 16, the base/neutral fraction of SVOCs will continue to be monitored because of concentrations of polynuclear

aromatic hydrocarbons (PAHs) in a subsurface soil sample from the boring for monitoring well KBA-16-2 (ABB-ES, 1992a).

Pesticides, polychlorinated biphenyl (PCB) compounds, herbicides, dioxins, and furans were not detected in groundwater samples from the three sites. These compounds will be deleted from the RFI/SI monitoring program, except that PCBs will continue to be monitored at Site 5 until additional soil PCB analytical data have been evaluated. One surface soil from Site 5 contained 53 ug/kg of the PCB Aroclor 1260. Additional soil samples will be collected to assess the site for higher concentrations of PCBs.

Concentrations of inorganic constituents were markedly lower in groundwater samples collected in May 1992. Appendix IX inorganic constituents will continue to be monitored at the three sites because decisions regarding whether releases of inorganic constituents have occurred require additional data collection.

Future groundwater sampling events at all three sites will include collection of both filtered and non-filtered groundwater samples for analysis of Appendix IX inorganic constituents. Total dissolved solids and total suspended solids will also be analyzed during future groundwater monitoring events. The decision to analyze filtered groundwater samples, total dissolved solids, and total suspended solids was prompted by the concentrations of inorganic constituents detected in both upgradient and downgradient groundwater samples associated with the first sampling event at the three sites.



FOREWORD

In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the 1986 Superfund Amendments and Reauthorization Act (SARA), the 1976 Resource Conservation and Recovery Act (RCRA), as augmented by the 1984 Hazardous and Solid Waste Amendments (HSWA), and as directed in Executive Order 12580 of January 1987, the Department of Defense (DOD) conducts an Installation Restoration (IR) Program for evaluating and remediating problems related to releases and disposal of toxic and hazardous materials at DOD facilities.

The Naval Assessment and Control of Installation Pollutants (NACIP) program was developed by the Navy to implement the IR Program for all Naval and Marine Corps facilities. The NACIP program was originally conducted in three phases: (1) Phase I, Initial Assessment Study, (2) Phase II, Confirmation Study (including a Verification Step and a Characterization Step), and (3) Phase III, Planning and Implementation of Remedial Measures. The three-phase IR Program was modified and updated to be congruent with CERCLA/SARA and RCRA/HSWA driven DOD IR program.

The updated nomenclature for the RCRA/SARA process is as follows:

- Preliminary Assessment and Site Inspection
- Remedial Investigation
- Feasibility Study
- Planning and Implementation of Remedial Design

Three sites at Naval Submarine Base (NSB) Kings Bay, Georgia, were identified for investigation under the IR Program. A work plan for conducting a RCRA Facility Investigation/Site Inspection (RFI/SI) at each of the three sites has been completed and implemented. This technical memorandum discusses the RFI/SI field program conducted at the activity and summarized findings, results, and revisions based on information and data collected as a result of the May 1992 field effort, which included the second of six groundwater sampling events. The deletion of certain Appendix IX parameters from the groundwater monitoring program based on results of laboratory analysis of environmental samples collected during the RFI/SI field program have been implemented.

Southern Division Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) has the responsibility for implementation of the Navy and Marine Corps IR Program in the southeastern and midwestern United States. Questions regarding this report should be addressed to the SOUTHNAVFACENGCOM Engineer-in-Charge, Mr. Ed Lohr, at (803) 743-0355.

ACKNOWLEDGEMENTS

In preparing this report, the personnel at ABB Environmental Services, Inc. commend the support, assistance, and cooperation provided by the personnel at NSB Kings Bay, Georgia, and SOUTHNAVFACENGCOM. In particular, we acknowledge the outstanding effort, dedication, and professionalism provided by the following people in the preparation of this report.

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RCRA Facility Investigation/Site Inspection
 Technical Memorandum No. 2

Naval Installation Restoration Program
 Naval Submarine Base
 Kings Bay, Georgia

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ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
ASTM	American Society for Testing and Materials
BLS	below land surface
CLEAN	Comprehensive Long-Term Environmental Action, Navy
CMS	Corrective Measures Study
CPT	Cone Penetrometer Testing
CRQL	contract required quantitation limit
CTO	Contract Task Order
DOD	Department of Defense
EL	elevation
FID	flame ionization detector
ft	Foot
GC/MS	gas chromatography/mass spectroscopy
HSWA	Hazardous and Solid Waste Amendments
IAS	Initial Assessment Study
IR	Installation Restoration
MCL	maximum contaminant level
MLW	mean low water
$\mu\text{g}/\text{l}$	micrograms per liter
$\mu\text{g}/\text{kg}$	micrograms per kilogram
$\mu\text{mhos}/\text{cm}$	micromhos per centimeter
mg/kg	milligram per kilogram
NACIP	Naval Assessment and Control of Installation Pollutants
NEESA	Naval Energy and Environmental Support Activity
NSB	Naval Submarine Base
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
PID	photoionization detector
ppm	parts per million
PVC	polyvinyl chloride
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SI	Site Inspection
s.u.	standard units
SOUTHNAV- FACENCOM	Southern Division, Naval Facilities Engineering Command

SS surface soil
SVOC semivolatile organic compound

TCL Target Compound List
TDS total dissolved solids
TSS total suspended solids

USEPA U.S. Environmental Protection Agency

VOC volatile organic compound

1.0 INTRODUCTION

1.1 PURPOSE. ABB Environmental Services, Inc. (ABB-ES), under contract to Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), conducted site investigation activities at three of four former wastes disposal sites at Naval Submarine Base (NSB) Kings Bay, Georgia. This Technical Memorandum is the second of five Technical Memoranda associated with the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and Site Inspection (SI) that will continue into calendar year 1993. The RFI/SI field program and preparation of this report were completed under the Comprehensive Long-Term Environmental Action Navy (CLEAN) contract (contract number N62467-89-D-0317, Contract Task Order [CTO] Number 041) between SOUTHNAVFACENGCOM and ABB-ES.

An Initial Assessment Study (IAS) was conducted in 1985 (C.C. Johnson and Associates, 1985) at NSB Kings Bay, Georgia. The IAS identified a total of 16 waste spill sites. None of the 16 sites required further action under the Navy Installation Restoration Program; however, four of the sites required further action under the Hazardous Waste Facility Permit. In February 1988, a Resource Conservation and Recovery Act and Hazardous and Solid Waste Amendments (HSWA) permit was issued to NSB Kings Bay by the Georgia Environmental Protection Division.

The overall purpose of the RFI/SI is to characterize three of the four previously identified sites with potential for contamination and/or contaminant migration. The three sites are identified as follows:

- Site 5 - Army Reserve Disposal Area, Towhee Trail
- Site 11 - Old Camden County Landfill
- Site 16 - Army Reserve Disposal Area

The fourth site, Site 12 - Army Reserve Disposal Area, Future Dry Dock, is included in the RFI/SI but no sampling or analyses will be conducted. NSB Kings Bay Public Works Department will conduct a records search and information review to be reported in the comprehensive RFI/SI Report. The RFI/SI Report will be prepared following completion of six groundwater sampling events scheduled to take place during calendar year 1992.

The information obtained during the RFI/SI will be used to eliminate sites from further consideration within the Navy IR Program (i.e., no further action) or present the necessary information (i.e., nature and distribution of contaminants) to plan further response actions including a Corrective Measures Study (CMS) and/or RCRA permit modification.

This Technical Memorandum No. 2 presents summarized findings, results, and recommendations based on information and data collected as a result of groundwater sampling event No. 2, which was performed on May 4 through 8, 1992.

2.0 FIELD PROGRAM

2.1 GROUNDWATER SAMPLING. Groundwater sampling was performed May 4, 1992, through May 8, 1992. Groundwater samples were collected from each of the 20 wells installed during the RFI/SI. Analysis of the samples included Appendix IX parameters. Laboratory services were provided by CH2M HILL Laboratories, Inc. in Montgomery, Alabama. Level C data quality objectives and deliverables were specified for the analytical program. Results of groundwater sample analyses are discussed in Sections 3.0 and 4.0.

Upon opening each monitoring well the headspace was screened for VOCs using a flame ionization detector (FID). Prior to sample collection each well was purged of at least three well volumes. Samples were collected within 24 hours following purging. An ISCO model 1580 peristaltic pump with polyethylene tubing was used to purge the monitoring wells. Decontaminated teflon bailers were used to collect samples. Groundwater was transferred from the bailer directly into labelled sample containers. ABB-ES personnel placed the filled containers on ice in ice chests immediately after collection. Chain-of-custody was initiated in the field at the time of sample collection. Samples were shipped via overnight courier service to the laboratory on the date of collection.

Appropriate preservatives were added to the empty sample containers by the laboratory prior to delivery of the containers to the project. Following sample collection ABB-ES personnel checked pH values of an aliquot of all preserved samples except VOC samples. Samples for cyanide analysis were also checked for sulfide and chloride interference by testing an aliquot of the sample with lead acetate and potassium iodide test paper.

Field parameters for groundwater samples included pH, conductivity, and temperature.

3.0 ANALYTICAL PROGRAM

This section summarizes the analytical program for groundwater samples collected during groundwater sampling event No.2 at NSB Kings Bay. In addition, it presents an assessment of data quality and useability.

3.1 CHEMICAL ANALYSES. Sampling activities during the second groundwater sampling event at NSB Kings Bay included the collection of 22 groundwater samples, including two duplicate samples. All samples were collected in accordance with the procedures outlined in the Quality Assurance Project Plan, Appendix A of the NSB Kings Bay Work Plan (ABB-ES, 1991). Samples were submitted to CH2M HILL Laboratories in Montgomery, Alabama, for chemical analyses. Table 3-1 summarizes the sampling and analysis program for samples collected from Sites 5, 11, and 16 during the second sampling event. Samples were analyzed in accordance with USEPA SW-846 methods (USEPA, 1986) and NEESA Level C documentation for Appendix IX volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), dioxins and furans, organochlorine and organophosphorous pesticides, polychlorinated biphenyls (PCBs), herbicides, and inorganic analytes (including total cyanide and sulfide) (NEESA, 1988). Table 3-2 provides a list of Appendix IX compounds and corresponding EPA analytical method numbers.

3.2 DATA QUALITY ASSESSMENT. All groundwater samples collected during the RFI/SI were properly preserved, placed in coolers, and packed with bagged ice immediately after their collection. All samples remained in the custody of the field operations leader until delivery to the courier service providing overnight shipment to the laboratory. All samples were shipped, complete with chain-of-custody forms, to CH2M HILL Laboratories within 24 hours for analysis. Upon arrival at CH2M HILL, the chain-of-custody and preservation of the samples was checked with the contents of each cooler by CH2M HILL personnel. After verification, the chain-of-custody form was signed by CH2M HILL personnel and the samples accepted for analysis.

Review of the field notebook and chain-of-custody forms did not indicate any non-conformance relative to field instrument calibration or sample handling. All required field quality control (QC) samples were collected in conformance with the requirements of the USEPA, NEESA, and ABB-ES Quality Assurance Plans and the June 1988 NEESA "Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program" (NEESA 1988). These field QC samples include field duplicates, equipment rinsewater blanks, source water blanks, and VOC trip blanks for each VOC sample shipment.

The analytical results for environmental samples collected during groundwater sampling event No. 2 were evaluated and validated according to NEESA Level C quality control criteria in order to determine data quality and useability. The data tables included in Appendix A reflect validation according to Level C criteria. These criteria are described in Section 7.3.2 of NEESA Document 20.2-047B. The following subsections discuss analytical performance and the evaluation of field and laboratory QC samples.

Table 3-1 Summary of Sampling and Analysis Program

Location and Type of Sampling	Laboratory Analysis					
	A	B	C	D	E	F
Site 5						
Groundwater	7	7	7	7	7	7
Site 11						
Groundwater	9	9	9	9	9	9
Site 16						
Groundwater	4	4	4	4	4	4
Field Duplicates						
Groundwater	2	2	2	2	2	2
Quality Control Samples						
Trip Blanks	5	0	0	0	0	0
Rinseate Blanks	5	5	5	5	5	5
Field Blanks	2	2	2	2	2	2

- A - Appendix IX Volatile Organic Compounds (VOCs)
- B - Appendix IX Semivolatile Organic Compounds (SVOCs)
- C - Appendix IX Organochlorine pesticides and PCBs
- D - Appendix IX Inorganic constituents (including cyanide and sulfide)
- E - Appendix IX Dioxins and Furans
- F - Appendix IX Herbicides and Organophosphorous pesticides

Table 3-2 Appendix IX, Groundwater Monitoring List

**Volatile Organic Compounds (58 total)
SW-846 Method 8240**

Chloromethane	Tetrachloroethene
Bromomethane	1,1,2,2-Tetrachloroethane
Vinyl Chloride	Toluene
Chloroethane	Chlorobenzene
Methylene Chloride	Ethylbenzene
Acetone	Styrene
Carbon Disulfide	Xylene (total)
Trichlorofluoromethane	1,3-Dichlorobenzene
1,1-Dichloroethene	1,4-Dichlorobenzene
1,1-Dichloroethane	1,2-Dichlorobenzene
1,2-Dichloroethene (total)	Acrolein
Chloroform	Iodomethane
1,2-Dichloroethane	Acrylonitrile
2-Butanone	Dibromomethane
1,1,1-Trichloroethane	Ethyl Methacrylate
Carbon Tetrachloride	1,2,3-Trichloropropane
Vinyl Acetate	trans-1,4-Dichloro-2-Butene
Bromodichloromethane	Acetonitrile
1,2-Dichloropropane	3-Chloropropene
cis-1,3-Dichloropropene	Propionitrile
Trichloroethene	Methacrylonitrile
Dibromochloromethane	1,4-Dioxane
1,1,2-Trichloroethane	Methyl Methacrylate
Benzene	1,2-Dibromoethane
trans-1,3-Dichloropropene	1,1,1,2-Tetrachloroethane
2-Chloroethylvinylether	1,2-Dibromo-3-Chloropropane
Bromoform	Pentachloroethane
2-Hexanone	Isobutyl alcohol
4-Methyl-2-Pentanone	Chloroprene

**Semivolatile Organic Compounds (acid fraction)
SW-846 Method 8270 (18 total)**

Phenol	2,4-Dichlorophenol
2,6-Dichlorophenol	4-Chloro-3-Methylphenol
2-Chlorophenol	2,4,6-Trichlorophenol
2-Methylphenol	2,4,5-Trichlorophenol
2,3,4,6-Tetrachlorophenol	2,4-Dinitrophenol
3-Methylphenol	4-Nitrophenol
4-Methylphenol	4,6-Dinitro-2-Methylphenol
2-Nitrophenol	2,4-Dimethylphenol
Benzoic Acid	Pentachlorophenol

Table 3-2 (continued) Appendix IX, Groundwater Monitoring List

**Semivolatile Organic Compounds (base/neutral fraction)
SW-846 Method 8270 (93 total)**

N-Nitrosodimethylamine	Di-n-Octyl Phthalate
Aniline	Benzo(b)Fluoranthene
bis(2-Chloroethyl)Ether	Benzo(k)Fluoranthene
1,3-Dichlorobenzene	Benzo(a)Pyrene
1,4-Dichlorobenzene	Indeno(1,2,3-cd)Pyrene
Benzyl Alcohol	Dibenz(a,h)Anthracene
1,2-Dichlorobenzene	Benzo(g,h,i)Perylene
bis(2-Chloroisopropyl)Ether	2-Picoline
N-Nitroso-Di-n-Propylamine	Methyl methanesulfonate
Hexachloroethane	Ethyl methanesulfonate
Nitrobenzene	Acetophenone
Isophorone	N-Nitrosopiperidine
bis(2-Chloroethoxy)Methane	Phenyl-tert-butylamine
1,2,4-Trichlorobenzene	N-Nitroso-di-n-butylamine
Naphthalene	N-Nitrosodiethylamine
4-Chloroaniline	N-Nitrosopyrrolidine
Hexachlorobutadiene	Benzidine
2-Methylnaphthalene	1,2,4,5-Tetrachlorobenzene
Hexachlorocyclopentadiene	Pentachlorobenzene
2-Chloronaphthalene	1-Naphthylamine
2-Nitroaniline	2-Naphthylamine
Dimethylphthalate	Diphenylamine
Acenaphthylene	Phenacetine
2,6-Dinitrotoluene	4-Aminobiphenyl
3-Nitroaniline	Pentachloronitrobenzene
Acenaphthene	Pronamide
Dibenzofuran	p-Dimethylaminoazobenzene
2,4-Dinitrotoluene	3-Methylcholanthrene
Diethylphthalate	7,12-Dimethylbenz(a)Anthracene
4-Chlorophenyl-phenylether	Pyridine
Fluorene	N-Nitrosomethylethylamine
4-Nitroaniline	N-Nitrosomorpholine
N-Nitrosodiphenylamine	o-Toluidine
1,2-Diphenylhydrazine	Hexachloropropene
4-Bromophenyl-phenylether	p-Phenylenediamine
Hexachlorobenzene	Safrole
Aramite	Isosafrole
Phenanthrene	1,4-Napthoquinone
Anthracene	1,3-Dinitrobenzene
Di-n-Butylphthalate	5-Nitro-o-toluidine
Fluoranthene	1,3,5-Trinitrobenzene
Pyrene	4-Nitroquinoline-1-oxide
Butylbenzylphthalate	Methapyrilene
3,3'-Dichlorobenzidine	3,3'-Dimethylbenzidine
Benzo(a)Anthracene	2-Acetamidofluorene
Chrysene	Hexachlorophene
bis(2-Ethylhexyl)Phthalate	

Table 3-2 (continued) Appendix IX, Groundwater Monitoring List

**Chlorinated Dibenzofurans and Dibenzo-p-dioxins
SW-846 Method 8280 (7 total)**

- Tetrachlorodibenzo-p-dioxins (TCDDs) (total)
- 2,3,7,8- TCDD (total)
- Pentachlorodibenzo-p-dioxins (PeCDDs) (total)
- Hexachlorodibenzo-p-dioxins (HeCDDs) (total)
- Tetrachlorodibenzofurans (TCDFs) (total)
- Pentachlorodibenzofurans (PeCDFs) (total)
- Hexachlorodebenzofurans (HeCDFs) (total)

**Organochlorine Pesticide and PCB Compounds (30 total)
SW-846 Method 8080**

- | | |
|---------------------|-----------------|
| alpha-BHC | 4,4'-DDT |
| beta-BHC | Methoxychlor |
| delta-BHC | Chlordane |
| gamma-BHC (Lindane) | Toxaphene |
| Heptachlor | Aroclor-1016 |
| Aldrin | Aroclor-1221 |
| Heptachlor epoxide | Aroclor-1232 |
| Endosulfan I | Aroclor-1242 |
| Dieldrin | Aroclor-1248 |
| 4,4'-DDE | Aroclor-1254 |
| Endrin | Aroclor-1260 |
| Endosulfan II | Kepone |
| 4,4'-DDD | Chlorobenzilate |
| Endrin aldehyde | Diallate |
| Endosulfan Sulfate | Isodrin |

**Organophosphorous Pesticide Compounds (9 total)
SW-846 Method 8140**

- | | |
|--------------------------|------------------|
| Triethylphosphorothioate | Disulfoton |
| Thionazin | Methyl Parathion |
| Sulfotepp | Ethyl Parathion |
| Phorate | Famphur |
| Dimethoate | |

**Chlorinated Herbicide Compounds (4 total)
SW-846 Method 8150**

- | | | | |
|-------|--------|---------|---------|
| 2,4-D | Silvex | 2,4,5-T | Dinoseb |
|-------|--------|---------|---------|
-

Table 3-2 (continued) Appendix IX, Groundwater Monitoring List

Inorganic Analytes (19 total)
SW-846 Methods

Antimony	Copper	Thallium
Arsenic	Lead	Vanadium
Barium	Mercury	Zinc
Beryllium	Nickel	Tin
Cadmium	Selenium	Cyanide
Chromium	Silver	Sulfide
	Cobalt	

3.2.1 Analytical Performance Review of analytical data indicated that the laboratory generally met applicable analytical QC criteria for all chemical analyses. Extraction and analysis holding times for all sample lots (except for three herbicide extractions) were met. The data review and validation were performed under a subcontract to Heartland Environmental Services, Inc., St. Peters, Missouri.

For VOC and SVOC analyses, all tuning criteria, holding times, internal standard/surrogate recoveries, precision, and accuracy criteria were met. However, several continuing calibration check standards contained compounds with percent differences exceeding QC limits. Sample results for compounds associated with the differences have been appropriately qualified as estimated and flagged with a "J". Sample quantitation limits for compounds associated with the differences have been appropriately qualified as estimated and flagged with a "UJ." All sample results qualified as estimated are considered useable data.

Analytical blanks associated with certain VOC sample analyses contained detectable concentrations of acetone and methylene chloride. Acetone and methylene chloride are common laboratory solvents and are frequently observed artifacts in laboratory method blanks. Table 3-3 summarizes VOC method blank analytical results.

Analytical blanks associated with SVOC sample analyses contained detectable concentrations of di-n-butylphthalate. Phthalate compounds are common laboratory and field contaminants which may originate from many types of plastic gloves, containers, and tubing used during field and laboratory operations. Table 3-3 summarizes SVOC method blank analytical results.

Qualifications of sample results for VOC and SVOC compounds associated with blank contamination are made according to NEESA Level C quality control guidelines and are as follows:

- If a chemical is present in a method blank, but not in associated samples, the sample results are reported unqualified at the CRQL. For the five common VOC and SVOC laboratory contaminants the CRQL is as follows:

Aqueous CRQL

Methylene chloride	5 µg/l
Acetone	10 µg/l
2-butanone	10 µg/l
Toluene	5 µg/l
Phthalates	10 µg/l

- If a chemical is present in the sample above the CRQL, but less than 5 times the concentration detected in the associated blanks (10 times for the chemicals listed above), qualify the result as undetected, "U". The "U" designation signifies that the chemical was analyzed for but not detected.

Table 3-3 Summary of VOC and SVOC Analysis of Method Blanks Associated with Samples Collected from all Sites

Method Blank ID	Blank Analysis Results			Associated Samples
	Compound	Concentration ($\mu\text{g}/\text{l}$)	CRQL* ($\mu\text{g}/\text{l}$)	Sample ID
X05082B1	Methylene Chloride	4 J	5	BT-12-FB, BS-12-ER, BT-13-FB, BS-13-ER, KBA-5-3, KBA-5-4, KBA-16-1, KBA-16-2, KBA-16-3, KBA-16-4
	Acetone	10	10	
X05132B1	Methylene Chloride	1 J	5	BT-14-FB, BS-14-ER, BT-15-FB, BS-15-ER, KBA-5-1, KBA-5-2, KBA-5-5, KBA-5-5D, KBA-5-6, KBA-5-7, KBA-11-1, KBA-11-8, KBA-11-9
	Acetone	7 J	10	
X05142B1	Methylene Chloride	1 J	5	BS-4-FB, BS-5-FB, BT-16-FB, KBA-11-2, KBA-11-2D, KBA-11-3, KBA-11-4, KBA-11-5, KBA-11-6, KBA-11-7
X05152B2	Methylene Chloride	3 J	5	BS-16-ER
	Acetone	5 J	10	
C05112B1	Di-n-butylphthalate	3 J	10	BS-13-ER, KBA-16-1, KBA-16-2, KBA-5-3, KBA-5-4
C05112B2	Di-n-butylphthalate	4 J	10	BS-14-ER, BS-15-ER, KBA-5-1, KBA-5-2, KBA-5-5, KBA-5-5D, KBA-5-6, KBA-5-7, KBA-11-1, KBA-11-8, KBA-11-9
C05112B3	Di-n-butylphthalate	5 J	10	BS-16-ER, KBA-11-2, KBA-11-2D, KBA-11-3, KBA-11-4, KBA-11-7, BS-5-FB

Notes: J = indicates that the reported concentration is estimated because it is below the CRQL

$\mu\text{g}/\text{l}$ = micrograms per liter

*Contract required quantitation limit

- If the sample result is below the CRQL and less than 5 times the blank value (10 times for the chemicals listed above), qualify by reporting as undetected at the CRQL.
- If the chemical is present in the sample at greater than 5 times the concentration in the method blank (10 times for the above chemicals), report as an unqualified result (i.e. the analyte is present).

Herbicide extraction holding times for three samples (BS-12-ER, KBA-16-3, and KBA-16-4) were exceeded by two days. Associated sample quantitation limits have been appropriately qualified as estimated and flagged with a "UJ".

For inorganic analyses, all holding times were met. Two matrix spike results for arsenic and cyanide and one matrix spike result for lead and selenium were below QC limits. Associated sample results and quantitation limits have been appropriately qualified as estimated. Several inorganics were detected in method blanks. Table 3-4 summarizes inorganic preparation and calibration blank analytical results. Inorganic results for environmental samples, in which concentrations of metals were also found in associated blanks, are designated undetected if the concentration in the sample is below CRQL and less than five times the blank value. For sample concentrations between 5 and 10 times that found in a blank that exhibited negative bias for an inorganic analyte, the sample results are qualified as estimated. No qualification is required if the sample value is more than 5 times the blank value and there is no negative bias, or more than 10 times the blank value if there is negative bias. All sample results qualified as estimated are considered useable data.

3.2.2 Evaluation of Field QC Samples Two field blanks, five trip blanks, and five rinseate blanks were collected during the second groundwater sampling event. One field blank, BS-4-FB, represents organic-free, deionized water which was used as a final rinse during equipment decontamination procedures and one field blank, BS-5-FB, represents regular deionized water which was used as an intermediate rinse during equipment decontamination procedures. The five equipment rinseate samples were collected during decontamination procedures involving teflon bailers.

No pesticides, PCBs, herbicides, dioxins, or furans were found in field blanks or rinseate blanks. Two SVOCs, diethylphthalate and bis(2-ethylhexyl)phthalate, were detected in rinseate blanks as shown in Table 3-5. Phthalate compounds are common laboratory and field contaminants which may originate from certain types of plastic gloves, containers, and tubing used during field and laboratory operations. The concentrations of these particular phthalates found in rinseate blanks and in corresponding method blanks are considered in interpretation of the results of the environmental samples. Occurrence of the observed levels in rinseate blanks and method blanks is common and do not constitute grounds for data rejection.

Several inorganics were detected in field blanks and rinseate blanks as shown in Table 3-5. Concentrations for all but two inorganic analytes are well below the CRQL. Blanks containing inorganic analytes below the CRQL are far below any regulatory limit in water, but will be considered in the evaluation of environmental samples.

Table 3-4 Summary of Inorganic Analysis of Preparation Blanks Associated with Samples Collected from all Sites

Sample Delivery Group No.	Blank Analysis Results			Associated Samples
	Compound	Concentration ($\mu\text{g}/\text{l}$)	CRQL* ($\mu\text{g}/\text{l}$)	
21599	Barium	0.5 J	200	BS-12-ER, KBA-16-3, BS-14-ER, KBA-16-4, KBA-5-1, KBA-5-2, KBA-5-5, KBA-5-5D, KBA-5-6, KBA-5-7, BS-15-ER, KBA-11-1, KBA-11-2, KBA-11-2D, KBA-11-7, KBA-11-8, KBA-11-9
21628	Lead	0.7 J	5	
21644	Zinc	5.0 J	20	
	Cadmium	-1.7 J	5	
	Vanadium	-1.4 J	50	
21616	Barium	1.4 J	200	BS-13-ER, KBA-16-1, KBA-16-2, KBA-5-3, KBA-5-4, KBA-11-3, BS-4-FB, BS-5-FB, BS-16-ER, KBA-11-4, KBA-11-5, KBA-11-6
21652	Mercury	0.1 J	0.2	
	Zinc	7.8 J	20	
	Nickel	-7.8 J	40	

Notes:

*Contract required quantitation limit

J = indicates that the reported concentration is estimated because it is below the CRQL

$\mu\text{g}/\text{l}$ = micrograms per liter

Table 3-5 Summary of Trip Blanks and Field Blanks Associated with Samples Collected from all Sites

Compounds Detected	CRQL	Sample Identification				
		Trip Blanks				
		BT-12-FB	BT-13-FB	BT-14-FB	BT-15-FB	BT-16-FB
VOCs ($\mu\text{g}/\text{l}$)						
Chloroform	5	4 J	5 U	4 J	5 U	5 U
2-Butanone	10	10 U	18	11	15	10 U
Xylene (total)	5	1 J	5 U	5 U	5 U	5 U
Equipment Rinseate Blanks						
		BS-12-ER	BS-13-ER	BS-14-ER	BS-15-ER	BS-16-ER
VOCs ($\mu\text{g}/\text{l}$)						
Acetone	10	100 U	72 U	280	210	58
Chloroform	5	8	11	3 J	2 J	9
2-Butanone	10	71	42	170	220	27
Bromodichloromethane	5	2 J	4 J	5 U	5 U	4 J
Dibromochloromethane	5	5 U	2 J	5 U	5 U	2 J
Chlorobenzene	5	2 J	5 U	2 J	2 J	5 U
Acetonitrile	100	36 J	100 U	100 U	100 U	100 U
3-Chloropropene	5	3 J	5 U	5	5 U	5 U
SVOCs ($\mu\text{g}/\text{l}$)						
bis(2-Ethylhexyl) Phthalate	10	10 U	3 J	10 U	10 U	10 U
Inorganics ($\mu\text{g}/\text{l}$)						
Chromium	10	3.3 U	3.3 U	6.0 J	3.3 U	3.3 U
Copper	25	28.9	33.0	205	51.6	108
Lead	50	1.8 U	0.90 J	2.1 U	1.0 U	0.90 J
Nickel	40	7.8 U	7.8 UJ	7.8 U	7.8 U	9.0 J
Thallium	10	0.80 U	0.90 J	0.80 U	0.80 U	0.80 U
Zinc	20	7.0 U	6.0 U	21.6	8.3 U	16.1 U

See notes at end of table.

Table 3-5 (continued) Summary of Trip Blanks and Field Blanks Associated with Samples Collected from all Sites

Compounds Detected	CRQL	Sample Identification	
		Field Blanks	
		BS-4-FB	BS-5-FB
VOCs ($\mu\text{g}/\text{l}$)			
Acetone	10	35 J	10 UJ
Trichlorofluoromethane	5	5 U	2 J
Chloroform	5	16	5 U
2-Butanone	10	28	10 U
Bromodichloromethane	5	6	5 U
Dibromochloromethane	5	3 J	5 U
Chlorobenzene	5	2 J	5 U
SVOCs ($\mu\text{g}/\text{l}$)			
		None Detected	
Diethylphthalate	10	2 J	10 U
bis(2-Ethylhexyl) Phthalate	10	3 J	10 U
Pesticides/PCBs/Herbicides			
		None Detected	
Inorganics ($\mu\text{g}/\text{l}$)			
Chromium	10	4.1 J	3.3 U
Copper	25	15.2 J	1.1 U
Lead	5	0.90 J	0.50 U

Notes:

* Trip blanks are analyzed for VOCs only.

J = estimated value

U = not detected at the reported value

$\mu\text{g}/\text{l}$ = micrograms per liter

Zinc was detected in all five rinseate blanks and was also present in their corresponding preparation blanks. For four rinseates the result for zinc was qualified as undetected because the concentration in the rinseate sample was less than five times the concentration in the preparation blank. The result for the fifth rinseate blank (BS-14-ER) could not be qualified as undetected based on Level C validation guidelines; however, the result of 20 $\mu\text{g}/\text{l}$ is considered biased high. Concentrations of copper in rinseate blanks exceeded the CRQL of 25 $\mu\text{g}/\text{l}$. Copper was also detected in the field blank and is representative of the source water used to collect these rinseate blanks. Both copper and zinc were detected in associated environmental samples but at much lower concentrations. The presence of copper and zinc in rinseate samples does not affect the interpretability of the data since concentrations are far below any regulatory limit, but the reported concentrations of copper and zinc in environmental samples may be biased high.

The VOCs chloroform, 2-butanone, and xylene were detected in four trip blanks as shown in Table 3-5. Several VOCs, including acetone, were detected in field blanks and rinseate blanks. As discussed in Section 3.2.1, method blanks associated with several of these rinseate blanks and field blanks also contained acetone. The occurrence of the observed levels of acetone in blanks is common and does not constitute grounds for data rejection.

None of the environmental samples associated with the trip blanks or rinseate blanks that contained detectable levels of VOCs contained these particular compounds. Chloroform, bromodichloromethane, and chlorodibromomethane are trihalomethanes which form in water chlorinated for drinking water disinfection. They also frequently occur in laboratory, deionized, organic-free water (ASTM Type II) water due to carry over in distillation and deionization. However, the water used during rinseate collection was carbon filtered and should not have contained organic compounds. Chlorobenzene, chloroform, bromodichloromethane, 2-butanone, and chlorodibromomethane were also detected in the field blanks representing organic-free water (BS-4-FB), but were not present in the field blank representing regular deionized water. A possible source of organics in the water is the improper maintenance of the charcoal filters used during filtering processes. Chlorobenzene was the only VOC found in BS-4-FB that was also detected in environmental samples. The presence of chlorobenzene in the field blank will be considered in evaluation of sample results.

Based on USEPA guidelines, organic-free water which has been treated with activated carbon and deionizing units should contain no pesticides, herbicides, extractable organic compounds (SVOCs), and less than 50 $\mu\text{g}/\text{l}$ of purgeable organic compounds (VOCs) (USEPA, 1991). The field blank BS-4-FB contained an estimated 90 $\mu\text{g}/\text{l}$ VOCs. Due to the extent of contamination in the organic-free, deionized water, ABB-ES will obtain the organic-free water required for final decontamination rinsing from an alternate source during future groundwater sampling events.

Review of the field duplicates showed good agreement for groundwater with the exception of one analyte in groundwater sample, KBA-5-5 (Table 3-6). During field duplicate comparisons, where an analyte was not detected in one groundwater replicate it was present at less than three times the quantitation limit in the duplicate. Variation in groundwater replicate results is common when an analyte is present in the replicates at or near the detection limit. Bis(2-ethylhexyl)phthalate was detected in one replicate (KBA-5-5) at 18 $\mu\text{g}/\text{l}$ and

undetected in the other replicate (KBA-5-5D) (see Table 3-6). As previously mentioned, phthalate compounds are common laboratory and field contaminants. The detection of this particular phthalate compound in one replicate but not the other is most likely indicative of laboratory or sampling contamination; however, the presence of bis(2-ethylhexyl)phthalate will be considered in the evaluation of this sample.

Table 3-6 Summary of Field Duplicate Results for Groundwater Samples Collected from all Sites

Sample Identification	Results ¹	
KBA-5-5/KBA-5-5D	<u>VOCs (µg/l)</u>	
	None detected	
	<u>SVOCs(µg/l)</u>	
	bis(2-Ethylhexyl)Phthalate	18/ 10 U
	<u>Pesticides and PCBs/ Herbicides (µg/l)</u>	
	None detected	
	<u>Metals (µg/l)</u>	
	Arsenic	22.5 J/ 24.0 J Lead 17.8/ 16.9
	Barium	187 J/ 187 J Nickel 24.3 J/ 24.7 J
	Beryllium	2.6 J/ 2.3 J Selenium 3.3 J/ 2.5 J
Cadmium	1.3 U/ 3.1 J Thallium 1.1 J/ 1.3 J	
Chromium	30.8/ 30.2 Vanadium 42.1 J/ 37.6 J	
Cobalt	14.7 J/ 13.0 J Zinc 62.9/ 62.2	
Copper	9.6 J/ 9.8 J Sulfide 1200/ 1300	

See notes at end of table.

Table 3-6 Summary of Field Duplicate Results for Groundwater Samples Collected from all Sites

Sample Identification	Results ¹	
KBA-11-2/ KBA-11-2D	<u>VOCs (µg/l)</u>	
	Vinyl Chloride	64/ 100
	1,2-Dichloroethene	16/ 22
	Trichloroethene	5 U/ 1 J
	Tetrachloroethene	1 J/ 1 J
	Toluene	5 U/ 1 J
	Xylene (total)	2 J/ 4 J
	<u>SVOCs/ Pesticides and PCBs/ Herbicides (µg/l)</u>	
	No compounds detected	
	<u>Metals (µg/l)</u>	
	Barium	26.2 J/ 25.9 J Selenium 2.7 J/ 2.9 J
	Beryllium	1.7 J/ 1.7 J Vanadium 20.2 J/ 24.5 J
	Chromium	38.1/ 37.2 Cyanide 6.1 J/ 6.1 J
	Copper	6.4 J/ 6.2 J Sulfide 2600/ 1000
	Lead	4.5/ 5.6

Notes:

µg/l = micrograms per liter

¹Numbers separated by a slash indicate respective concentrations of an analyte in replicate samples identified similarly under the heading for sample identification.

U = undetected at the stated detection limit

J = concentration value estimated. Either below CRQL or due to non-rejectable QA problems.

4.0 RESULTS OF INVESTIGATIONS

The purpose of Section 4.0 is to present the results of analysis of groundwater samples collected during the second groundwater sampling event, May 1992. Technical Memorandum No. 1 (ABB-ES, 1992a) presents discussions of the RFI/SI field program, including analyses of soil samples from the sites and groundwater sampling event No. 1. The contents of this section are arranged according to site, in the following order:

- Site 5, Army Reserve Disposal Area, Towhee Trail
- Site 11, Old Camden County Landfill
- Site 16, Army Reserve Disposal Area, Motor Missile Magazines

Tables included in this section summarize analytical data for compounds detected in samples collected during the second sampling event. The following subsections discuss comparison of these data with data associated with the first sampling event conducted in February 1992. Appendix A contains tables of validated analytical data for the full list of Appendix IX parameters for samples collected in May 1992. Analyses were performed by CH2M HILL Laboratories under subcontract to ABB-ES. Appendix B contains analytical data tables for compounds detected in groundwater samples collected during the first sampling event.

4.1 SITE 5, ARMY RESERVE DISPOSAL AREA, TOWHEE TRAIL On May 5, 1992, groundwater level measurements were taken from seven monitoring wells at Site 5. Figure 4-1 is a groundwater potentiometric surface map developed from these measurements. The configuration of the potentiometric surface and the groundwater flow direction are generally unchanged from February 1992, when sampling event No. 1 was conducted.

The headspace of monitoring wells were screened for VOCs using an FID. In February 1992, during the first sampling event, a photoionization detector (PID) was used to screen the headspace of monitoring wells. No measurable VOCs were detected in February 1992, whereas in May 1992 the headspace of one monitoring well, KBA-5-1, recorded 25 parts per million (ppm) on the FID. No other monitoring wells were found to contain measurable VOCs (Table 4-1). Groundwater analytical data for the two sampling events and soil sample analytical data associated with the RFI/SI field program do not indicate a source for the VOC headspace reading for monitoring well KBA-5-1. The reading of .25 ppm is attributed to collection of naturally occurring methane gas in the monitoring well headspace. This is consistent with headspace VOC screening data for monitoring wells at the other two sites under investigation. The PID is not sensitive to methane, but an FID will respond to concentrations of methane. The concentrations detected by the FID decreased rapidly once the cap was removed from the well riser pipe.

Field measurements of pH, specific conductance, and temperature were collected during monitoring well purging. Table 4-1 summarizes field measurements collected during purging of monitoring wells at Site 5. Purging continued until four well volumes had been removed, and field parameters had stabilized to within 10 percent (%). The final measurements of pH, specific conductance, and temperature are considered the measurements of record for the monitoring well (USEPA, 1991).

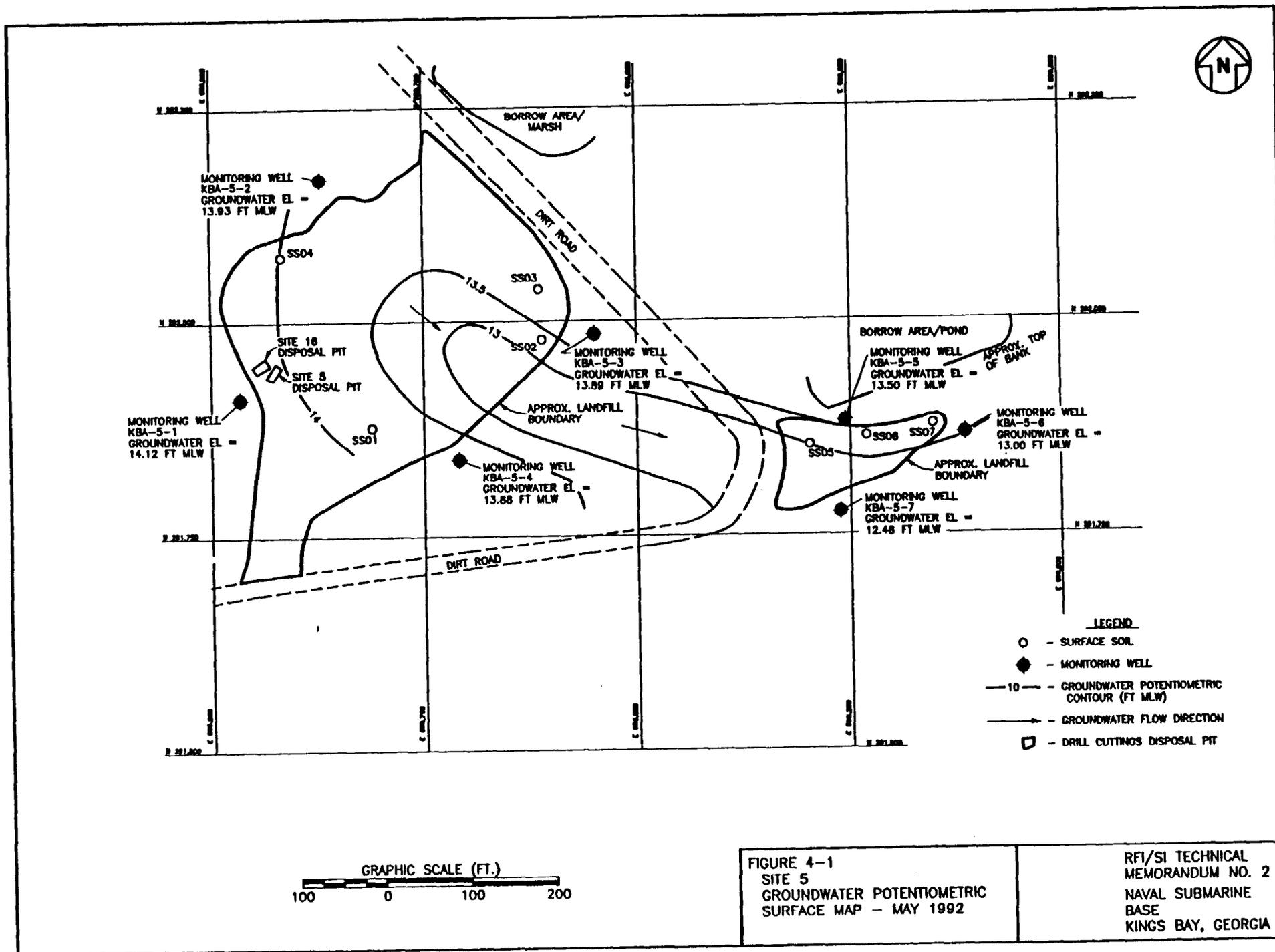


FIGURE 4-1
 SITE 5
 GROUNDWATER POTENTIOMETRIC
 SURFACE MAP - MAY 1992

RFI/SI TECHNICAL
 MEMORANDUM NO. 2
 NAVAL SUBMARINE
 BASE
 KINGS BAY, GEORGIA

Table 4-1 Summary of Field Measurements for Monitoring Wells at Site 5

Monitoring Well No.	FID Headspace Data (ppm)	Field Data ¹	Well Volume No.				Total Purge Vol. (gal)
			1	2	3	4	
KBA-5-1	25	pH	4.74	4.53	4.47	4.44	5.0
		Cond.	error	error	error	error	
		Temp.	error	error	error	error	
KBA-5-2	0	pH	4.94	4.64	4.60	4.54	6.0
		Cond.	error	error	error	error	
		Temp.	error	error	error	error	
KBA-5-3	0	pH	4.84	4.65	4.63	4.63	6.0
		Cond.	error	error	error	error	
		Temp.	error	error	error	error	
KBA-5-4	0	pH	5.11	4.87	5.00	4.93	5.0
		Cond.	error	error	error	error	
		Temp.	error	error	error	error	
KBA-5-5	NA	pH	5.25	5.05	5.04	5.05	6.0
		Cond.	140	130	125	125	
		Temp.	25	23	23	22	
KBA-5-6	NA	pH	5.40	5.37	5.38	5.34	5.0
		Cond.	280	265	250	240	
		Temp.	22	21	20	20	
KBA-5-7	NA	pH	6.11	6.18	6.24	6.24	5.0
		Cond.	550	440	390	350	
		Temp.	21	21	21	21	

Notes:

FID = flame ionization detector

ppm = parts per million

NA = not analyzed because of problems with FID gas cylinder O-ring.

error = analyzed, but readings were erroneous because of instrument malfunction. Instrument replaced.

1) Units are standard units (s.u.) for pH, micromhos per centimeter (umhos/cm) for specific conductance, and degrees Celsius (°C) for temperature.

Eight groundwater samples, including one duplicate sample, were collected from seven monitoring wells at Site 5. Groundwater samples were analyzed for Appendix IX parameters. Table 4-2 summarizes analytical data for compounds detected in groundwater samples collected from Site 5.

4.1.1 Volatile Organic Compounds in Groundwater Analytical data for the second sampling event did not confirm the presence of these VOCs in groundwater at Site 5. No VOCs were detected in groundwater samples collected during the second sampling event. No QA/QC problems were identified that would adversely affect the VOC data for these samples and the data are considered representative of groundwater quality at the site. Five VOCs were detected in groundwater samples collected during the first groundwater sampling event, including; carbon disulfide, trichlorofluoromethane, 4-methyl-2-pentanone; ethylbenzene, and xylene. Concentrations of these VOCs ranged from 7 $\mu\text{g}/\text{l}$ to an estimated 1 J $\mu\text{g}/\text{l}$ (Appendix B). VOCs will, however, continue to be monitored at Site 5. Section 5.1 of this document describes the analytical program for sampling events Nos. 3 through 6.

4.1.2 Semivolatile Organic Compounds in Groundwater SVOC analytical data for groundwater samples collected from Site 5 during the second sampling event do not indicate the presence of site-related SVOCs. Bis(2-ethylhexyl) phthalate was detected in two groundwater samples, from monitoring wells KBA-5-2 and KBA-5-5, at concentrations of 2 J $\mu\text{g}/\text{l}$ and 18 $\mu\text{g}/\text{l}$, respectively. The duplicate sample from monitoring well KBA-5-5 did not contain detectable concentrations of bis(2-ethylhexyl)phthalate. Previous groundwater samples collected from Site 5 during the first sampling event did not contain detectable concentrations of SVOCs.

The presence of bis(2-ethylhexyl)phthalate in two groundwater samples collected from Site 5 during the second sampling event is attributed to sampling and/or laboratory artifact. Phthalates are easily introduced into sample media by items such as sample gloves, plastic tubing, sample containers, or other materials having plastic components.

Recommendations presented in Technical Memorandum No. 1 (ABB-ES, 1992) included deletion of SVOCs from the monitoring program at Site 5, if analytical data for the second sampling event confirmed the absence of SVOCs in groundwater at this site. This has been confirmed by second round data and SVOCs will not be included in the analytical program for groundwater sampling events No. 3 through 6. Section 5.1 of this document describes the analytical program for Site 5.

4.1.3 Pesticides, Herbicides, and PCBs in Groundwater Pesticides, herbicides, and PCBs were not detected in groundwater samples collected from Site 5 during the first and second sampling events. Pesticides and herbicides will be deleted from the analytical program for sampling events No. 3 through 6.

PCBs will continue to be monitored in groundwater at Site 5 until additional soil sample PCB analytical data have been evaluated. During groundwater sampling event No. 3, scheduled for mobilization on July 7, 1992, seven soil samples will be collected from locations around surface soil sample SS-02 (Figure 4-2). Soil sample SS-02 was collected during the RFI/SI field program in February 1992 and contained 53 $\mu\text{g}/\text{kg}$ of the PCB Aroclor-1260.

Table 4-2 Summary of Laboratory Analysis of Groundwater Samples Collected from Site 5¹

Compounds Detected	Monitoring Well Number								
	CRQL	KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-4	KBA-5-5	KBA-5-5D	KBA-5-6	KBA-5-7
APPENDIX IX SVOCs ($\mu\text{g/L}$)									
bis(2-Ethylhexyl)-Phthalate ²	10	10 U	2 J	10 U	10 U	18	10 U	10 U	10 U
APPENDIX IX Inorganics ($\mu\text{g/l}$)									
Arsenic ³	10	10.5 J	20.0 J	28.5	12.5	22.5 J	24.0 J	3.2 J	14.0 J
Barium ²	200	417	181 J	366	274	187 J	187 J	208	203
Beryllium ²	5	3.4 J	1.4 J	2.9 J	2.3 J	2.6 J	2.3 J	2.0 J	2.0 J
Cadmium ^{2,4}	5	1.3 J	1.0 UJ	2.2 J	1.8 J	1.3 J	3.1 J	7.5 J	5.5 J
Chromium	10	56.8	24.7	59.5	31.4	30.8	30.2	34.7	35.2
Cobalt ²	50	16.8 J	7.8 U	14.1 J	7.8 U	14.7 J	13.0 J	7.8 U	7.8 U
Copper ²	25	14.6 J	10.9 J	22.2 J	10.3 J	9.6 J	9.8 J	10.7 J	14.8 J
Lead	5	13.1	10.0	18.0	14.0	17.8	16.9	11.3	12.7
Nickel ^{2,4}	40	24.3 J	7.8 U	21.3 J	8.2 J	24.3 J	24.7 J	9.4 J	19.7 J
Selenium ^{2,3}	5	3.2 J	2.3 J	6.3	2.9 J	3.3 J	2.5 J	2.7 J	2.9 J
Thallium ²	10	1.0 J	0.80 U	1.1 J	1.1 J	1.1 J	1.3 J	0.80 U	0.80 U
Vanadium ^{2,4}	50	63.5	21.4 J	52.3	31.5 J	42.1 J	37.6 J	34.6 J	34.3 J
Zinc	20	62.0	130	76.1	41.0	62.9	62.2	44.0	45.3

See notes at end of table.

Table 4-2 Summary of Laboratory Analysis of Groundwater Samples Collected from Site 5¹

Compounds Detected	Monitoring Well Number								
	CRQL	KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-4	KBA-5-5	KBA-5-5D	KBA-5-6	KBA-5-7
Cyanide ²	10	1.8 U	1.8 U	1.8 U	7.8 J	1.8 U	1.8 U	10.3	5.7 J
Sulfide	100	1800	100 U	400	500	1200	3100	500	400

Notes:

CRQL = Contract Required Quantitation Limit

U = not detected above or below CRQL

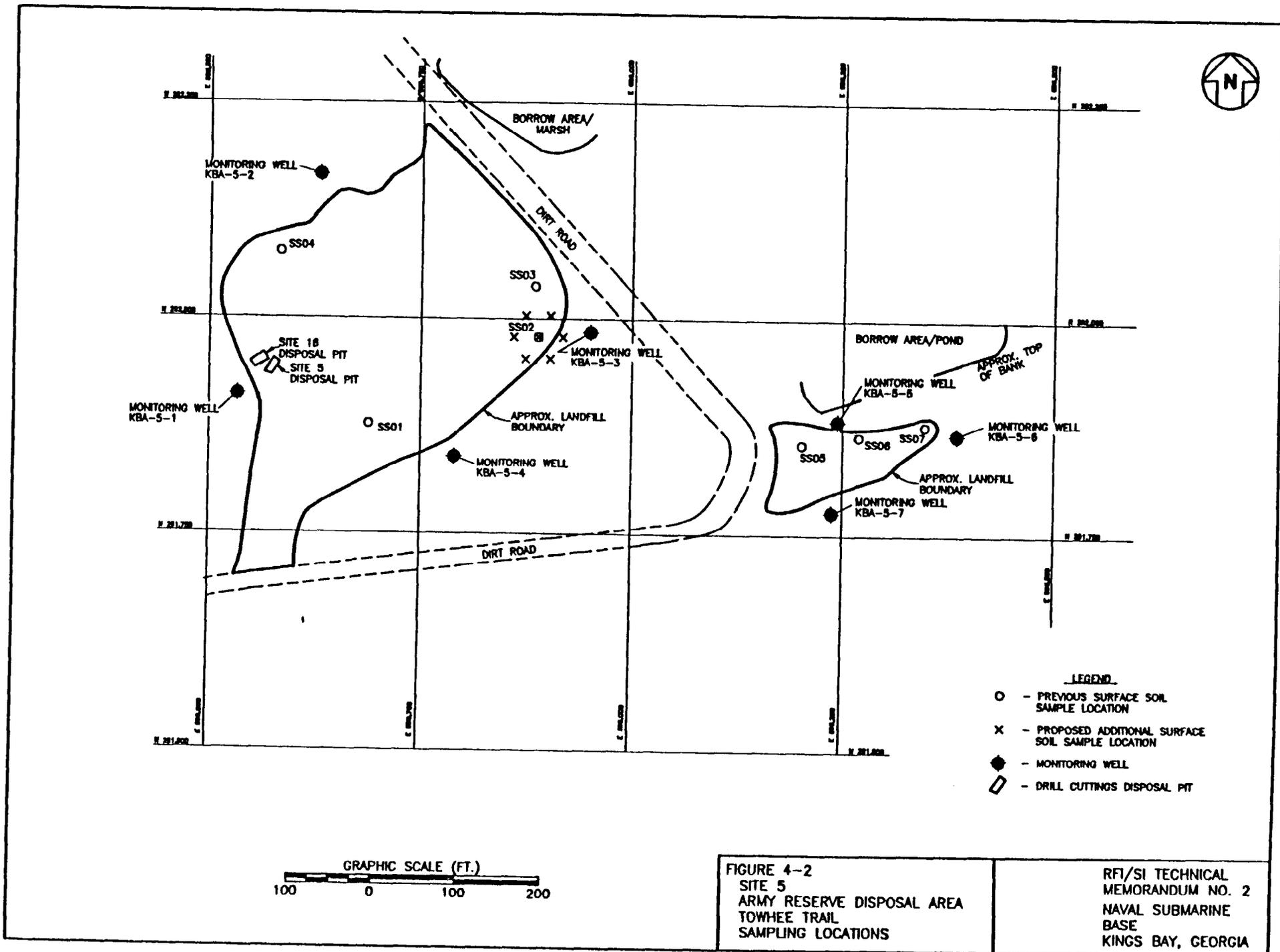
¹ No Appendix IX VOCs, pesticides, PCBs, herbicides, dioxins, or furans were detected in groundwater samples.

Data Qualifiers

² Values flagged J as estimated because concentrations are less than the CRQL.

³ Quantitation limits flagged UJ as estimated and values flagged J as estimated due to low matrix spike recovery for arsenic and selenium.

⁴ Values flagged J as estimated because the preparation blank exhibited negative bias for cadmium, nickel, and vanadium.



The purpose of additional soil sampling at Site 5 is to confirm the presence of PCBs in soil and to assess the site for higher concentrations of PCBs in soil.

One of the seven soil samples will be collected at the location of sample SS-02 in an attempt to confirm the presence of PCBs at this location. The other six soil samples will be collected from locations equally spaced around sample location SS-02 at a distance of 25 feet. These samples will be collected using a hand auger. Sample depths will correspond to intervals where changes in soil color or texture indicate the original surface of the disposal area, or intervals where odors, visual appearance, or screening of VOCs using an FID indicate contamination may be present. Based on previous soil sampling at this site, sampling depths are anticipated to be approximately 1.5 feet to 2.0 feet below land surface (BLS).

If PCB data for the seven soil samples do not confirm the presence of PCB contamination in soil at Site 5, ABB-ES may recommend that PCBs be deleted from the groundwater monitoring program at this site.

4.1.4 Dioxins and Furans in Groundwater Dioxins and furans were not detected in groundwater samples collected during the first and second sampling events. These parameters will be deleted from the analytical program for groundwater sampling events No.3 through 6.

4.1.5 Inorganic Constituents in Groundwater With few exceptions, concentrations of inorganic constituents in groundwater samples from each monitoring well at Site 5 decreased markedly when compared to concentrations detected in samples collected in February 1992. The higher concentrations of inorganic constituents for samples collected during the first sampling event have been attributed to aquifer trauma. Monitoring wells at Site 5 were sampled in February 1992 approximately 10 days following installation. The subsurface strata at the site are organic-rich, silty sands. General agitation and the introduction of air into the strata during drilling is thought to have disrupted equilibrium conditions among inorganic constituents sorbed to soil and organic particles and those suspended or dissolved in groundwater. Inorganics will continue to be monitored at the site. Following evaluation of six data sets for inorganic constituents, the cause for decreased concentrations or inorganics in groundwater at the site should be better defined. If this evaluation reveals that the concentrations of inorganics in groundwater samples collected during the first sampling event are not representative of groundwater quality at the site, the data will not be used in statistical calculations.

In two cases, concentrations of inorganic constituents on groundwater samples collected in May 1992 increased when compared to the data for the samples collected in February 1992. One exception is that selenium concentrations increased in samples from all monitoring wells. Low matrix spike recoveries for selenium analyses may indicate that reported concentrations for the second round of samples are biased low.

Another exception is that groundwater samples collected during the second sampling event from monitoring well KBA-5-3 contained concentrations of barium, beryllium, chromium, lead, selenium, vanadium, and sulfide that were greater than or equal to two times the concentration detected in groundwater samples collected from this well during the first sampling event. Lead was detected at a concentration of 0.9 J $\mu\text{g}/\text{l}$ in the field blank and equipment rinsewater samples

associated with groundwater samples from monitoring well KBA-5-3. However, 0.9 $\mu\text{g}/\text{l}$ is well below the concentration of lead of 18 $\mu\text{g}/\text{l}$ detected in the groundwater sample from monitoring well KBA-5-3.

The concentrations of chromium, lead, and selenium in groundwater samples from monitoring well KBA-5-3 were also greater than the corresponding concentrations detected in upgradient monitoring wells KBA-5-1 and KBA-5-2. Although greater than the concentrations in upgradient groundwater samples, concentrations of chromium, lead, and selenium in groundwater samples from monitoring well KBA-5-3 were less than two times the concentration in upgradient samples, and may not be significant in regard to indicating a release from the site.

Arsenic, cadmium, copper, and lead were also present in samples from one or more downgradient monitoring wells at concentrations greater than that detected in upgradient groundwater samples collected during the second sampling event. None of the downgradient wells produced groundwater samples having concentrations of these inorganic constituents that were more than two times the corresponding upgradient concentrations.

Concentrations of inorganic constituents in groundwater samples collected from Site 5 were compared to Federal Primary Drinking Water Standard Maximum Contaminant Levels (MCLs). Appendix C presents inorganic data for the first and second sampling events in bar chart for for seven inorganic constituents regulated under the Safe Drinking Water Act. Cadmium is the only inorganic constituent present at concentrations above MCLs. Lead was detected at concentrations above the future MCL of 15 $\mu\text{g}/\text{l}$, but concentrations do not exceed the present MCL of 50 $\mu\text{g}/\text{l}$. Inorganic data for the first round of groundwater samples collected from Site 5 contained arsenic, chromium, and cadmium at concentrations above present MCLs, and lead exceeded the future MCL. Figure 4-3 summarizes concentrations of inorganics having MCLs for the first and second sampling events. MCLs are presented in a table on Figure 4-3.

Cadmium concentrations in groundwater samples collected from monitoring wells KBA-5-6 and KBA-5-7 were 7.5 $\mu\text{g}/\text{l}$ and 5.5 $\mu\text{g}/\text{l}$, respectively. The MCL for cadmium is 5 $\mu\text{g}/\text{l}$. Although the concentrations of cadmium in samples from monitoring wells KBA-5-6 and KBA-5-7 decreased markedly in the second round sampling, cadmium concentrations in samples from these two wells appear elevated relative to upgradient groundwater.

Groundwater samples from monitoring well KBA-5-5 contained lead concentrations of 17.8 $\mu\text{g}/\text{l}$ and 16.9 $\mu\text{g}/\text{l}$ for duplicate samples. These concentrations exceeded the 15 $\mu\text{g}/\text{l}$ MCL that will be effective on December 7, 1992, but do not exceed the present MCL for lead of 50 $\mu\text{g}/\text{l}$. The concentrations of lead in samples from upgradient monitoring wells KBA-5-1 and KBA-5-2 were 13.1 $\mu\text{g}/\text{l}$ and 10.0 $\mu\text{g}/\text{l}$, respectively. The concentrations of lead detected in groundwater samples from downgradient monitoring wells do not appear to be significantly different from upgradient concentrations.

4.2 SITE 11, OLD CAMDEN COUNTY LANDFILL. On May 7, 1992, groundwater level measurements were taken from nine monitoring wells at Site 11. Figure 4-4 is a groundwater potentiometric surface map developed from these measurements.

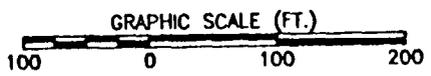
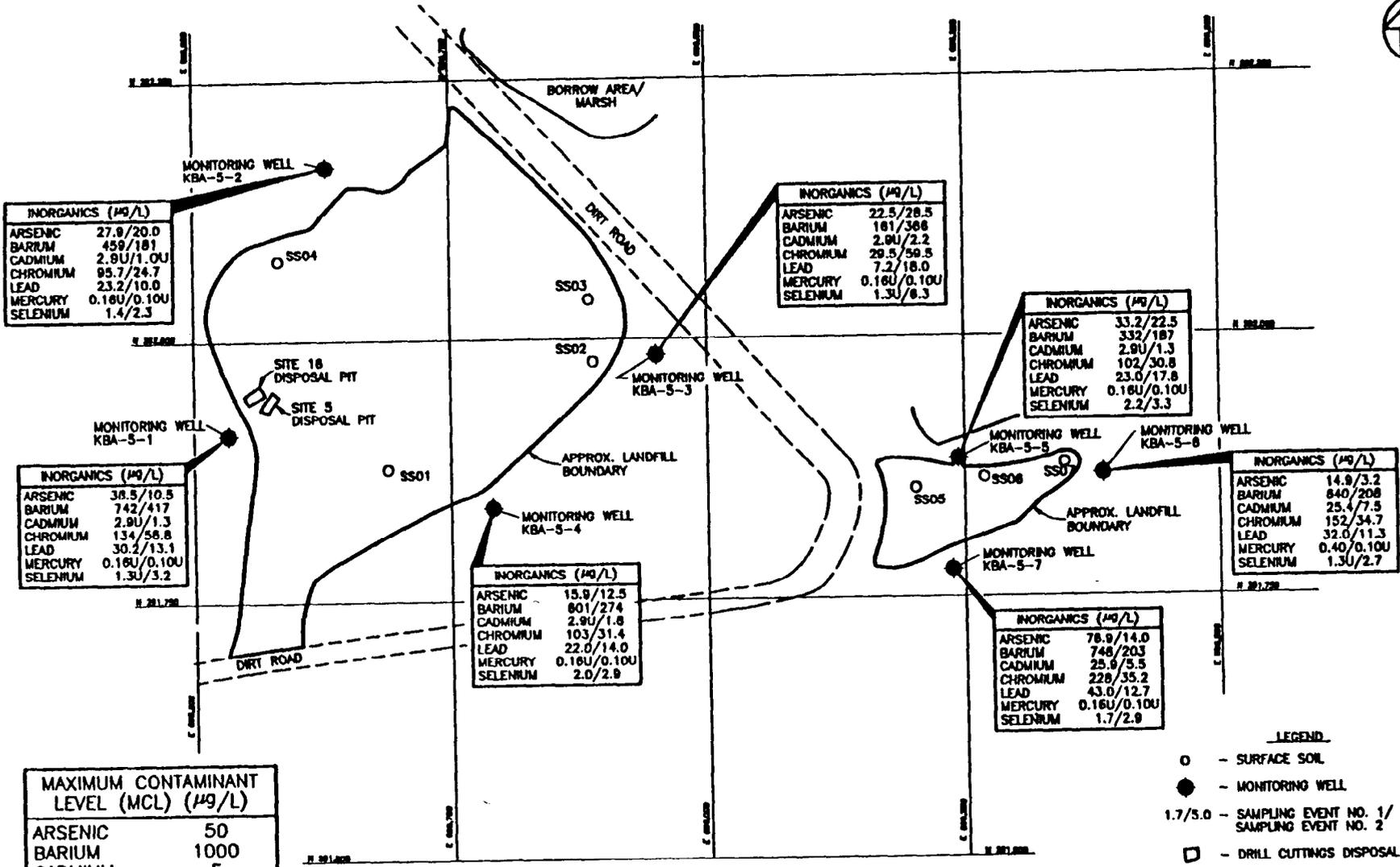


FIGURE 4-3
SITE 5
INORGANICS IN GROUNDWATER
RELATIVE TO PRIMARY DRINKING
WATER STANDARDS

RFI/SI TECHNICAL
MEMORANDUM NO. 2
NAVAL SUBMARINE
BASE
KINGS BAY, GEORGIA

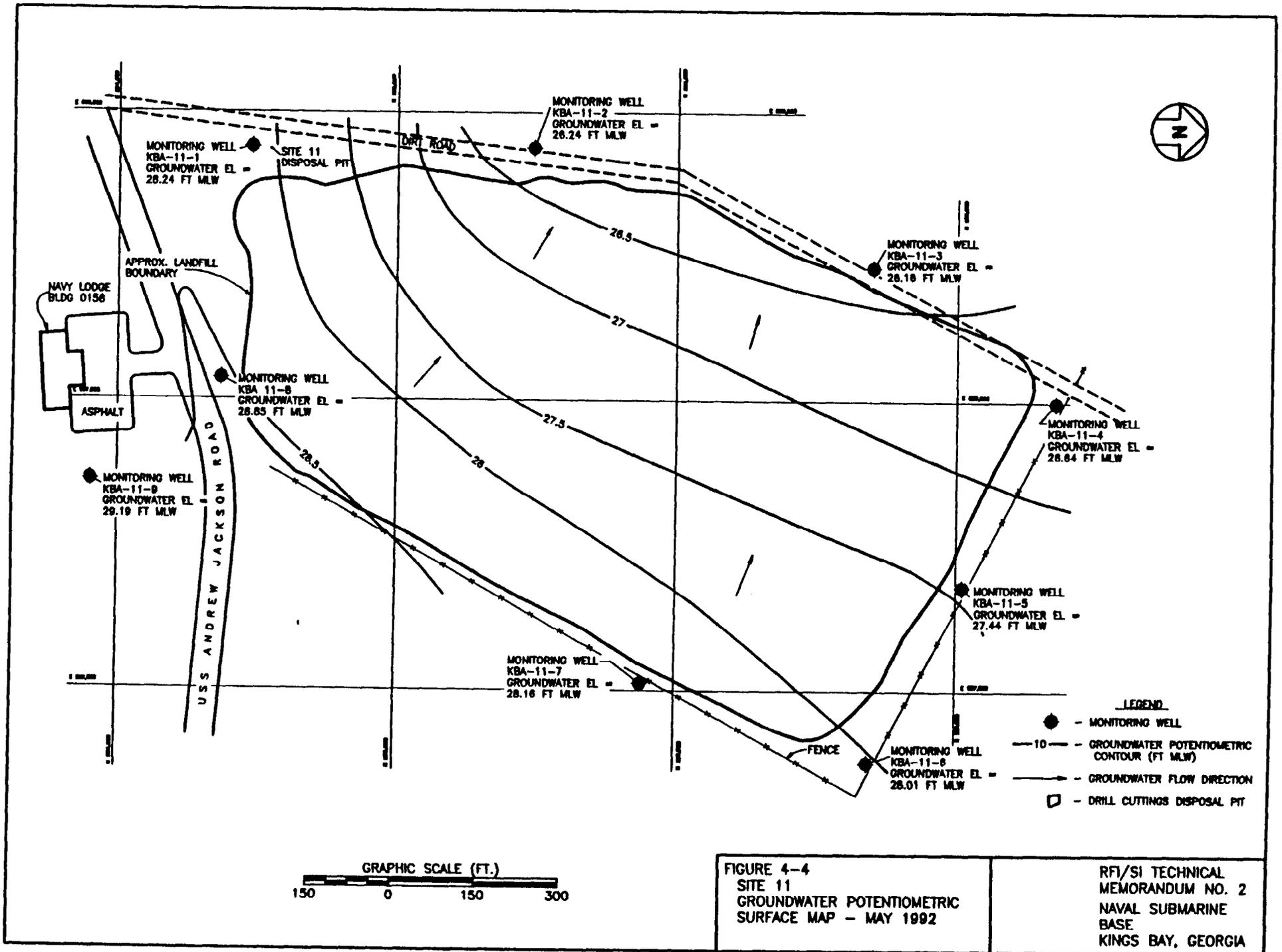


FIGURE 4-4
 SITE 11
 GROUNDWATER POTENTIOMETRIC
 SURFACE MAP - MAY 1992

RFI/SI TECHNICAL
 MEMORANDUM NO. 2
 NAVAL SUBMARINE
 BASE
 KINGS BAY, GEORGIA

The configuration of the potentiometric surface and the groundwater flow direction are generally unchanged from February 1992, when sampling event No. 1 was conducted.

The headspace of monitoring wells were screened for VOCs using an FID. Detectable concentrations of VOCs were recorded for two monitoring wells (Table 4-3). Concentrations of 2 ppm and 10 ppm VOCs were detected in the headspace of KBA-11-5 and KBA-11-9, respectively. As described in Section 4.1, these concentrations are attributed to collection of naturally occurring methane gas in the well riser.

Field measurements of pH, specific conductance, and temperature were collected during monitoring well purging. Table 4-3 summarizes field measurements collected during purging of monitoring wells at Site 11. Purging continued until four well volumes had been removed, and field parameters had stabilized to within 10 percent (%). The final measurements of pH, specific conductance, and temperature are considered the measurements of record for the monitoring well (USEPA, 1991).

Ten groundwater samples, including one duplicate sample, were collected from nine monitoring wells at Site 11. Groundwater samples were analyzed for Appendix IX parameters. Table 4-4 summarizes analytical data for compounds detected in groundwater samples collected from Site 11.

4.2.1 Volatile Organic Compounds in Groundwater Seven VOCs were detected in groundwater samples collected during the first groundwater sampling event including; vinyl chloride, 1,2-dichloroethene, chlorobenzene, xylene, 1,4-dichlorobenzene, ethylbenzene, and 4-methyl-2-pentanone. Concentrations of these VOCs ranged from 18 $\mu\text{g}/\text{l}$ to an estimated 1 J $\mu\text{g}/\text{l}$ (Appendix B).

Analytical data for the second sampling event confirmed the presence of vinyl chloride and 1,2-dichloroethene in groundwater samples from monitoring well KBA-11-2 and confirmed the presence of chlorobenzene and 1,4-dichlorobenzene or an isomer, 1,3-dichlorobenzene, in groundwater samples from monitoring well KBA-11-3. 1,4-Dichlorobenzene was also detected in samples from monitoring well KBA-11-6 collected in February and May 1992, however, the concentration detected was 1 J $\mu\text{g}/\text{l}$, which is near the detection limit of the instrument. Other VOCs detected in samples from monitoring wells KBA-11-5, KBA-11-6, KBA-11-8, and KBA-11-9 from round 1 but not during round 2, include vinyl chloride, xylene, ethylbenzene, and 4-methyl-2-pentanone. VOCs will continue to be monitored at Site 5. Section 5.1 of this document describes the analytical program for sampling events Nos. 3 through 6.

The concentration of vinyl chloride in samples from monitoring well KBA-11-2 increased from 18 $\mu\text{g}/\text{l}$ to 64 $\mu\text{g}/\text{l}$ and 100 $\mu\text{g}/\text{l}$ for duplicate samples collected during the second sampling event. The Primary Drinking Water Standard MCL for vinyl chloride is 2 $\mu\text{g}/\text{l}$. This monitoring well is located on the western side of the landfill, approximately 80 feet from the NSB Kings Bay property line. Groundwater flow direction is west towards the property line. If the flow direction continues in a western direction off base, contaminants could be transported to private property located west of the base. This private property is the location of private residences, some of which have well point systems for irrigation. Drinking water is supplied to the residences by a public utility.

Table 4-3 Summary of Field Measurements for Monitoring Wells at Site 11

Monitoring Well No.	FID Headspace Data (ppm)	Field Data ¹	Well Volume No.				Total Purge Vol. (gal)
			1	2	3	4	
KBA-11-1	0	pH	4.89	4.22	4.14	4.17	5.0
		Cond.	100	130	150	150	
		Temp.	20	20	20	21	
KBA-11-2	0	pH	6.04	6.18	6.11	6.06	5.0
		Cond.	225	250	280	290	
		Temp.	21	20.5	21	20.5	
KBA-11-3	0	pH	6.04	6.15	6.13	6.16	5.0
		Cond.	1300	1400	1350	1400	
		Temp.	21	21	20	20	
KBA-11-4	0	pH	5.23	5.18	5.14	5.12	4.5
		Cond.	700	800	850	800	
		Temp.	22	21	21	21	
KBA-11-5	2	pH	5.55	5.45	5.35	5.15	4.5
		Cond.	120	100	125	115	
		Temp.	21	21	21	20.5	
KBA-11-6	0	pH	5.21	5.00	4.96	5.01	4.0
		Cond.	80	80	80	50	
		Temp.	22	22	22	22	
KBA-11-7	0	pH	5.53	5.36	5.22	5.15	4.0
		Cond.	30	30	30	30	
		Temp.	21	21	21	21	
KBA-11-8	0	pH	6.07	6.19	6.19	6.20	4.0
		Cond.	1000	1000	1000	1000	
		Temp.	21	21	20	20	
KBA-11-9	10	pH	5.64	5.61	5.65	5.61	7.0
		Cond.	100	100	100	100	
		Temp.	20	21	21	20	

Notes:

FID = flame ionization detector

ppm = parts per million

1) Units are standard units (s.u.) for pH, micromhos per centimeter (umhos/cm) for specific conductance, and degrees Celsius (°C) for temperature.

Table 4-4 Summary of Laboratory Analysis of Groundwater Samples Collected from Site 11¹

Compounds Detected	Monitoring Well Number										
	CRQL	KBA-11-1	11-2	11-2D	11-3	11-4	11-5	11-6	11-7	11-8	11-9
APPENDIX IX VOCs (µg/L)											
Vinyl Chloride	10	10 U	64	100	10 U						
Chloroethane ²	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 J	10 U
1,2-Dichloroethene	5	5 U	16	22	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Trichloroethene ²	5	5 U	5 U	1 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Tetrachloroethene ²	5	5 U	1 J	1 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Toluene ²	5	5 U	5 U	1 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Chlorobenzene	5	5 U	5 U	5 U	6	5 U	5 U	5 U	5 U	5 U	5 U
Xylene (total) ²	5	5 U	2 J	4 J	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,3-Dichlorobenzene	5	5 U	5 U	5 U	15	5 U	5 U	5 U	5 U	5 U	5 U
1,4-Dichlorobenzene ²	5	5 U	5 U	5 U	5 U	5 U	5 U	1 J	5 U	5 U	5 U
APPENDIX IX SVOCs (µg/L)											
1,4-Dichlorobenzene	10	10 U	10 U	10 U	13	10 U					
bis(2-Ethylhexyl-Phthalate) ²	10	10 U	10 U	10 U	31	10 U	4 J	5 J			

See notes at end of table.

Table 4-4 Summary of Laboratory Analysis of Groundwater Samples Collected from Site 11¹

Compounds Detected	Monitoring Well Number										
	CRQL	KBA-11-1	11-2	11-2D	11-3	11-4	11-5	11-6	11-7	11-8	11-9
APPENDIX IX Inorganics (µg/L)											
Arsenic ³	10	0.70UJ	0.70UJ	3.5 UJ	0.70 U	0.70 U	0.70 U	3.5 U	0.70UJ	1.7 J	0.70UJ
Barium ²	200	95.7 J	26.2 J	25.9 J	54.2 J	30.2 J	71.7 J	34.6 J	26.2 J	43.4 J	43.8 J
Beryllium ²	5	2.3 J	1.7 J	1.7 J	1.1 J	2.2 J	4.0 J	2.3 J	1.7 J	1.7 J	2.3 J
Cadmium ⁴	5	1.0 UJ	1.0 UJ	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.3 J	1.0 UJ
Chromium	10	92.8	38.1	37.2	20.8	29.0	27.1	40.5	54.6	23.8	49.1
Copper ²	25	21.7 J	6.4 J	6.2 J	4.4 J	3.1 J	6.2 J	7.9 J	10.3 J	13.7 J	14.2 J
Lead ²	5	23.3	4.5	5.6 J	3.9 J	3.9 J	2.9 J	4.3 J	3.8 J	4.0 J	12.2
Mercury ²	0.2	0.11 J	0.10 U								
Selenium ²	5	5.6	2.7 J	2.9 J	3.8 J	2.4 J	0.55 J	2.5 J	3.4 J	1.7 J	5.4
Thallium ²	10	0.80 U	0.80 U	0.80 U	1.6 J	0.80 U					
Vanadium ^{2,4}	50	29.9 J	20.2 J	24.5 J	44.3 J	59.4	64.5	25.7 J	25.0 J	33.2 J	42.8 J
Zinc	20	7.6 U	7.5 U	10.3 U	19.5 U	10.9 U	555	9.3 U	6.5 U	23.4 U	8.7 U
Cyanide ³	10	1.8 UJ	6.1 J	6.1 J	1.8 UJ	10.8 J	1.8 UJ	1.8 UJ	1.8 UJ	26.2 J	1.8 UJ
Sulfide	100	500	2600	1000	200	300	1500	100 U	200	2900	300

Notes:

CRQL = Contract Required Quantitation Limit

U = not detected above or below CRQL

¹ No Appendix IX pesticides, PCBs, herbicides, or dioxins/furans were detected in groundwater samples.

Data Qualifiers

² Samples results flagged J as estimated because concentrations are less than the CRQL.

³ Samples quantitation limits flagged UJ as estimated and sample results flagged J as estimated because matrix spike recoveries were below QC limits.

⁴ Samples quantitation limits flagged UJ as estimated and sample results flagged J as estimated because the corresponding preparation blank exhibited negative bias for cadmium and vanadium.

SOUTHNAVFACENCOM and NSB Kings Bay have elected to take immediate measures to evaluate the vinyl chloride contaminant plume. This evaluation will include collection of groundwater samples and stratigraphic characterization using Cone Penetrometer Testing (CPT). VOC analyses will be conducted in the field using a field laboratory equipped for GC analysis of groundwater samples. This is explained in Section 5.2

A percentage of the groundwater samples will be replicated for analysis in a NEESA-approved laboratory. The scope of work for this investigation has generally been planned and is described in the *RCRA Facility Investigation/Site Inspection Preliminary Plan of Action, Site 11 - Vinyl Chloride Investigation* (ABB-ES, 1992b). A more detailed Plan of Action will be prepared prior to implementation of the field work, which is anticipated for August 1992.

4.2.2 Semivolatile Organic Compounds in Groundwater SVOC analysis of groundwater samples collected in May 1992 confirmed previous results indicating that 1,4-dichlorobenzene is the only potentially site-related Appendix IX SVOC present in groundwater at Site 11. This compound is also listed as a VOC in Appendix IX and can be monitored as such. SVOCs will be deleted from the monitoring list at Site 11.

4.2.3 Pesticides, Herbicides, and PCBs in Groundwater Analytical results for the second groundwater sampling event confirmed the absence of Appendix IX pesticides, herbicides, and PCBs, in groundwater samples from Site 11. These compounds will be deleted from future monitoring events at this site.

4.2.4 Dioxins and Furans in Groundwater Analytical results for the second groundwater sampling event confirmed the absence of Appendix IX dioxins and furans in groundwater samples from Site 11. These compounds will be deleted from future monitoring events at this site.

4.2.5 Inorganic Constituents in Groundwater With few exceptions concentrations of inorganic constituents in groundwater samples from monitoring wells at Site 11 decreased markedly when compared to concentrations detected in samples collected in February 1992. The monitoring wells at Site 11 were sampled approximately 10 days following installation. As described in Section 4.1.5 of this document, the higher concentrations of inorganics in samples collected during the first sampling event have been attributed to aquifer trauma.

Inorganics will continue to be monitored at the site. Following evaluation of six data sets for inorganic constituents, the cause for decreased concentrations of inorganics in groundwater at the site should be better defined. If this evaluation reveals that the concentrations of inorganics in groundwater samples collected during the first sampling event are not representative of groundwater quality at the site, that data will not be used in statistical calculations.

The concentrations of seven inorganic constituents increased in samples collected from upgradient monitoring well KBA-11-1 when compared to the data for the first sampling event. The seven inorganic constituents include barium, beryllium, chromium, lead, mercury, vanadium, and sulfide. Barium and lead were detected in the preparation blank associated with the groundwater sample from monitoring well KBA-11-1, but the concentrations in the preparation blank were an order of magnitude or more less than the concentration detected in the groundwater sample. Beryllium, chromium, and sulfide concentrations increased by more than two times

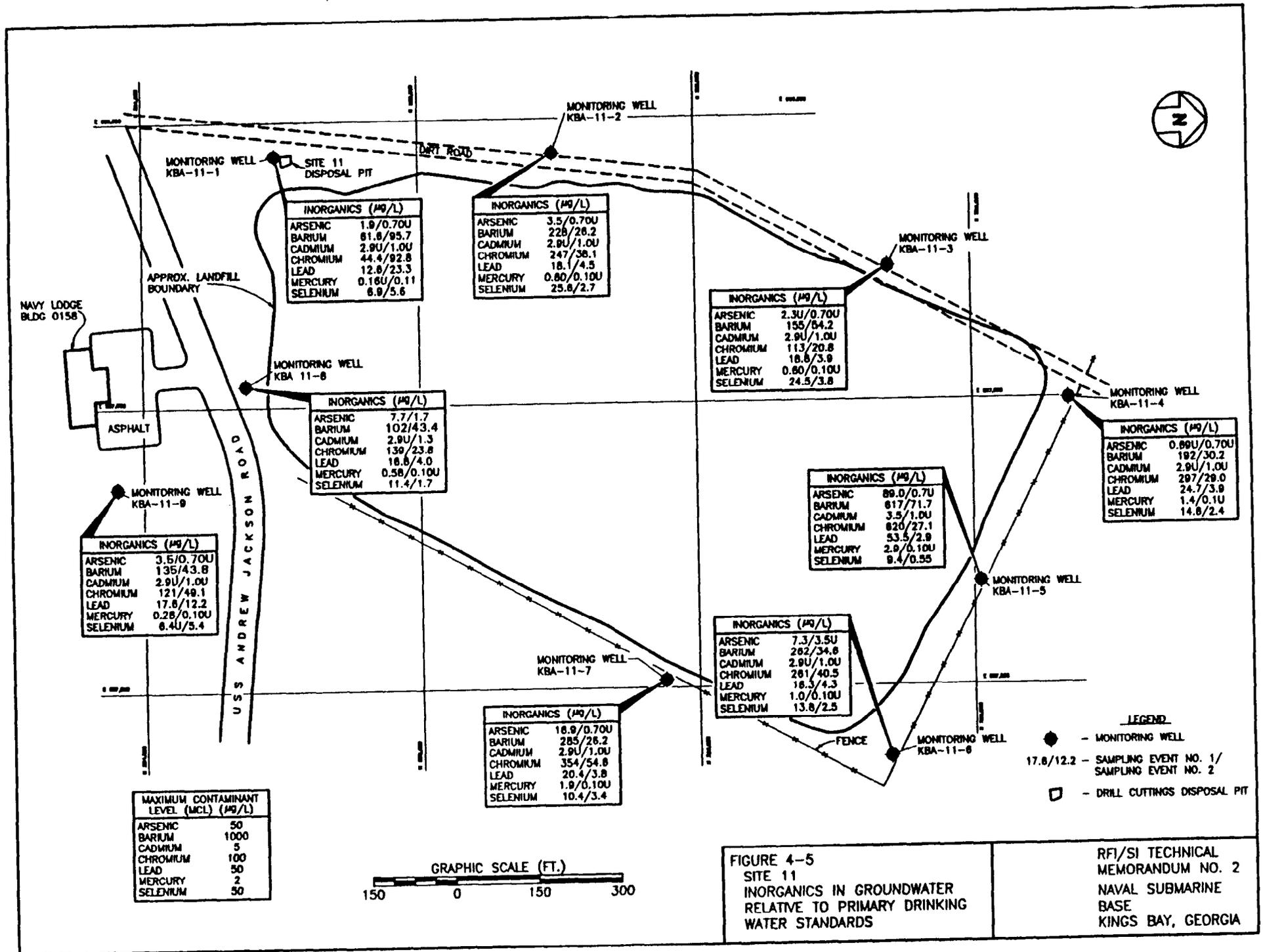
the concentration previously detected. Other isolated instances of a two-fold increase in concentration of an inorganic constituent include the concentration of zinc in a sample from monitoring well KBA-11-5, the concentrations of cyanide in samples from monitoring wells KBA-11-2 and KBA-11-4, and the concentrations of sulfide in samples from monitoring wells KBA-11-2 and KBA-11-5.

When compared to concentrations in samples from upgradient monitoring wells KBA-11-1, KBA-11-7, KBA-11-8, and KBA-11-9, concentrations of inorganic constituents in downgradient wells were generally within background ranges based on the analytical data for the second sampling event. Exceptions include the concentration of thallium (1.6 J $\mu\text{g}/\text{l}$) in a sample from monitoring well KBA-11-3, the concentration of vanadium in a sample from monitoring well KBA-11-4 (59.4 $\mu\text{g}/\text{l}$), and the concentrations of beryllium (4.0 J $\mu\text{g}/\text{l}$), vanadium (64.5 $\mu\text{g}/\text{l}$), and zinc (555 $\mu\text{g}/\text{l}$) in a sample from monitoring well KBA-11-5. Zinc was detected in the preparation blank associated with the sample from monitoring well KBA-11-5, but the concentration in the preparation blank was 7.8 $\mu\text{g}/\text{l}$ and is negligible compared to the concentration of 555 $\mu\text{g}/\text{l}$ detected in the groundwater sample. This concentration of 555 $\mu\text{g}/\text{l}$ of zinc in the sample from monitoring well KBA-11-5 is the only inorganic concentration that exceeded upgradient concentrations by more than two times.

The concentrations of inorganic constituents detected in groundwater samples collected from Site 11 were compared to Primary Drinking Water Standard MCLs. Appendix C presents inorganic data for the first and second sampling events in bar chart form for seven inorganic constituents regulated under the Safe Drinking Water Act. None of the concentrations detected in the second round of groundwater samples exceeded applicable Primary Drinking Water Standard MCLs. The concentration of chromium of 92.8 $\mu\text{g}/\text{l}$ detected in a sample from upgradient monitoring well KBA-11-1 is near the MCL of 100 $\mu\text{g}/\text{l}$ for chromium. Similarly, the concentration of 23.3 $\mu\text{g}/\text{l}$ of lead in a sample from this same monitoring well exceeds the future MCL of 15 $\mu\text{g}/\text{l}$ for lead. The present MCL for lead is 50 $\mu\text{g}/\text{l}$. Figure 4-5 summarizes concentrations of inorganics having MCLs for the first and second sampling events. MCLs are presented in a table on Figure 4-5.

4.3 SITE 16, ARMY RESERVE DISPOSAL AREA, MOTOR MISSILE MAGAZINES. On May 4, 1992, groundwater level measurements were taken from four monitoring wells at Site 16. Figure 4-6 is a groundwater potentiometric surface map developed from these measurements. The configuration of the potentiometric surface and the groundwater flow direction are similar to those for February 1992, except that the flow direction is generally north based on the May 1992 water level measurements and to the northeast based on the February 1992 water level data.

The headspace of monitoring wells were screened for VOCs using an FID. The headspace of all four monitoring wells at Site 16 contained high levels of VOCs, suspected of being naturally occurring methane (Table 4-5). Headspace screening concentrations were 2800 ppm at monitoring well KBA-16-3, and greater than 5000 ppm at the other three monitoring wells. Headspace screening using a PID in February 1992 did not indicate detectable levels of VOCs. As described in Section 4.1, comparison of FID and PID headspace data, and review of soil sample and groundwater sample analytical data do not indicate the presence of a source of VOCs.



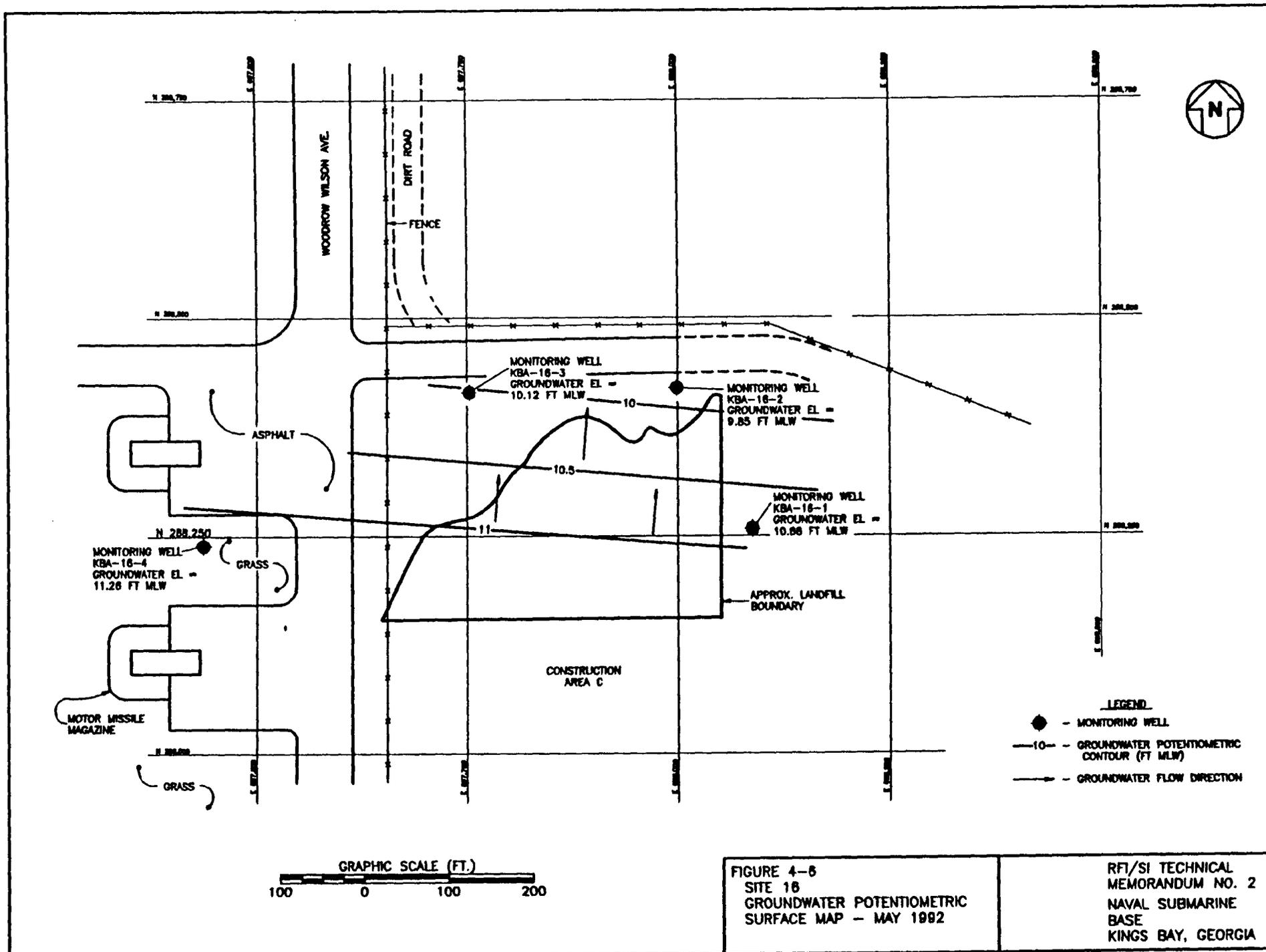


Table 4-5 Summary of Field Measurements for Monitoring Wells at Site 5

Monitoring Well No.	FID Headspace Data (ppm)	Field Data ¹	Well Volume No.				Total Purge Vol. (gal)
			1	2	3	4	
KBA-16-1	>5000	pH	5.51	5.51	5.48	5.48	4.5
		Cond.	error	error	error	error	
		Temp.	error	error	error	error	
KBA-16-2	>5000	pH	5.95	5.96	6.10	6.07	5.6
		Cond.	error	error	error	error	
		Temp.	error	error	error	error	
KBA-16-3	2800	pH	5.67	5.94	5.73	5.78	5.5
		Cond.	error	error	error	error	
		Temp.	error	error	error	error	
KBA-16-4	>5000	pH	5.97	5.55	5.54	5.67	6.0
		Cond.	error	error	error	error	
		Temp.	error	error	error	error	

Notes:

FID = flame ionization detector

ppm = parts per million

error = analyzed, but readings were erroneous because of instrument malfunction. Instrument replaced.

1) Units are standard units (s.u.) for pH, micromhos per centimeter (umhos/cm) for specific conductance, and degrees Celsius (°C) for temperature.

Field measurements of pH, specific conductance, and temperature were collected during monitoring well purging. Table 4-5 summarizes field measurements collected during purging of monitoring wells at Site 16. Purging continued until four well volumes had been removed, and field parameters had stabilized to within 10 percent (%). The final measurements of pH, specific conductance, and temperature are considered the measurements of record for the monitoring well (USEPA, 1991).

Four groundwater samples were collected from four monitoring wells at Site 16. Groundwater samples were analyzed for Appendix IX parameters. Table 4-6 summarizes analytical data for compounds detected in groundwater samples collected from Site 16.

4.3.1 Volatile Organic Compounds in Groundwater Three VOCs were detected in a groundwater sample collected from monitoring well KBA-16-2 during the first groundwater sampling event. The VOCs 4-methyl-2-pentanone, ethylbenzene, and xylene were detected at estimated concentrations of 3 J $\mu\text{g}/\text{l}$ and 2 J $\mu\text{g}/\text{l}$. No other groundwater samples collected from the site during groundwater sampling event No. 1 contained detectable levels of VOCs. No VOCs were detected in groundwater samples collected from Site 16 during the second sampling event. No QA/QC problems were identified that would adversely affect the VOC data for the second round samples and the data are considered representative of groundwater quality at the site. VOCs will continue to be monitored at this site. Section 5.1 of this document describes the analytical program for sampling events Nos. 3 through 6.

4.3.2 Semivolatile Organic Compounds in Groundwater No SVOCs were detected in groundwater samples collected from Site 16 during the first sampling event. Two phthalate compounds, di-n-butylphthalate and bis(2-ethylhexyl)phthalate, were detected in groundwater samples associated with the second sampling event. A groundwater sample from monitoring well KBA-16-2 contained 28 $\mu\text{g}/\text{l}$ of bis(2-ethylhexyl)phthalate, and a groundwater sample from monitoring well KBA-16-3 contained an estimated concentration of 2 J $\mu\text{g}/\text{l}$ of di-n-butylphthalate and 75 $\mu\text{g}/\text{l}$ of bis(2-ethylhexyl)phthalate.

The presence of phthalates in groundwater samples from Site 16 is attributed to laboratory or sampling artifact. Method blanks associated with SVOC analyses contained di-n-butylphthalate at estimated concentrations ranging from 3 J $\mu\text{g}/\text{l}$ to 5 J $\mu\text{g}/\text{l}$. This concentration is greater than that detected in the groundwater sample from monitoring well KBA-16-3. While the other concentrations of phthalates detected in the groundwater samples from Site 16 cannot readily be accounted for based on method blank contamination, they also are not considered to be directly attributed to waste disposal at the site. Phthalates are easily introduced into sample media by certain types of sample gloves, plastic tubing, or sample containers.

The base/neutral fraction of SVOCs will remain on the list of parameters to monitor at Site 16 because one subsurface soil sample from a downgradient monitoring well boring contained concentrations of polynuclear aromatic hydrocarbons (PAHs). No PAHs or other site-related SVOCs have been detected in groundwater samples collected from Site 16 to date. Section 5.1 of this document describes the analytical program for sampling events Nos. 3 through 6.

Table 4-6 Summary of Laboratory Analysis of Groundwater Samples Collected from Site 16¹

Compounds Detected	Monitoring Well Number				
	CRQL	KBA-16-1	KBA-16-2	KBA-16-3	KBA-16-4
APPENDIX IX SVOCs ($\mu\text{g}/\text{l}$)					
Di-n-Butylphthalate ²	10	10 U	10 U	2 J	10 U
bis(2-Ethylhexyl) Phthalate	10	10 U	28	75	10 U
APPENDIX IX Inorganics ($\mu\text{g}/\text{l}$)					
Antimony ²	60	11.0 U	11.0 U	11.0 U	11.3 J
Arsenic ^{2,3}	10	8.5 J	19.5	10.2 J	1.5 J
Barium ²	200	70.8 J	82.2 J	119 J	37.1 J
Beryllium ²	5	1.1 J	1.7 J	4.7 J	0.80 U
Cadmium ^{2,4}	5	1.5 J	1.6 J	1.0 UJ	1.0 UJ
Chromium	10	32.0	28.1	20.7	3.3 U
Cobalt ²	50	7.8 U	9.1 J	7.8 U	7.8 U
Copper ²	25	9.2 J	3.8 J	5.5 J	4.2 J
Lead ²	5	7.6	11.5	4.3 J	2.5 U
Nickel ^{4,5}	40	7.8 UJ	19.4 J	7.8 U	7.8 U
Selenium ²	5	10.6	1.6 J	1.1 J	0.88 J
Silver ²	10	1.4 J	1.4 U	1.4 U	1.4 U
Thallium ²	10	0.90 J	0.80 U	0.80 U	0.80 U
Vanadium ²	50	44.4 J	48.0 J	33.6 J	12.0 J
Zinc	20	15.1 U	65.7	56.2	10.8 U
Cyanide ²	10	8.4 J	8.5 J	1.8 U	18.5
Sulfide	100	100 U	2400	1400	200

Notes:

CRQL = Contract Required Quantitation Limit

U = not detected above or below CRQL

¹ No Appendix IX VOCs, pesticides, PCBs, herbicides, or dioxins/furans were detected in groundwater samples.

Data Qualifiers

² Value(s) flagged J as estimated because concentrations are less than the CRQL.

³ Values flagged J as estimated because matrix spike recovery for arsenic was below QC limits.

⁴ Quantitation limits flagged UJ as estimated because the preparation blank exhibited negative bias for cadmium and nickel.

⁵ Values flagged J as estimated because the preparation blank exhibited negative bias for and nickel

4.3.3 Pesticides, Herbicides, and PCBs in Groundwater The analytical data associated with groundwater samples collected from Site 16 during the second sampling event confirmed the absence of pesticides, herbicides, and PCBs in groundwater at the site. These parameters will be deleted from the analytical program for sampling events Nos. 3 through 6.

4.3.4 Dioxins and Furans in Groundwater The analytical data associated with groundwater samples collected from Site 16 during the second sampling event confirmed the absence of dioxins and furans in groundwater at the site. These parameters will be deleted from the analytical program for sampling events Nos. 3 through 6.

4.3.5 Inorganic Constituents in Groundwater With few exceptions, concentrations of inorganic constituents in groundwater samples from each monitoring well at Site 16 decreased markedly when compared to concentrations detected in samples collected in February 1992. The monitoring wells at Site 16 were sampled within approximately 10 days following installation. As described in Section 4.1.5 of this document, the higher concentrations detected in the groundwater samples collected during the first sampling event have been attributed to aquifer trauma.

Inorganics will continue to be monitored at the site. Following evaluation of six data sets for inorganic constituents, the cause for decreased concentrations of inorganics in groundwater at the site should be better defined. If this evaluation reveals that the concentrations of inorganics in groundwater samples collected during the first sampling event are not representative of groundwater quality at the site, that data will not be used in statistical calculations.

Two inorganic constituents were detected in groundwater samples collected during the second sampling event at concentrations greater than previously detected. Selenium and cyanide concentrations in a groundwater sample from monitoring well KBA-16-1 increased when compared to concentrations detected in the sample collected in February 1992. Cyanide concentration also increased in a sample from monitoring well KBA-16-2 when compared to previous data. The concentrations for these inorganic constituents were, however, less than two times greater than the concentrations associated with the first sampling event.

The concentrations of inorganic constituents detected in samples from downgradient monitoring wells KBA-16-1, KBA-16-2, and KBA-16-3 were compared to concentrations detected in the upgradient groundwater sample. Twelve inorganic constituents present at concentrations greater than the upgradient concentrations include arsenic, barium, beryllium, cadmium, chromium, copper, lead, nickel, selenium, vanadium, zinc, and sulfide. Whether the concentrations of inorganic constituents in samples from downgradient monitoring wells reflect a release from the waste disposed at Site 16 is uncertain. This will be evaluated after six rounds of data have been collected. The following is a general discussion of observations regarding the constituents and concentrations detected in samples collected in May 1992.

Arsenic and barium concentrations in samples from monitoring wells KBA-16-2 and KBA-16-3 were more than two times the concentration in the upgradient groundwater sample, being 19.5 $\mu\text{g}/\text{l}$ and 10.2 $\mu\text{g}/\text{l}$, respectively, for arsenic and 82.2 J $\mu\text{g}/\text{l}$ and 119 J $\mu\text{g}/\text{l}$, respectively for barium. Barium concentrations are estimated because they are below the CRQL of 200 $\mu\text{g}/\text{l}$. Barium was detected in the preparation blanks for these samples, but the concentrations of 0.5 $\mu\text{g}/\text{l}$ and 1.4

$\mu\text{g}/\text{l}$ are small compared to the concentrations detected in the groundwater samples.

Beryllium concentrations in all three downgradient monitoring wells ranged from an estimated 1.1 J $\mu\text{g}/\text{l}$ to 4.7 $\mu\text{g}/\text{l}$ and are more than two times the concentration detected in the upgradient groundwater sample from monitoring well KBA-16-4.

Cadmium was detected in the groundwater sample from monitoring well KBA-16-1 at an estimated concentration of 1.5 J $\mu\text{g}/\text{l}$ and in a sample from KBA-16-2 at a concentration of 1.6 J $\mu\text{g}/\text{l}$. This concentration is slightly above the reported instrument detection limit of 1.0 $\mu\text{g}/\text{l}$ for the upgradient groundwater sample, which did not contain detectable cadmium. The preparation blank associated with the groundwater samples from monitoring wells KBA-16-3 and KBA-16-4 exhibited negative bias for cadmium. The reported non-detect values could be biased low. The reported concentration for the upgradient groundwater sample from monitoring well KBA-16-4 may not be representative of the actual concentration of cadmium.

Chromium was present in groundwater samples from the three downgradient monitoring wells at concentrations more than two times the concentration detected in the upgradient groundwater sample. The concentrations of chromium in downgradient groundwater samples ranged from 20.7 $\mu\text{g}/\text{l}$ to 32.0 $\mu\text{g}/\text{l}$.

Copper was detected in groundwater samples from downgradient monitoring wells KBA-16-1 and KBA-16-3 at concentrations of 9.2 J $\mu\text{g}/\text{l}$ and 5.5 $\mu\text{g}/\text{l}$. These concentrations are greater than the concentration detected in the upgradient groundwater sample, and the estimated value of 9.2 J $\mu\text{g}/\text{l}$ is more than two times greater. Copper was detected in associated equipment rinseate blanks at concentrations of 28.9 $\mu\text{g}/\text{l}$ and 33.0 $\mu\text{g}/\text{l}$, and in the field blank of organic-free deionized water at a concentration of 15.2 J $\mu\text{g}/\text{l}$. These concentrations are significantly greater than the concentrations detected in the groundwater samples. The reported values for the groundwater samples are probably biased high.

Lead was detected in all three downgradient groundwater samples at concentrations greater than the concentration detected in the upgradient groundwater sample. Lead concentrations in samples from downgradient monitoring wells ranged from 4.3 $\mu\text{g}/\text{l}$ to 11.5 $\mu\text{g}/\text{l}$. Lead was not detected in the sample from the upgradient monitoring well. The concentration of lead in samples from downgradient monitoring wells KBA-16-1 and KBA-16-2 were more than two times the reported instrument detection limit of 2.5 $\mu\text{g}/\text{l}$ for the analysis of the sample from the upgradient monitoring well.

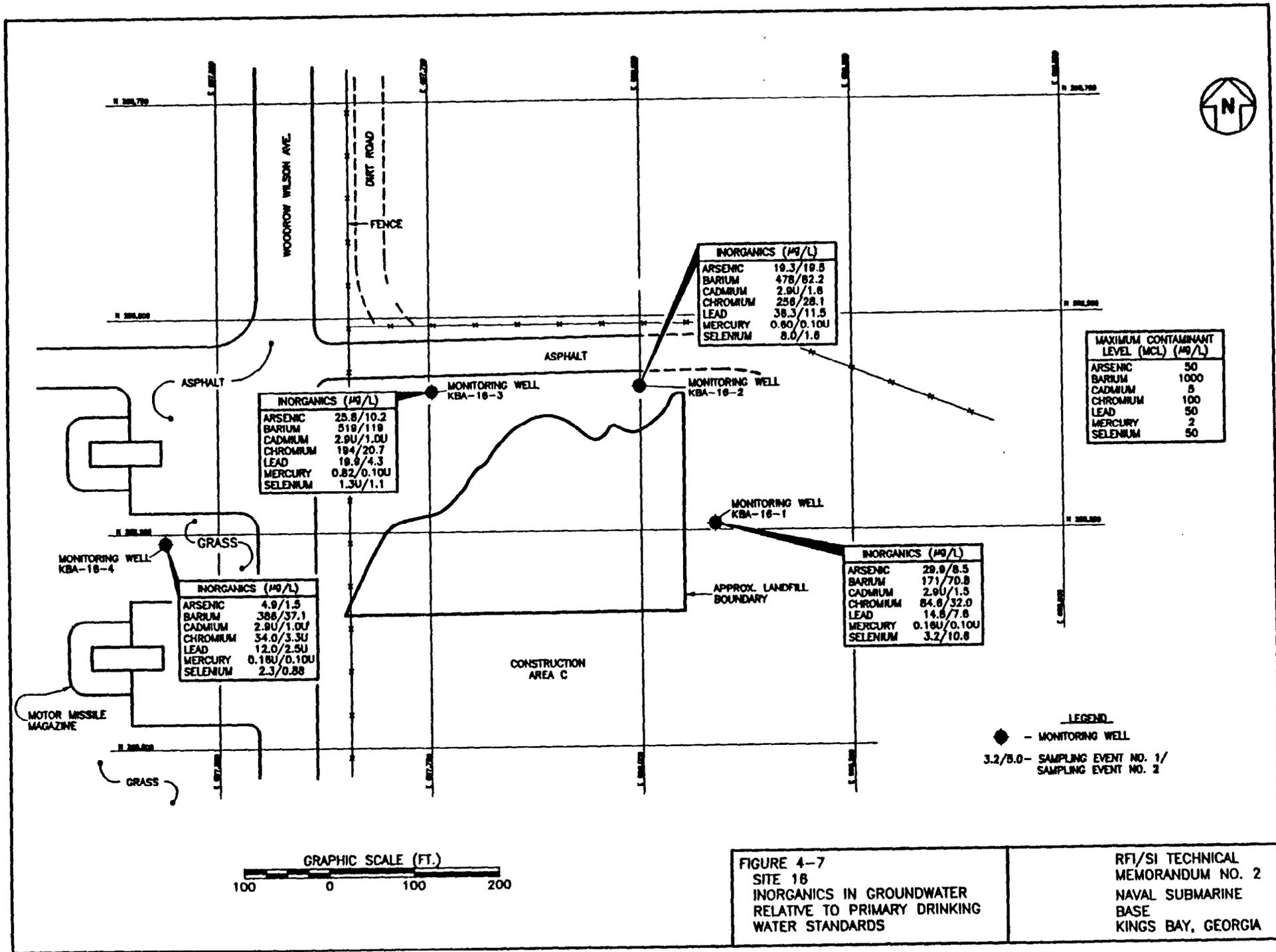
Nickel was detected in only one groundwater sample from monitoring well KBA-16-2 at a concentration of 19.4 $\mu\text{g}/\text{l}$. This is more than two times the reported instrument detection limit of 7.8 $\mu\text{g}/\text{l}$. The preparation blank associated with the analysis of this sample exhibited negative bias for nickel and the value reported for the groundwater sample may be biased low. Likewise, the non-detect values may be biased low.

Selenium concentrations in groundwater samples from the three downgradient monitoring wells ranged from 1.1 J $\mu\text{g}/\text{l}$ to 10.6 $\mu\text{g}/\text{l}$. These concentrations exceed the reported value of 0.88 $\mu\text{g}/\text{l}$ for the sample from the upgradient monitoring well (KBA-16-4). The concentration of 10.6 $\mu\text{g}/\text{l}$ in the sample from monitoring well KBA-16-1 is an order of magnitude greater than the concentration detected in the upgradient groundwater sample.

Vanadium concentrations detected in samples from the three downgradient monitoring wells ranged from 33.6 J $\mu\text{g}/\text{l}$ to 48.0 J $\mu\text{g}/\text{l}$. These values are estimated because they are below the CRQL of 50 $\mu\text{g}/\text{l}$ for vanadium. These concentrations are more than two times the concentration detected in the sample from the upgradient monitoring well. The preparation blank associated with analysis of groundwater samples from monitoring wells KBA-16-3 and KBA-16-4 exhibited negative bias for vanadium. The reported concentrations for these samples may be biased low.

Zinc and sulfide are the remaining two of twelve inorganic constituents detected in groundwater samples from downgradient monitoring wells at concentrations greater than that detected in the sample from the upgradient groundwater sample. In both cases the concentrations are associated with samples from monitoring wells KBA-16-2 and KBA-16-3. Zinc concentrations in the samples from these monitoring wells were 65.7 $\mu\text{g}/\text{l}$ and 56.2 $\mu\text{g}/\text{l}$ and sulfide concentrations were 2400 $\mu\text{g}/\text{l}$ and 1400 $\mu\text{g}/\text{l}$. These concentrations of zinc and sulfide are more than two times the concentration detected in the sample from the upgradient monitoring well.

Concentrations of inorganic constituents in groundwater samples collected from Site 16 were compared to Federal Primary Drinking Water Standard MCLs. Appendix C presents inorganic data for the first and second sampling events in bar chart for seven inorganic constituents regulated under the Safe Drinking Water Act. None of the inorganic constituents detected in samples collected during the second sampling event were present at concentrations above their corresponding MCLs. Figure 4-7 summarizes concentrations of inorganics having MCLs for the first and second sampling events.



5.0 SUMMARY

Section 5.1 summarizes the groundwater monitoring analytical program for groundwater sampling events Nos. 3 through 6. The analytical program has been developed based on information obtained from analysis of soil samples collected during the RFI/SI field program and two groundwater sampling events.

Section 5.2 summarizes the preliminary plan of action for an investigation of VOC contamination of groundwater at Site 11. A more detailed plan of action will be developed prior to implementation which should take place in August 1992.

5.1 Groundwater Monitoring Program. Two rounds of groundwater samples were analyzed for Appendix IX constituents. The following paragraphs summarize comparison of the first and second rounds of groundwater analytical data and analytes to be deleted from the monitoring list for future groundwater sampling events associated with the RFI/SI currently underway at three sites at NSB, Kings Bay, Georgia. The three sites are discussed separately below and are identified as follows:

- Site 5 - Army Reserve Disposal Area, Towhee Trail
- Site 11 - Old Camden County Landfill
- Site 16 - Army Reserve Disposal Area, Motor Missile Magazines

Table 5-1 is a summary of the sampling and analysis program for groundwater sampling events No. 3 through 6. Table 5-2 lists the compounds and analytical methods included in the analytical program.

5.1.1 Site 5, Army Reserve Disposal Area, Towhee Trail Several VOCs were detected in groundwater samples collected in February 1992 (first sampling event), however, no VOCs were detected in samples collected in May 1992 (second sampling event). VOCs will continue to be monitored at this site. The VOC analytes will be limited to include Target Compound List (TCL) VOCs, plus trichlorofluoromethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene.

Second round groundwater samples confirmed the absence of SVOCs, pesticides, herbicides, PCBs, dioxins, and furans in groundwater at Site 5. With the exception of PCBs, these compounds will be deleted from future monitoring events at this site.

PCBs will continue to be monitored in groundwater at this site because one surface soil sample collected from the site contained 53 $\mu\text{g}/\text{kg}$ Aroclor 1260. Additional soil samples will be collected to evaluate the site for higher concentrations of PCBs. No PCBs have been detected in groundwater samples collected from the site to date. If results of PCB analysis of the soil samples do not indicate higher levels are present, the Navy may consider deletion of PCBs from groundwater monitoring at that time.

Concentrations of inorganic constituents were markedly lower in groundwater samples collected in May 1992. Appendix IX inorganic constituents will continue to be monitored at Site 11 because decisions regarding whether a release of inorganic constituents has occurred require additional data collection.

Table 5-1 Summary of Sampling and Analysis Program for Groundwater Sampling Events Nos. 3 through 6

Location and Type of Sampling	Laboratory Analysis					
	A	B	C	D	E	F
Site 5						
Surface Soil	0	0	7	0	0	0
Groundwater	7	0	7	7	7	7
Site 11						
Groundwater	9	0	0	9	9	9
Site 16						
Groundwater	4	4	0	4	4	4
Field Duplicates						
Surface Soil	0	0	1	0	0	0
Groundwater	2	2	2	2	2	2
Quality Control Samples						
Trip Blanks	5	0	0	0	0	0
Rinseate Blanks	5	2	3	5	5	5
Field Blanks	2	2	2	2	3	2

Notes:

- A - Volatile Organic Compounds (VOCs)
- B - Semivolatile Organic Compounds (SVOCs) (base/neutral fraction)
- C - Polychlorinated Biphenyl Compounds (PCBs)
- D - Inorganic constituents (including cyanide and sulfide) (non-filtered)
- E - Inorganic constituents (including cyanide and sulfide) (filtered)
- F - Total Dissolved Solids (TDS) and Total Suspended Solids (TSS)

Table 5-2 Compounds and Analytical Methods for Groundwater Sampling Events Nos. 3 through 6

Parameter: Volatile Organic Compounds (38 total)
Method: TCL List plus 4 additional compounds
 SW-846 Method 8240

Chloromethane	cis-1,3-Dichloropropene
Bromomethane	Trichloroethene
Vinyl Chloride	Dibromochloromethane
Chloroethane	1,1,2-Trichloroethane
Methylene Chloride	Benzene
Acetone	trans-1,3-Dichloropropene
Carbon Disulfide	Bromoform
Trichlorofluoromethane*	2-Hexanone
1,1-Dichloroethene	4-Methyl-2-Pentanone
1,1-Dichloroethane	Tetrachloroethene
1,2-Dichloroethene (total)	1,1,2,2-Tetrachloroethane
Chloroform	Toluene
1,2-Dichloroethane	Chlorobenzene
2-Butanone	Ethylbenzene
1,1,1-Trichloroethane	Styrene
Carbon Tetrachloride	Xylene (total)
Vinyl Acetate	1,3-Dichlorobenzene*
Bromodichloromethane	1,4-Dichlorobenzene*
1,2-Dichloropropane	1,2-Dichlorobenzene*

* Non-TCL compounds

Parameter: Polychlorinated Biphenyls (PCBs) (7 total)
Method: SW-846 Method 8080

Aroclor-1016	Aroclor-1221	Aroclor-1232
Aroclor-1242	Aroclor-1248	Aroclor-1254
	Aroclor-1260	

Parameter: Appendix IX Inorganic Analytes (19 total)
Method: SW-846 Methods (listed in parentheses)

Antimony (6010)	Copper (6010)	Thallium (7841)
Arsenic (7060)	Lead (7421)	Vanadium (6010)
Barium (6010)	Mercury (7470)	Zinc (6010)
Beryllium (6010)	Nickel (6010)	Tin (6010)
Cadmium (6010)	Selenium (7740)	Cyanide (9010)
Chromium (6010)	Silver (6010)	Sulfide (9030)
	Cobalt (6010)	

Table 5-2 (continued) Compounds and Analytical Methods for Groundwater Sampling Events Nos. 3 through 6

Parameter: Semivolatile Organic Compounds (base/neutral fraction)
TCL List (base/neutral fraction)
Method: SW-846 Method 8270 (50 total)

bis(2-Chloroethyl)Ether	2,4-Dinitrotoluene
1,3-Dichlorobenzene	Diethylphthalate
1,4-Dichlorobenzene	4-Chlorophenyl-phenylether
Benzyl Alcohol	Fluorene
1,2-Dichlorobenzene	4-Nitroaniline
bis(2-Chloroisopropyl)Ether	N-Nitrosodiphenylamine
N-Nitroso-Di-n-Propylamine	4-Bromophenyl-phenylether
Hexachloroethane	Hexachlorobenzene
Nitrobenzene	Phenanthrene
Isophorone	Anthracene
bis(2-Chloroethoxy)Methane	Di-n-Butylphthalate
1,2,4-Trichlorobenzene	Fluoranthene
Naphthalene	Pyrene
4-Chloroaniline	Butylbenzylphthalate
Hexachlorobutadiene	3,3'-Dichlorobenzidine
2-Methylnaphthalene	Benzo(a)Anthracene
Hexachlorocyclopentadiene	Chrysene
2-Chloronaphthalene	bis(2-Ethylhexyl)Phthalate
2-Nitroaniline	Di-n-Octyl Phthalate
Dimethylphthalate	Benzo(b)Fluoranthene
Acenaphthylene	Benzo(k)Fluoranthene
2,6-Dinitrotoluene	Benzo(a)Pyrene
3-Nitroaniline	Indeno(1,2,3-cd)Pyrene
Acenaphthene	Dibenz(a,h)Anthracene
Dibenzofuran	Benzo(g,h,i)Perylene

Parameter: Total Dissolved Solids (TDS)/ Total Suspended Solids (TSS)
Method: Standard Methods-- Methods 2540C and 2540D

Future groundwater sampling events at Site 11 will include collection of both filtered and non-filtered groundwater samples for analysis of Appendix IX inorganic constituents. Total dissolved solids and total suspended solids will also be analyzed during future groundwater monitoring events. The decision to analyze filtered groundwater samples, total dissolved solids, and total suspended solids was prompted by the concentrations of inorganic constituents detected in both upgradient and downgradient groundwater samples associated with the first sampling event.

5.1.2 Site 11. Old Camden County Landfill VOCs detected in samples collected in February 1992 were also present in samples collected in May 1992. The concentrations of vinyl chloride in duplicate downgradient groundwater samples from monitoring well KBA-11-2 were 3 to 5 times greater than the concentration detected in a sample collected from this monitoring well during the first groundwater sampling event. Section 5.2 of this document describes a preliminary plan of action for addressing VOC contamination of groundwater in the area of monitoring well KBA-11-2 at Site 11. Several other VOCs not previously detected were present in groundwater samples collected in May 1992. VOCs will continue to be monitored at Site 11. The VOC analytes will be limited to include TCL VOCs, plus trichlorofluoromethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene.

SVOC analysis of groundwater samples collected in May 1992 confirmed previous results indicating that 1,4-dichlorobenzene is the only potentially site-related Appendix IX SVOC present in groundwater at Site 11. This compound is also listed as a VOC in Appendix IX and can be monitored as such. SVOCs will be deleted from the monitoring list at Site 11.

Analytical results for the second groundwater sampling event confirmed the absence of Appendix IX pesticides, herbicides, PCBs, dioxins, and furans in groundwater samples from Site 11. These compounds will be deleted from future monitoring events at this site.

Concentrations of Appendix IX inorganic constituents decreased markedly in groundwater samples collected from Site 11 during the May 1992 sampling event. Appendix IX inorganic constituents will continue to be monitored at Site 11 because decisions regarding whether a release of inorganic constituents has occurred require additional data collection.

Future groundwater sampling events at Site 11 will include collection of both filtered and non-filtered groundwater samples for analysis of Appendix IX inorganic constituents. Total dissolved solids and total suspended solids will also be analyzed during future groundwater monitoring events. The decision to analyze filtered groundwater samples, total dissolved solids, and total suspended solids was prompted by the concentrations of inorganic constituents detected in both upgradient and downgradient groundwater samples associated with the first sampling event.

5.1.3 Site 16. Army Reserve Disposal Area, Motor Missile Magazines Several VOCs were detected in groundwater samples collected in February 1992, however, no VOCs were detected in samples collected in May 1992. VOCs will continue to be monitored at this site. The VOC analytes will be limited to include TCL VOCs, plus trichlorofluoromethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, and 1,4-dichlorobenzene.

Second round groundwater samples confirmed the absence of SVOCs, pesticides, herbicides, PCBs, dioxins, and furans in groundwater at Site 16. With the exception of the base/neutral fraction of SVOCs, these compounds will be deleted from future monitoring events at this site.

The base/neutral fraction of SVOCs will remain on the list of parameters to monitor at Site 16 because one subsurface soil sample from a downgradient monitoring well boring contained concentrations of PAHs. No PAHs or other site-related SVOCs have been detected in groundwater samples collected from Site 16 to date. The analytes for SVOC analysis will be limited to TCL SVOCs included in the base/neutral fraction.

Concentrations of Appendix IX inorganic constituents decreased markedly in groundwater samples collected from Site 16 during the May 1992 sampling event. Appendix IX inorganic constituents will continue to be monitored at Site 16 because decisions regarding whether a release of inorganic constituents has occurred require additional data collection.

Future groundwater sampling events at Site 16 will include collection of both filtered and non-filtered groundwater samples for analysis of Appendix IX inorganic constituents. Total dissolved solids and total suspended solids will also be analyzed during future groundwater monitoring events. The decision to analyze filtered groundwater samples, total dissolved solids, and total suspended solids was prompted by the concentrations of inorganic constituents detected in both upgradient and downgradient groundwater samples associated with the first sampling event.

5.2 Site 11 VOC Investigation, Preliminary Plan of Action. Analytical results for the first groundwater sampling event (February 1992) at Site 11 indicated that a sample from monitoring well KBA-11-2 contained vinyl chloride at a concentration of 18 ug/l. This monitoring well is downgradient of the disposal area. In May 1992 the second groundwater sampling event was conducted. Two replicate groundwater samples were collected from monitoring well KBA-11-2. Concentrations of vinyl chloride in these samples were considerably higher than before, being 64 ug/l and 100 ug/l for the replicate samples. These concentrations of vinyl chloride are well above the USEPA Federal Drinking Water Standard MCL of 2 ug/l.

Several other VOCs have been detected in groundwater samples from monitoring well KBA-11-2, including parent compounds that decompose anaerobically to form vinyl chloride. These parent compounds include tetrachloroethene, trichloroethene, and 1,2-dichloroethene. The concentrations of the parent compounds range from an estimated 1 ug/l to 16 ug/l.

Monitoring well KBA-11-2 is located on the western side of the landfill. Two other monitoring wells located on the western side of the landfill, north and south of monitoring well KBA-11-2, have not produced samples with detectable concentrations of vinyl chloride. The location of monitoring well KBA-11-2 is approximately 80 feet east of the NSB property line. Approximately 350 feet to 400 feet to the west of the landfill there is a housing development (private property). As shown on the groundwater potentiometric surface map (Figure 4-4) groundwater flow is to the west, towards the NSB property line and potentially towards the housing development.

The Navy has elected to take immediate action to determine whether vinyl chloride has migrated off NSB property. The scope of work for this evaluation includes the use of CPT and on-site analysis of VOCs using a field laboratory. A percentage of the groundwater samples analyzed in the on-site laboratory will be replicated for analysis in an off-site, NEESA-approved laboratory.

CPT will be used for collection of groundwater samples and lithologic characterization. Initially, CPT and field analysis will begin at the location of monitoring well KBA-11-2 to confirm the viability of the technique by comparing the CPT sample data to that obtained from the monitoring well and off-site laboratory analysis. CPT sampling will then move toward the NSB property line, downgradient of monitoring well KBA-11-2. Several points, positioned east-west and perpendicular to groundwater flow direction, will be sampled near the property line. If VOC analysis indicates the presence of vinyl chloride near the property line, an effort will be made to locate the center of the contaminant plume by defining the limits of vinyl chloride contamination in the north-south direction. CPT sampling will then move off NSB property, to the western right-of-way of Spur 40. Spur 40 generally parallels the NSB property line in this vicinity.

If field analysis of CPT samples collected near the NSB property line do not indicate the presence of a VOC contaminant plume, CPT sampling will move towards the landfill. CPT sample locations will be selected to delineate the north and south limits of contamination so that the center of the plume can be located.

When the center of the plume has been located, locations will be selected for collection of CPT groundwater samples at depth. Several CPT penetrations will be done to locate the vertical extent of VOC contamination or any confining layers present. For purposes of scoping and budgeting the work, it is assumed that CPT penetrations will not extend beyond 100 feet BLS. This assumption is based on reports that clay and/or limestone confining layers are present 40 to 90 feet BLS.

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**APPENDIX A
ANALYTICAL DATA VALIDATION
SUMMARY TABLES
SAMPLE EVENT NO. 2
MAY 1992**

DEFINITION OF DATA QUALIFIERS

Organic Data Qualifiers

- J - Indicates an estimated concentration because results are either below the concentration required detection level (CRQL) or quality control criteria were not met.
- U - Indicates that compound was analyzed but not detected.
- UJ - Indicates that quantitation level was estimated because QC criteria were not met.
- NJ - Presumptive evidence for the presence of a compound at an estimated value.
- E - Indicates that the analyte concentration exceeded the calibration range of the GC/MS and re-analysis of diluted sample within calibration range.
- D - Indicates that sample concentration was obtained by dilution to bring result within calibration range.
- X - Total concentration of two indistinguishable isomers (i.e., 3-Methylphenol and 4-Methylphenol).
- UR - Indicates that the reported detection limit is unusable because QA criteria were not met.

Inorganic Data Qualifiers

- J - Indicates an estimated concentration because results are either below the concentration required detection level (CRQL) or quality control criteria were not met.
- U - Indicates that compound was analyzed but not detected.
- UJ - Indicates that quantitation level was estimated because QC criteria were not met.
- E - The reported concentration is estimated because of the presence of an interference.
- UR - Indicates that the reported detection limit is unusable because QC criteria were not met.

PROJECT: NSB KINGS BAY, GEORGIA		VOLATILE AQUEOUS ANALYSES (ug/l)						Validation/Summary Table	
SAMPLE LOCATION:		KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-4	KBA-5-5	KBA-5-5D	KBA-5-6	
LAB NUMBER:		21628002	21628003	21616004	21616006	21628005	21628006	21628008	
DATE SAMPLED:		05/06/92	05/06/92	05/05/92	05/05/92	05/06/92	05/06/92	05/06/92	
DATA ANALYZED:		05/13/92	05/13/92	05/08/92	05/08/92	05/13/92	05/13/92	05/13/92	
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0	1.0	
ANALYTE	CRQL								
Chloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Bromomethane	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Vinyl Chloride	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Chloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Methylene Chloride	5	5 U	5 U	6 U	5 U	5 U	5 U	5 U	
Acetone	10	13 U	10 U	10 U	10 U	10 U	10 U	10 U	
Carbon Disulfide	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Trichlorofluoromethane	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
1,1-Dichloroethene	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
1,1-Dichloroethane	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
1,2-Dichloroethene (total)	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Chloroform	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
1,2-Dichloroethane	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
2-Butanone	10	12 U	10 U	10 U	10 U	10 U	10 U	10 U	
1,1,1-Trichloroethane	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Carbon Tetrachloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Vinyl Acetate	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Bromodichloromethane	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
1,2-Dichloropropane	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
cis-1,3-Dichloropropene	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Trichloroethene	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Dibromochloromethane	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
1,1,2-Trichloroethane	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Benzene	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
trans-1,3-Dichloropropene	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
2-Chloroethylvinylether	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Bromoform	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
2-Hexanone	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
4-Methyl-2-Pentanone	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Tetrachloroethene	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
1,1,2,2-Tetrachloroethane	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Toluene	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Chlorobenzene	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Ethylbenzene	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Styrene	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Xylene (total)	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
1,3-Dichlorobenzene	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
1,4-Dichlorobenzene	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
1,2-Dichlorobenzene	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Acrolein	100	100 U	100 U	100 U	100 U	100 U	100 U	100 U	
Iodomethane	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Acrylonitrile	100	100 U	100 U	100 U	100 U	100 U	100 U	100 U	
Dibromomethane	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Ethyl Methacrylate	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
1,2,3-Trichloropropane	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	

PROJECT: NSB KINGS BAY, GEORGIA		VOLATILE AQUEOUS ANALYSES (ug/l)					Validation/Summary Table	
SAMPLE LOCATION:	KBA-5-7	KBA-16-1	KBA-16-2	KBA-16-3	KBA-16-4	KBA-11-1	KBA-11-2	
LAB NUMBER:	21628007	21616003	21616002	21599002	21599003	21644002	21644007	
DATE SAMPLED:	05/06/92	05/05/92	05/05/92	05/04/92	05/04/92	05/07/92	05/07/92	
DATE ANALYZED:	05/13/92	05/08/92	05/08/92	05/08/92	05/08/92	05/13/92	05/14/92	
DILUTION FACTOR:	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
ANALYTE	CRQL							
Chloromethane	10	10 U	10 U	10 U	10 U	10 U	10 U	
Bromomethane	10	10 U	10 U	10 U	10 U	10 U	10 U	
Vinyl Chloride	10	10 U	10 U	10 U	10 U	10 U	64	
Chloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U	
Methylene Chloride	5	5 U	5 U	5 U	5 U	5 U	6 U	
Acetone	10	10 U	10 U	10 U	10 U	25 U	10 UJ	
Carbon Disulfide	5	5 U	5 U	5 U	5 U	5 U	5 U	
Trichlorofluoromethane	5	5 U	5 U	5 U	5 U	5 U	5 U	
1,1-Dichloroethene	5	5 U	5 U	5 U	5 U	5 U	5 U	
1,1-Dichloroethane	5	5 U	5 U	5 U	5 U	5 U	5 U	
1,2-Dichloroethene (total)	5	5 U	5 U	5 U	5 U	5 U	16	
Chloroform	5	5 U	5 U	5 U	5 U	5 U	5 U	
1,2-Dichloroethane	5	5 U	5 U	5 U	5 U	5 U	5 U	
2-Butanone	10	10 U	10 U	10 U	10 U	10 U	10 U	
1,1,1-Trichloroethane	5	5 U	5 U	5 U	5 U	5 U	5 U	
Carbon Tetrachloride	5	5 U	5 U	5 U	5 U	5 U	5 U	
Vinyl Acetate	10	10 U	10 U	10 U	10 U	10 U	10 U	
Bromodichloromethane	5	5 U	5 U	5 U	5 U	5 U	5 U	
1,2-Dichloropropane	5	5 U	5 U	5 U	5 U	5 U	5 U	
cis-1,3-Dichloropropene	5	5 U	5 U	5 U	5 U	5 U	5 U	
Trichloroethene	5	5 U	5 U	5 U	5 U	5 U	5 U	
Dibromochloromethane	5	5 U	5 U	5 U	5 U	5 U	5 U	
1,1,2-Trichloroethane	5	5 U	5 U	5 U	5 U	5 U	5 U	
Benzene	5	5 U	5 U	5 U	5 U	5 U	5 U	
trans-1,3-Dichloropropene	5	5 U	5 U	5 U	5 U	5 U	5 U	
2-Chloroethylvinylether	10	10 U	10 U	10 U	10 U	10 U	10 U	
Bromoform	5	5 U	5 U	5 U	5 U	5 U	5 U	
2-Hexanone	10	10 U	10 U	10 U	10 U	10 U	10 U	
4-Methyl-2-Pentanone	10	10 U	10 U	10 U	10 U	10 U	10 U	
Tetrachloroethene	5	5 U	5 U	5 U	5 U	5 U	1 J	
1,1,2,2-Tetrachloroethane	5	5 U	5 U	5 U	5 U	5 U	5 U	
Toluene	5	5 U	5 U	5 U	5 U	5 U	5 U	
Chlorobenzene	5	5 U	5 U	5 U	5 U	5 U	5 U	
Ethylbenzene	5	5 U	5 U	5 U	5 U	5 U	5 U	
Styrene	5	5 U	5 U	5 U	5 U	5 U	5 U	
Xylene (total)	5	5 U	5 U	5 U	5 U	5 U	2 J	
1,3-Dichlorobenzene	5	5 U	5 U	5 U	5 U	5 U	5 U	
1,4-Dichlorobenzene	5	5 U	5 U	5 U	5 U	5 U	5 U	
1,2-Dichlorobenzene	5	5 U	5 U	5 U	5 U	5 U	5 U	
Acrolein	100	100 U	100 U	100 U	100 U	100 U	100 U	
Iodomethane	10	10 U	10 U	10 U	10 U	10 U	10 U	
Acrylonitrile	100	100 U	100 U	100 U	100 U	100 U	100 U	
Dibromomethane	5	5 U	5 U	5 U	5 U	5 U	5 U	
Ethyl Methacrylate	5	5 U	5 U	5 U	5 U	5 U	5 U	
1,2,3-Trichloropropane	5	5 U	5 U	5 U	5 U	5 U	5 U	

PROJECT: NSB KINGS BAY, GEORGIA		VOLATILE AQUEOUS ANALYSES (ug/l)				Validation/Summary Table	
SAMPLE LOCATION:		KBA-11-9					
LAB NUMBER:		21644003					
DATE SAMPLED:		05/07/92					
DATE ANALYZED:		05/13/92					
DILUTION FACTOR:		1.0					
ANALYTE	CRQL						
Chloromethane	10	10 U					
Bromomethane	10	10 U					
Vinyl Chloride	10	10 U					
Chloroethane	10	10 U					
Methylene Chloride	5	5 U					
Acetone	10	10 U					
Carbon Disulfide	5	5 U					
Trichlorofluoromethane	5	5 U					
1,1-Dichloroethene	5	5 U					
1,1-Dichloroethane	5	5 U					
1,2-Dichloroethene (total)	5	5 U					
Chloroform	5	5 U					
1,2-Dichloroethane	5	5 U					
2-Butanone	10	10 U					
1,1,1-Trichloroethane	5	5 U					
Carbon Tetrachloride	5	5 U					
Vinyl Acetate	10	10 U					
Bromodichloromethane	5	5 U					
1,2-Dichloropropane	5	5 U					
cis-1,3-Dichloropropene	5	5 U					
Trichloroethene	5	5 U					
Dibromochloromethane	5	5 U					
1,1,2-Trichloroethane	5	5 U					
Benzene	5	5 U					
trans-1,3-Dichloropropene	5	5 U					
2-Chloroethylvinylether	10	10 U					
Bromoform	5	5 U					
2-Hexanone	10	10 U					
4-Methyl-2-Pentanone	10	10 U					
Tetrachloroethene	5	5 U					
1,1,2,2-Tetrachloroethane	5	5 U					
Toluene	5	5 U					
Chlorobenzene	5	5 U					
Ethylbenzene	5	5 U					
Styrene	5	5 U					
Xylene (total)	5	5 U					
1,3-Dichlorobenzene	5	5 U					
1,4-Dichlorobenzene	5	5 U					
1,2-Dichlorobenzene	5	5 U					
Acrolein	100	100 U					
Iodomethane	10	10 U					
Acrylonitrile	100	100 U					
Dibromomethane	5	5 U					
Ethyl Methacrylate	5	5 U					
1,2,3-Trichloropropane	5	5 U					

PROJECT: NSB KINGS BAY, GEORGIA		VOLATILE AQUEOUS ANALYSES (ug/l)				Validation/Summary Table	
SAMPLE LOCATION:		KBA-11-9					
LAB NUMBER:		21644003					
DATE SAMPLED:		05/07/92					
DATE ANALYZED:		05/13/92					
DILUTION FACTOR:		1.0					
ANALYTE	CRQL						
trans-1,4-Dichloro-2-Butene	5	5 U					
Acetonitrile	100	100 U					
3-Chloropropene	5	5 U					
Propionitrile	100	100 U					
Methacrylonitrile	5	5 U					
1,4-Dioxane	200	200 U					
Methyl Methacrylate	10	10 U					
1,2-Dibromoethane	5	5 U					
1,1,1,2-Tetrachloroethane	5	5 U					
1,2-Dibromo-3-Chloropropane	10	10 U					
Pentachloroethane	10	10 U					
Isobutyl alcohol	200	200 U					
Chloroprene	200	200 U					

PROJECT: NSB KINGS BAY, GEORGIA		SEMVOLATILE AQUEOUS ANALYSES (ug/l)					Validation/Summary Table	
SAMPLE LOCATION:	KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-4	KBA-5-5	KBA-5-5D	KBA-5-6	
LAB NUMBER:	21628002	21628003	21616004	21616006	21628005	21628006	21628008	
DATE SAMPLED:	05/06/92	05/06/92	05/05/92	05/05/92	05/06/92	05/06/92	05/06/92	
DATE ANALYZED:	05/21/92	05/21/92	05/20/92	05/20/92	05/21/92	05/21/92	05/21/92	
DILUTION FACTOR:	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
SEMVOLATILES -- METHOD 8270								
ANALYTE	CRQL							
N-nitrosodimethylamine	10	10 U	10 U	10 U	10 U	10 U	10 U	
Phenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
Aniline	10	10 U	10 U	10 U	10 U	10 U	10 U	
bis (2-Chloroethyl) Ether	10	10 U	10 U	10 U	10 U	10 U	10 U	
2-Chlorophenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
1,3-Dichlorobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
1,4-Dichlorobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
Benzyl Alcohol	10	10 U	10 U	10 U	10 U	10 U	10 U	
1,2-Dichlorobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
2-Methylphenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
bis (2-Chloroisopropyl) Ether	10	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	
N-Nitroso-Di-n-Propylamine	10	10 U	10 U	10 U	10 U	10 U	10 U	
Hexachloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U	
Nitrobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
Isopharone	10	10 U	10 U	10 U	10 U	10 U	10 U	
2-Nitrophenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
2,4-Dimethylphenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
Benzoic Acid	50	50 U	50 U	50 U	50 U	50 U	50 U	
bis (2-Chloroethoxy) Methane	10	10 U	10 U	10 U	10 U	10 U	10 U	
2,4-Dichlorophenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
1,2,4-Trichlorobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
Naphthalene	10	10 U	10 U	10 U	10 U	10 U	10 U	
4-Chloroaniline	10	10 U	10 U	10 U	10 U	10 U	10 U	
Hexachlorobutadiene	10	10 U	10 U	10 U	10 U	10 U	10 U	
4-Chloro-3-Methylphenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
2-Methylnaphthalene	10	10 U	10 U	10 U	10 U	10 U	10 U	
Hexachlorocyclopentadiene	10	10 U	10 U	10 U	10 U	10 U	10 U	
2,4,6-Trichlorophenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
2,4,5-Trichlorophenol	50	50 U	50 U	50 U	50 U	50 U	50 U	
2-Chloronaphthalene	10	10 U	10 U	10 U	10 U	10 U	10 U	
2-Nitroaniline	50	50 U	50 U	50 U	50 U	50 U	50 U	
Dimethylphthalate	10	10 U	10 U	10 U	10 U	10 U	10 U	
Acenaphthylene	10	10 U	10 U	10 U	10 U	10 U	10 U	
2,6-Dinitrotoluene	10	10 U	10 U	10 U	10 U	10 U	10 U	
3-Nitroaniline	50	50 U	50 U	50 U	50 U	50 U	50 U	
Acenaphthene	10	10 U	10 U	10 U	10 U	10 U	10 U	
2,4-Dinitrophenol	50	50 U	50 U	50 U	50 U	50 U	50 U	
4-Nitrophenol	50	50 U	50 U	50 U	50 U	50 U	50 U	
Dibenzofuran	10	10 U	10 U	10 U	10 U	10 U	10 U	
2,4-Dinitrotoluene	10	10 U	10 U	10 U	10 U	10 U	10 U	
Diethylphthalate	10	10 U	10 U	10 U	10 U	10 U	10 U	
4-Chlorophenyl-phenylether	10	10 U	10 U	10 U	10 U	10 U	10 U	
Fluorene	10	10 U	10 U	10 U	10 U	10 U	10 U	
4-Nitroaniline	50	50 U	50 U	50 U	50 U	50 U	50 U	
4,6-Dinitro-2-Methylphenol	50	50 U	50 U	50 U	50 U	50 U	50 U	

PROJECT: NSB KINGS BAY, GEORGIA		SEMIVOLATILE AQUEOUS ANALYSES (ug/l)						Validation/Summary Table	
SAMPLE LOCATION:		KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-4	KBA-5-5	KBA-5-5D	KBA-5-6	
LAB NUMBER:		21628002	21628003	21616004	21616006	21628005	21628006	21628008	
DATE SAMPLED:		05/06/92	05/06/92	05/05/92	05/05/92	05/06/92	05/06/92	05/06/92	
DATE ANALYZED:		05/21/92	05/21/92	05/20/92	05/20/92	05/21/92	05/21/92	05/21/92	
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0	1.0	
SEMIVOLATILES --- METHOD 8270 (continued)									
ANALYTE	CRQL								
Pyridine	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U	
N-Nitrosomethylethylamine	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
N-Nitrosomorpholine	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
o-Toluidine	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
3- & 4- Methylphenol	20	20 U	20 U	20 U	20 U	20 U	20 U	20 U	
Hexachloropropene	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U	
p-Phenylenediamine	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U	
Safrole	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U	
Isosafrole	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U	
1,4-Naphthoquinone	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U	
1,3-Dinitrobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
5-Nitro-o-toluidine	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
1,3,5-Trinitrobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
4-Nitroquinoline-1-oxide	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Methapyrilene	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U	
3,3'-Dimethylbenzidine	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
2-Acetamidofluorene	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	
Hexachlorophene	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U	
POLYCHLORINATED DIBENZO-FURANS/DIOXINS --- METHOD 8280 (ng/l)									
ANALYTE	DATE ANALYZED:	05/21/92	05/21/92	05/20/92	05/20/92	05/21/92	05/21/92	05/21/92	
	CRQL (ng/l)								
TCDFs (total)	10	0.018 U	0.019 U	0.051 U	0.028 U	0.031 U	0.023 U	0.063 U	
PeCDFs (total)	10	0.028 U	0.033 U	0.073 U	0.033 U	0.043 U	0.037 U	0.052 U	
HxCDFs (total)	10	0.061 U	0.071 U	0.15 U	0.095 U	0.082 U	0.068 U	0.089 U	
TCDDs (total)	10	0.040 U	0.038 U	0.10 U	0.055 U	0.041 U	0.028 U	0.050 U	
2,3,7,8-TCDD	5	0.040 U	0.038 U	0.10 U	0.055 U	0.041 U	0.028 U	0.050 U	
PeCDDs (total)	10	0.062 U	0.077 U	0.23 U	0.10 U	0.092 U	0.081 U	0.13 U	
HeCDDs (total)	10	0.069 U	0.059 U	0.27 U	0.15 U	0.12 U	0.087 U	0.10 U	

PROJECT: NSB KINGS BAY, GEORGIA		SEMIVOLATILE AQUEOUS ANALYSES (ug/l)					Validation/Summary Table	
SAMPLE LOCATION:	KBA-5-7	KBA-16-1	KBA-16-2	KBA-16-3	KBA-16-4	KBA-11-1	KBA-11-2	
LAB NUMBER:	21628007	21616003	21616002	21599002	21599003	21644002	21644007	
DATE SAMPLED:	05/06/92	05/05/92	05/05/92	05/04/92	05/04/92	05/07/92	05/07/92	
DATE ANALYZED:	05/21/92	05/20/92	05/20/92	05/20/92	05/20/92	05/21/92	05/22/92	
DILUTION FACTOR:	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
SEMIVOLATILES --- METHOD 8270 (continued)								
ANALYTE	CRQL							
Pyridine	50	50 U	50 U	50 U	50 U	50 U	50 U	
N-Nitrosomethylethylamine	10	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	
N-Nitrosomorpholine	10	10 U	10 U	10 U	10 U	10 U	10 U	
o-Toluidine	10	10 U	10 U	10 U	10 U	10 U	10 U	
3- & 4- Methylphenol	20	20 U	20 U	20 U	20 U	20 U	20 U	
Hexachloropropene	50	50 U	50 U	50 U	50 U	50 U	50 U	
p-Phenylenediamine	50	50 U	50 U	50 U	50 U	50 U	50 U	
Safrole	50	50 U	50 U	50 U	50 U	50 U	50 U	
Isosafrole	50	50 U	50 U	50 U	50 U	50 U	50 U	
1,4-Naphthoquinone	50	50 U	50 U	50 U	50 U	50 U	50 U	
1,3-Dinitrobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
5-Nitro-o-toluidine	10	10 U	10 U	10 U	10 U	10 U	10 U	
1,3,5-Trinitrobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
4-Nitroquinoline-1-oxide	10	10 U	10 U	10 U	10 U	10 U	10 U	
Methapyrene	50	50 U	50 U	50 U	50 U	50 U	50 U	
3,3'-Dimethylbenzidine	10	10 U	10 U	10 U	10 U	10 U	10 UJ	
2-Acetamidofluorene	10	10 U	10 U	10 U	10 U	10 U	10 U	
Hexachlorophene	50	50 U	50 U	50 U	50 U	50 U	50 U	
POLYCHLORINATED DIBENZO-FURANS/DIOXINS --- METHOD 8280 (ng/l)								
ANALYTE	DATE ANALYZED:	05/21/92	05/20/92	05/20/92	05/12/92	05/12/92	05/21/92	05/22/92
	CRQL (ng/l)							
TCDFs (total)	10	0.047 U	0.024 U	0.030 U	0.045 U	0.047 U	0.022 U	0.021 U
PeCDFs (total)	10	0.048 U	0.042 U	0.052 U	0.055 U	0.048 U	0.033 U	0.028 U
HxCDFs (total)	10	0.086 U	0.096 U	0.086 U	0.10 U	0.077 U	0.068 U	0.069 U
TCDDs (total)	10	0.037 U	0.058 U	0.048 U	0.053 U	0.044 U	0.054 U	0.038 U
2,3,7,8- TCDD	5	0.037 U	0.058 U	0.048 U	0.053 U	0.044 U	0.054 U	0.038 U
PeCDDs (total)	10	0.069 U	0.14 U	0.20 U	0.17 U	0.12 U	0.082 U	0.069 U
HeCDDs (total)	10	0.12 U	0.16 U	0.14 U	0.14 U	0.12 U	0.081 U	0.083 U

PROJECT: NSB KINGS BAY, GEORGIA		SEMIVOLATILE AQUEOUS ANALYSES (ug/l)					Validation/Summary Table	
SAMPLE LOCATION:	KBA-11-2D	KBA-11-3	KBA-11-4	KBA-11-5	KBA-11-6	KBA-11-7	KBA-11-8	
LAB NUMBER:	21644008	21652005	21652006	21652007	21652008	21644006	21644005	
DATE SAMPLED:	05/07/92	05/08/92	05/08/92	05/08/92	05/08/92	05/07/92	05/07/92	
DATE ANALYZED:	05/22/92	05/22/92	05/22/92	05/20/92	05/26/92	05/22/92	05/21/92	
DILUTION FACTOR:	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
SEMIVOLATILES --- METHOD 8270 (continued)								
ANALYTE	CRQL							
Pyridine	50	50 U	50 U	50 U	50 U	50 U	50 U	
N-Nitrosomethylethylamine	10	10 U	10 U	10 U	10 U	10 U	10 U	
N-Nitrosomorpholine	10	10 U	10 U	10 U	10 U	10 U	10 U	
o-Toluidine	10	10 U	10 U	10 U	10 U	10 U	10 U	
3- & 4- Methylphenol	20	20 U	20 U	20 U	20 U	20 U	20 U	
Hexachloropropene	50	50 U	50 U	50 U	50 U	50 U	50 U	
p-Phenylenediamine	50	50 U	50 U	50 U	50 U	50 U	50 U	
Safrole	50	50 U	50 U	50 U	50 U	50 U	50 U	
Isosafrole	50	50 U	50 U	50 U	50 U	50 U	50 U	
1,4-Naphthoquinone	50	50 U	50 U	50 U	50 U	50 U	50 U	
1,3-Dinitrobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
5-Nitro-o-toluidine	10	10 U	10 U	10 U	10 U	10 U	10 U	
1,3,5-Trinitrobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
4-Nitroquinoline-1-oxide	10	10 U	10 U	10 U	10 U	10 U	10 U	
Methapyrilene	50	50 U	50 U	50 U	50 U	50 U	50 U	
3,3'-Dimethylbenzidine	10	10 U	10 U	10 U	10 U	10 U	10 U	
2-Acetamidofluorene	10	10 U	10 U	10 U	10 U	10 U	10 U	
Hexachlorophene	50	50 U	50 U	50 U	50 U	50 U	50 U	
POLYCHLORINATED DIBENZO-FURANS/DIOXINS --- METHOD 8280 (ng/l)								
ANALYTE	DATE ANALYZED:	05/22/92	05/26/92	05/26/92	05/26/92	05/26/92	05/22/92	
	CRQL (ng/l)							
TCDFs (total)	10	0.016 U	0.055 U	0.051 U	0.049 U	0.052 U	0.024 U	
PeCDFs (total)	10	0.023 U	0.11 U	0.16 U	0.13 U	0.13 U	0.036 U	
HxCDFs (total)	10	0.055 U	0.21 U	0.27 U	0.23 U	0.35 U	0.096 U	
TCDDs (total)	10	0.042 U	0.078 U	0.11 U	0.12 U	0.11 U	0.036 U	
2,3,7,8- TCDD	5	0.042 U	0.078 U	0.11 U	0.12 U	0.11 U	0.036 U	
PeCDDs (total)	10	0.057 U	0.30 U	0.38 U	0.26 U	0.36 U	0.084 U	
HeCDDs (total)	10	0.075 U	0.33 U	0.35 U	0.36 U	0.37 U	0.12 U	

PROJECT: NSB KINGS BAY, GEORGIA		SEMIVOLATILE AQUEOUS ANALYSES (ug/l)				Validation/Summary Table	
SAMPLE LOCATION:		KBA-11-9					
LAB NUMBER:		21644003					
DATE SAMPLED:		05/07/92					
DATE ANALYZED:		05/21/92					
DILUTION FACTOR:		1.0					
SEMIVOLATILES --- METHOD 8270							
ANALYTE	CRQL						
N-Nitrosodimethylamine	10	10 U					
Phenol	10	10 U					
Aniline	10	10 U					
bis (2-Chloroethyl) Ether	10	10 U					
2-Chlorophenol	10	10 U					
1,3-Dichlorobenzene	10	10 U					
1,4-Dichlorobenzene	10	10 U					
Benzyl Alcohol	10	10 U					
1,2-Dichlorobenzene	10	10 U					
2-Methylphenol	10	10 U					
bis (2-Chloroisopropyl) Ether	10	10 U					
N-Nitroso-Di-n-Propylamine	10	10 U					
Hexachloroethane	10	10 U					
Nitrobenzene	10	10 U					
Isophorone	10	10 U					
2-Nitrophenol	10	10 U					
2,4-Dimethylphenol	10	10 U					
Benzoic Acid	50	50 U					
bis (2-Chloroethoxy) Methane	10	10 U					
2,4-Dichlorophenol	10	10 U					
1,2,4-Trichlorobenzene	10	10 U					
Naphthalene	10	10 U					
4-Chloroaniline	10	10 U					
Hexachlorobutadiene	10	10 U					
4-Chloro-3-Methylphenol	10	10 U					
2-Methylnaphthalene	10	10 U					
Hexachlorocyclopentadiene	10	10 U					
2,4,6-Trichlorophenol	10	10 U					
2,4,5-Trichlorophenol	50	50 U					
2-Chloronaphthalene	10	10 U					
2-Nitroaniline	50	50 U					
Dimethylphthalate	10	10 U					
Acenaphthylene	10	10 U					
2,6-Dinitrotoluene	10	10 U					
3-Nitroaniline	50	50 U					
Acenaphthene	10	10 U					
2,4-Dinitrophenol	50	50 U					
4-Nitrophenol	50	50 U					
Dibenzofuran	10	10 U					
2,4-Dinitrotoluene	10	10 U					
Diethylphthalate	10	10 U					
4-Chlorophenyl-phenylether	10	10 U					
Fluorene	10	10 U					
4-Nitroaniline	50	50 U					
4,6-Dinitro-2-Methylphenol	50	50 U					

PROJECT: NSB KINGS BAY, GEORGIA		SEMIVOLATILE AQUEOUS ANALYSES (ug/l)				Validation/Summary Table	
SAMPLE LOCATION:	KBA-11-9						
LAB NUMBER:	21644003						
DATE SAMPLED:	05/07/92						
DATE ANALYZED:	05/21/92						
DILUTION FACTOR:	1.0						
SEMIVOLATILES --- METHOD 8270 (continued)							
ANALYTE	CRQL						
N-Nitrosodiphenylamine & Diphenylamine	10	10 U					
1,2-Diphenylhydrazine	10	10 U					
4-Bromophenyl-phenylether	10	10 U					
Hexachlorobenzene	10	10 U					
Pentachlorophenol	50	50 U					
Phenanthrene	10	10 U					
Anthracene	10	10 U					
Di-n-Butylphthalate	10	10 U					
Fluoranthene	10	10 U					
Pyrene	10	10 U					
Butylbenzylphthalate	10	10 U					
3,3'-Dichlorobenzidine	20	20 U					
Benzo (a) Anthracene	10	10 U					
Chrysene	10	10 U					
bis (2-Ethylhexyl) Phthalate	10	10 U					
Di-n-Octyl Phthalate	10	10 U					
Benzo (b) Fluoranthene	10	10 U					
Benzo (k) Fluoranthene	10	10 U					
Benzo (a) Pyrene	10	10 U					
Indeno (1,2,3-cd) Pyrene	10	10 U					
Dibenz (a,h) Anthracene	10	10 U					
Benzo (g,h,i) Perylene	10	10 U					
2-Picoline	50	50 U					
Methyl methanesulfonate	10	10 U					
Ethyl methanesulfonate	10	10 U					
Acetophenone	10	10 U					
N-Nitrosopiperidine	10	10 U					
Phenyl-tert-butylamine	50	50 U					
2,6-Dichlorophenol	10	10 U					
N-Nitroso-di-n-butylamine	10	10 U					
N-Nitrosodiethylamine	10	10 U					
N-Nitrosopyrrolidine	10	10 U					
Benzidine	50	50 U					
1,2,4,5-Tetrachlorobenzene	50	50 U					
Pentachlorobenzene	50	50 U					
1-Naphthylamine	50	50 UJ					
2-Naphthylamine	50	50 UJ					
2,3,4,6-Tetrachlorophenol	10	10 U					
Phenacetin	10	10 U					
4-Aminobiphenyl	50	50 U					
Pentachloronitrobenzene	50	50 U					
Pronamide	10	10 U					
p-Dimethylaminoazobenzene	10	10 U					
7,12-Dimethylbenz (a) Anthracene	10	10 U					
3-Methylcholanthrene	10	10 U					

PROJECT: NSB KINGS BAY, GEORGIA		SEMIVOLATILE AQUEOUS ANALYSES (ug/l)				Validation/Summary Table	
SAMPLE LOCATION:		KBA-11-9					
LAB NUMBER:		21644003					
DATE SAMPLED:		05/07/92					
DATE ANALYZED:		05/21/92					
DILUTION FACTOR:		1.0					
SEMIVOLATILES -- METHOD 8270 (continued)							
ANALYTE		CRQL					
Pyridine	50	50 U					
N-Nitrosomethylethylamine	10	10 U					
N-Nitrosomorpholine	10	10 U					
o-Toluidine	10	10 U					
3- & 4- Methylphenol	20	20 U					
Hexachloropropene	50	50 U					
p-Phenylenediamine	50	50 U					
Safrole	50	50 U					
Isosafrole	50	50 U					
1,4-Naphthoquinone	50	50 U					
1,3-Dinitrobenzene	10	10 U					
5-Nitro-o-toluidine	10	10 U					
1,3,5-Trinitrobenzene	10	10 U					
4-Nitroquinoline-1-oxide	10	10 U					
Methapyrene	50	50 U					
3,3'-Dimethylbenzidine	10	10 U					
2-Acetamidofluorene	10	10 U					
Hexachlorophene	50	50 U					
POLYCHLORINATED DIBENZO-FURANS/DIOXINS -- METHOD 8280 (ng/l)							
DATE ANALYZED:		05/22/92					
ANALYTE		CRQL (ng/l)					
TCDFs (total)	10	0.029 U					
PeCDFs (total)	10	0.030 U					
HxCDFs (total)	10	0.062 U					
TCDDs (total)	10	0.053 U					
2,3,7,8- TCDD	5	0.053 U					
PeCDDs (total)	10	0.076 U					
HeCDDs (total)	10	0.090 U					

PROJECT: NSB KINGS BAY, GEORGIA		PESTICIDE/PCB/HERBICIDE				AQUEOUS ANALYSES (ug/l)		Validation/Summary Table	
SAMPLE LOCATION:		KBA-5-7	KBA-16-1	KBA-16-2	KBA-16-3	KBA-16-4	KBA-11-1	KBA-11-2	
LAB NUMBER:		21628007	21616003	21616002	21599002	21599003	21644002	21644007	
DATE SAMPLED:		05/06/92	05/05/92	05/05/92	05/04/92	05/04/92	05/07/92	05/07/92	
ORGANOCHLORINE PESTICIDES AND PCBs -- METHOD 8060									
ANALYTE	CRQL								
alpha-BHC	0.05	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	
beta-BHC	0.05	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	
delta-BHC	0.05	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	
gamma-BHC (Lindane)	0.05	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	
Heptachlor	0.05	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	
Aldrin	0.05	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	
Heptachlor epoxide	0.05	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	
Endosulfan I	0.05	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	
Dieldrin	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	
4,4'-DDE	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	
Endrin	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	
Endosulfan II	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	
4,4'-DDD	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	
Endrin Aldehyde	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	
Endosulfan Sulfate	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	
4,4'-DDT	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	
Methoxychlor	0.50	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	
Endrin Ketone	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	
Chlordane	0.50	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	
Toxaphene	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Aroclor-1016	0.50	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	
Aroclor-1221	0.50	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	
Aroclor-1232	0.50	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	
Aroclor-1242	0.50	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	
Aroclor-1248	0.50	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	
Aroclor-1254	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Aroclor-1260	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Chlorobenzilate	0.5	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	
Diallate	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Isodrin	0.02	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	
Kepone	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
ORGANOPHOSPHOROUS PESTICIDES -- METHOD 8140									
ANALYTE	CRQL								
Triethylphosphorothioate	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Thionazin	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Phorate	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Sulfotepp	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Dimethoate	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	
Disulfoton	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Methyl Parathion	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Ethyl Parathion	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
Famphur	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	
CHLORINATED HERBICIDES -- METHOD 8150									
ANALYTE	CRQL								
2,4-D	2.5	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 UJ	2.5 U	2.5 U	
Silvex	0.5	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 U	
2,4,5-T	0.5	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 U	
Dinoseb	2.5	2.5 U	2.5 U	2.5 U	2.5 UJ	2.5 UJ	2.5 U	2.5 U	

PROJECT: NSB KINGS BAY, GEORGIA		PESTICIDE/PCB/HERBICIDE		AQUEOUS ANALYSES (ug/l)		Validation/Summary Table	
SAMPLE LOCATION:		KBA-11-9					
LAB NUMBER:		21644003					
DATE SAMPLED:		05/07/92					
ORGANOCHLORINE PESTICIDES AND PCBs -- METHOD 8080							
ANALYTE		CRQL					
alpha-BHC	0.05	0.05 U					
beta-BHC	0.05	0.05 U					
delta-BHC	0.05	0.05 U					
gamma-BHC (Lindane)	0.05	0.05 U					
Heptachlor	0.05	0.05 U					
Aldrin	0.05	0.05 U					
Heptachlor epoxide	0.05	0.05 U					
Endosulfan I	0.05	0.05 U					
Dieldrin	0.10	0.10 U					
4,4'-DDE	0.10	0.10 U					
Endrin	0.10	0.10 U					
Endosulfan II	0.10	0.10 U					
4,4'-DDD	0.10	0.10 U					
Endrin Aldehyde	0.10	0.10 U					
Endosulfan Sulfate	0.10	0.10 U					
4,4'-DDT	0.10	0.10 U					
Methoxychlor	0.50	0.50 U					
Endrin Ketone	0.10	0.10 U					
Chlordane	0.50	0.50 U					
Toxaphene	1.0	1.0 U					
Aroclor-1016	0.50	0.50 U					
Aroclor-1221	0.50	0.50 U					
Aroclor-1232	0.50	0.50 U					
Aroclor-1242	0.50	0.50 U					
Aroclor-1248	0.50	0.50 U					
Aroclor-1254	1.0	1.0 U					
Aroclor-1260	1.0	1.0 U					
Chlorobenzilate	0.5	0.5 U					
Diallate	1	1 U					
Isodrin	0.02	0.02 U					
Kepona	1.0	1.0 U					
ORGANOPHOSPHOROUS PESTICIDES -- METHOD 8140							
ANALYTE		CRQL					
Triethylphosphorothioate	1	1 U					
Thionazin	1	1 U					
Phorate	1	1 U					
Sulfotepp	1	1 U					
Dimethoate	5	5 U					
Disulfoton	1	1 U					
Methyl Parathion	1	1 U					
Ethyl Parathion	1	1 U					
Famphur	1	1 U					
CHLORINATED HERBICIDES -- METHOD 8150							
ANALYTE		CRQL					
2,4-D	2.5	2.5 U					
Silvex	0.5	0.5 U					
2,4,5-T	0.5	0.5 U					
Dinoseb	2.5	2.5 U					

PROJECT: NSB KINGS BAY, GEORGIA		INORGANIC AQUEOUS ANALYSES (ug/l)					Validation/Summary Table	
SAMPLE LOCATION:		KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-4	KBA-5-5	KBA-5-5D	KBA-5-6
LAB NUMBER:		21628002	21628003	21616004	21616006	21628005	21628006	21628008
DATE SAMPLED:		05/06/92	05/06/92	05/05/92	05/05/92	05/06/92	05/06/92	05/06/92
ANALYTE	CRQL							
Antimony	60	11.0 U	11.0 U	11.0 U	11.0 U	11.0 U	11.0 U	11.0 U
Arsenic	10	10.5 J	20.0 J	28.5	12.5	22.5 J	24.0 J	3.2 J
Barium	200	417	181 J	366	274	187 J	187 J	208
Beryllium	5	3.4 J	1.4 J	2.9 J	2.3 J	2.6 J	2.3 J	2.0 J
Cadmium	5	1.3 J	1.0 UJ	2.2 J	1.8 J	1.3 J	3.1 J	7.5 J
Chromium	10	56.8	24.7	59.5	31.4	30.8	30.2	34.7
Cobalt	50	16.8 J	7.8 U	14.1 J	7.8 U	14.7 J	13.0 J	7.8 U
Copper	25	14.6 J	10.9 J	22.2 J	10.3 J	9.6 J	8.8 J	10.7 J
Lead	5	13.1	10.0	18.0	14.0	17.8	16.9	11.3
Mercury	0.2	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Nickel	40	24.3 J	7.8 U	21.3 J	8.2 J	24.3 J	24.7 J	9.4 J
Selenium	5	3.2 J	2.3 J	6.3	2.9 J	3.3 J	2.5 J	2.7 J
Silver	10	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Thallium	10	1.0 J	0.80 U	1.1 J	1.1 J	1.1 J	1.3 J	0.80 U
Tin	208	23.3 U	23.3 U	23.3 U	23.3 U	23.3 U	23.3 U	23.3 U
Vanadium	50	63.5	21.4 J	52.3	31.5 J	42.1 J	37.6 J	34.6 J
Zinc	20	62.0	130	76.1	41.0	62.9	62.2	44.0
Cyanide	10	1.8 U	1.8 U	1.8 U	7.8 J	1.8 U	1.8 U	10.3
Sulfide	100	1800	100 U	400	500	1200	3100	500

PROJECT: NSB KINGS BAY, GEORGIA		INORGANIC AQUEOUS ANALYSES (ug/l)					Validation/Summary Table	
SAMPLE LOCATION:		KBA-5-7	KBA-16-1	KBA-16-2	KBA-16-3	KBA-16-4	KBA-11-1	KBA-11-2
LAB NUMBER:		21628007	21616003	21616002	21599002	21599003	21644002	21644007
DATE SAMPLED:		05/06/92	05/05/92	05/05/92	05/04/92	05/04/92	05/07/92	05/07/92
ANALYTE	CRQL							
Antimony	60	11.0 U	11.0 U	11.0 U	11.0 U	11.3 J	11.0 U	11.0 U
Arsenic	10	14.0 J	8.5 J	19.5	10.2 J	1.5 J	0.70 UJ	0.70 UJ
Barium	200	203	70.8 J	82.2 J	119 J	37.1 J	95.7 J	26.2 J
Beryllium	5	2.0 J	1.1 J	1.7 J	4.7 J	0.80 U	2.3 J	1.7 J
Cadmium	5	5.5 J	1.5 J	1.6 J	1.0 UJ	1.0 UJ	1.0 UJ	1.0 UJ
Chromium	10	35.2	32.0	28.1	20.7	3.3 U	92.8	38.1
Cobalt	50	7.8 U	7.8 U	9.1 J	7.8 U	7.8 U	7.8 U	7.8 U
Copper	25	14.8 J	9.2 J	3.8 J	5.5 J	4.2 J	21.7 J	6.4 J
Lead	5	12.7	7.6	11.5	4.3 J	2.5 U	23.3	4.5
Mercury	0.2	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.11 J	0.10 U
Nickel	40	19.7 J	7.8 UJ	19.4 J	7.8 U	7.8 U	7.8 U	7.8 U
Selenium	5	2.9 J	10.6	1.6 J	1.1 J	0.88 J	5.6	2.7 J
Silver	10	1.4 U	1.4 J	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Thallium	10	0.80 U	0.90 J	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U
Tin	23.3	23.3 U	23.3 U	23.3 U	23.3 U	23.3 U	23.3 U	23.3 U
Vanadium	50	34.3 J	44.4 J	48.0 J	33.6 J	12.0 J	29.9 J	20.2 J
Zinc	20	45.3	15.1 U	65.7	56.2	10.8 U	7.6 U	7.5 U
Cyanide	10	5.7 J	8.4 J	8.5 J	1.8 U	18.5	1.8 UJ	6.1 J
Sulfide	100	400	100 U	2400	1400	200	500	2600

PROJECT: NSB KINGS BAY, GEORGIA		INORGANIC AQUEOUS ANALYSES (ug/l)						Validation/Summary Table	
SAMPLE LOCATION:		KBA-11-2D	KBA-11-3	KBA-11-4	KBA-11-5	KBA-11-6	KBA-11-7	KBA-11-8	
LAB NUMBER:		21644008	21652005	21652006	21652007	21652008	21644006	21644005	
DATE SAMPLED:		05/07/92	05/08/92	05/08/92	05/08/92	05/08/92	05/07/92	05/07/92	
ANALYTE	CRQL								
Antimony	60	11.0 U	11.0 U	11.0 U	11.0 U	11.0 U	11.0 U	11.0 U	
Arsenic	10	3.5 UJ	0.70 U	0.70 U	0.70 U	3.5 U	0.70 UJ	1.7 J	
Barium	200	25.9 J	54.2 J	30.2 J	71.7 J	34.6 J	26.2 J	43.4 J	
Beryllium	5	1.7 J	1.1 J	2.2 J	4.0 J	2.3 J	1.7 J	1.7 J	
Cadmium	5	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.3 J	
Chromium	10	37.2	20.8	29.0	27.1	40.5	54.6	23.8	
Cobalt	50	7.8 U	7.8 U	7.8 U	7.8 U	7.8 U	7.8 U	7.8 U	
Copper	25	6.2 J	4.4 J	3.1 J	6.2 J	7.9 J	10.3 J	13.7 J	
Lead	5	5.6	3.9 J	3.9 J	2.9 J	4.3 J	3.8 J	4.0 J	
Mercury	0.2	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	
Nickel	40	7.8 U	7.8 UJ	7.8 UJ	7.8 UJ	7.8 UJ	7.8 U	7.8 U	
Selenium	5	2.9 J	3.8 J	2.4 J	0.55 J	2.5 J	3.4 J	1.7 J	
Silver	10	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	
Thallium	10	0.80 U	1.6 J	0.80 U					
Tin	208	23.3 U	23.3 U	23.3 U	23.3 U	23.3 U	23.3 U	23.3 U	
Vanadium	50	24.5 J	44.3 J	59.4	64.5	25.7 J	25.0 J	33.2 J	
Zinc	20	10.3 U	19.5 U	10.9 U	555	9.9 U	6.5 U	23.4 U	
Cyanide	10	6.1 J	1.8 UJ	10.8 J	1.8 UJ	1.8 UJ	1.8 UJ	26.2 J	
Sulfide	100	1000	200	300	1500	100 U	200	2900	

PROJECT: NSB KINGS BAY, GEORGIA		INORGANIC AQUEOUS ANALYSES (ug/l)						Validation/Summary Table	
SAMPLE LOCATION:		KBA-11-9							
LAB NUMBER:		21644003							
DATE SAMPLED:		05/07/92							
ANALYTE	CRQL								
Antimony	60	11.0 U							
Arsenic	10	0.70 UJ							
Barium	200	43.8 J							
Beryllium	5	2.3 J							
Cadmium	5	1.0 UJ							
Chromium	10	49.1							
Cobalt	50	7.8 U							
Copper	25	14.2 J							
Lead	5	12.2							
Mercury	0.2	0.10 U							
Nickel	40	7.8 U							
Selenium	5	5.4							
Silver	10	1.4 U							
Thallium	10	0.80 U							
Tin	208	23.3 U							
Vanadium	50	42.8 J							
Zinc	20	8.7 U							
Cyanide	10	1.8 UJ							
Sulfide	100	300							

**TRIP BLANKS
SOURCE WATER BLANKS
SAMPLE EVENT NO. 2
MAY 1992**

PROJECT: NSB KINGS BAY, GEORGIA		VOLATILE AQUEOUS ANALYSES (ug/l)					Validation/Summary Table	
SAMPLE LOCATION:		BS-14-ER	BS-15-ER	BS-16-ER	BS-4-FB	BS-5-FB		
LAB NUMBER:		21628004	21644004	21652004	21652003	21652002		
DATE SAMPLED:		05/06/92	05/07/92	05/08/92	05/08/92	05/08/92		
DATE ANALYZED:		05/13/92	05/13/92	05/15/92	05/14/92	05/14/92		
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0		
ANALYTE	CRQL							
Chloromethane	10	10 U	10 U	10 U	10 U	10 U		
Bromomethane	10	10 U	10 U	10 U	10 U	10 U		
Vinyl Chloride	10	10 U	10 U	10 U	10 U	10 U		
Chloroethane	10	10 U	10 U	10 U	10 U	10 U		
Methylene Chloride	5	5 U	6 U	5 U	5 U	5 U		
Acetone	10	280	210	58	35 J	10 UJ		
Carbon Disulfide	5	5 U	5 U	5 U	5 U	5 U		
Trichlorofluoromethane	5	5 U	5 U	5 U	5 U	2 J		
1,1-Dichloroethene	5	5 U	5 U	5 U	5 U	5 U		
1,1-Dichloroethane	5	5 U	5 U	5 U	5 U	5 U		
1,2-Dichloroethene (total)	5	5 U	5 U	5 U	5 U	5 U		
Chloroform	5	3 J	2 J	9	16	5 U		
1,2-Dichloroethane	5	5 U	5 U	5 U	5 U	5 U		
2-Butanone	10	170	220	27	28	10 U		
1,1,1-Trichloroethane	5	5 U	5 U	5 U	5 U	5 U		
Carbon Tetrachloride	5	5 U	5 U	5 U	5 U	5 U		
Vinyl Acetate	10	10 U	10 U	10 U	10 U	10 U		
Bromodichloromethane	5	5 U	5 U	4 J	6	5 U		
1,2-Dichloropropane	5	5 U	5 U	5 U	5 U	5 U		
cis-1,3-Dichloropropene	5	5 U	5 U	5 U	5 U	5 U		
Trichloroethene	5	5 U	5 U	5 U	5 U	5 U		
Dibromochloromethane	5	5 U	5 U	2 J	3 J	5 U		
1,1,2-Trichloroethane	5	5 U	5 U	5 U	5 U	5 U		
Benzene	5	5 U	5 U	5 U	5 U	5 U		
trans-1,3-Dichloropropene	5	5 U	5 U	5 U	5 U	5 U		
2-Chloroethylvinylether	10	10 U	10 U	10 U	10 U	10 U		
Bromoform	5	5 U	5 U	5 U	5 U	5 U		
2-Hexanone	10	10 U	10 U	10 U	10 U	10 U		
4-Methyl-2-Pentanone	10	10 U	10 U	10 U	10 U	10 U		
Tetrachloroethene	5	5 U	5 U	5 U	5 U	5 U		
1,1,2,2-Tetrachloroethane	5	5 U	5 U	5 U	5 U	5 U		
Toluene	5	5 U	5 U	5 U	5 U	5 U		
Chlorobenzene	5	2 J	2 J	5 U	2 J	5 U		
Ethylbenzene	5	5 U	5 U	5 U	5 U	5 U		
Styrene	5	5 U	5 U	5 U	5 U	5 U		
Xylene (total)	5	5 U	5 U	5 U	5 U	5 U		
1,3-Dichlorobenzene	5	5 U	5 U	5 U	5 U	5 U		
1,4-Dichlorobenzene	5	5 U	5 U	5 U	5 U	5 U		
1,2-Dichlorobenzene	5	5 U	5 U	5 U	5 U	5 U		
Acrolein	100	100 U	100 U	100 U	100 U	100 U		
Iodomethane	10	10 U	10 U	10 U	10 U	10 U		
Acrylonitrile	100	100 U	100 U	100 U	100 U	100 U		
Dibromomethane	5	5 U	5 U	5 U	5 U	5 U		
Ethyl Methacrylate	5	5 U	5 U	5 U	5 U	5 U		
1,2,3-Trichloropropane	5	5 U	5 U	5 U	5 U	5 U		

PROJECT: NSB KINGS BAY, GEORGIA		SEMIVOLATILE AQUEOUS ANALYSES (ug/l)					Validation/Summary Table	
SAMPLE LOCATION:	BS-12-ER	BS-13-ER	BS-14-ER	BS-15-ER	BS-16-ER	BS-4-FB	BS-5-FB	
LAB NUMBER:	21599001	21616005	21628004	21644004	21652004	21652003	21652002	
DATE SAMPLED:	05/04/92	05/05/92	05/06/92	05/07/92	05/08/92	05/08/92	05/08/92	
DATE ANALYZED:	05/20/92	05/20/92	05/21/92	05/21/92	05/22/92	05/22/92	05/22/92	
DILUTION FACTOR:	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
SEMIVOLATILES --- METHOD 8270								
ANALYTE	CRQL							
N-nitrosodimethylamine	10	10 U	10 U	10 U	10 U	10 U	10 U	
Phenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
Aniline	10	10 U	10 U	10 U	10 U	10 U	10 U	
bis (2-Chloroethyl) Ether	10	10 U	10 U	10 U	10 U	10 U	10 U	
2-Chlorophenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
1,3-Dichlorobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
1,4-Dichlorobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
Benzyl Alcohol	10	10 U	10 U	10 U	10 U	10 U	10 U	
1,2-Dichlorobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
2-Methylphenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
bis (2-Chloroisopropyl) Ether	10	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	
N-Nitroso-Di-n-Propylamine	10	10 U	10 U	10 U	10 U	10 U	10 U	
Hexachloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U	
Nitrobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
Isophorone	10	10 U	10 U	10 U	10 U	10 U	10 U	
2-Nitrophenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
2,4-Dimethylphenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
Benzoic Acid	50	50 U	50 U	50 U	50 U	50 U	50 U	
bis (2-Chloroethoxy) Methane	10	10 U	10 U	10 U	10 U	10 UJ	10 UJ	
2,4-Dichlorophenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
1,2,4-Trichlorobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	
Naphthalene	10	10 U	10 U	10 U	10 U	10 U	10 U	
4-Chloroaniline	10	10 U	10 U	10 U	10 U	10 U	10 U	
Hexachlorobutadiene	10	10 U	10 U	10 U	10 U	10 U	10 U	
4-Chloro-3-Methylphenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
2-Methylnaphthalene	10	10 U	10 U	10 U	10 U	10 U	10 U	
Hexachlorocyclopentadiene	10	10 U	10 U	10 U	10 U	10 U	10 U	
2,4,6-Trichlorophenol	10	10 U	10 U	10 U	10 U	10 U	10 U	
2,4,5-Trichlorophenol	50	50 U	50 U	50 U	50 U	50 U	50 U	
2-Chloronaphthalene	10	10 U	10 U	10 U	10 U	10 U	10 U	
2-Nitroaniline	50	50 U	50 U	50 U	50 U	50 U	50 U	
Dimethylphthalate	10	10 U	10 U	10 U	10 U	10 U	10 U	
Acenaphthylene	10	10 U	10 U	10 U	10 U	10 U	10 U	
2,6-Dinitrotoluene	10	10 U	10 U	10 U	10 U	10 U	10 U	
3-Nitroaniline	50	50 U	50 U	50 U	50 U	50 U	50 U	
Acenaphthene	10	10 U	10 U	10 U	10 U	10 U	10 U	
2,4-Dinitrophenol	50	50 U	50 U	50 U	50 U	50 U	50 U	
4-Nitrophenol	50	50 U	50 U	50 U	50 U	50 U	50 U	
Dibenzofuran	10	10 U	10 U	10 U	10 U	10 U	10 U	
2,4-Dinitrotoluene	10	10 U	10 U	10 U	10 U	10 U	10 U	
Diethylphthalate	10	10 U	10 U	10 U	10 U	2 J	10 U	
4-Chlorophenyl-phenylether	10	10 U	10 U	10 U	10 U	10 U	10 U	
Fluorene	10	10 U	10 U	10 U	10 U	10 U	10 U	
4-Nitroaniline	50	50 U	50 U	50 U	50 U	50 U	50 U	
4,6-Dinitro-2-Methylphenol	50	50 U	50 U	50 U	50 U	50 U	50 U	

PROJECT: NSB KINGS BAY, GEORGIA	SEMIVOLATILE AQUEOUS ANALYSES (ug/l)					Validation/Summary Table	
SAMPLE LOCATION:	BS-12-ER	BS-13-ER	BS-14-ER	BS-15-ER	BS-16-ER	BS-4-FB	BS-5-FB
LAB NUMBER:	21599001	21616005	21628004	21644004	21652004	21652003	21652002
DATE SAMPLED:	05/04/92	05/05/92	05/06/92	05/07/92	05/08/92	05/08/92	05/08/92
DATE ANALYZED:	05/20/92	05/20/92	05/21/92	05/21/92	05/22/92	05/22/92	05/22/92
DILUTION FACTOR:	1.0	1.0	1.0	1.0	1.0	1.0	1.0

SEMIVOLATILES --- METHOD 8270 (continued)								
ANALYTE	CRQL							
Pyridine	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U
N-Nitrosomethylethylamine	10	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
N-Nitrosomorpholine	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U
o-Toluidine	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U
3- & 4- Methylphenol	20	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Hexachloropropene	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U
p-Phenylenediamine	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Safrole	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Isosafrole	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,4-Naphthoquinone	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,3-Dinitrobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U
5-Nitro-o-toluidine	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,3,5-Trinitrobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Nitroquinoline-1-oxide	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methapyrilene	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U
3,3'-Dimethylbenzidine	10	10 U	10 U	10 U	10 U	10 UJ	10 UJ	10 UJ
2-Acetamidofluorene	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorophene	50	50 U	50 U	50 U	50 U	50 U	50 U	50 U

POLYCHLORINATED DIBENZO-- FURANS/DIOXINS --- METHOD 8280 (ng/l)								
ANALYTE	CRQL (ng/l)	DATE ANALYZED:	05/12/92	05/20/92	05/21/92	05/22/92	05/26/92	05/26/92
TCDFs (total)	10		0.029 U	0.048 U	0.014 U	0.021 U	0.027 U	0.044 U
PeCDFs (total)	10		0.035 U	0.066 U	0.029 U	0.026 U	0.079 U	0.10 U
HxCDFs (total)	10		0.060 U	0.15 U	0.054 U	0.048 U	0.19 U	0.25 U
TCDDs (total)	10		0.038 U	0.074 U	0.033 U	0.048 U	0.058 U	0.060 U
2,3,7,8- TCDD	5		0.038 U	0.074 U	0.033 U	0.048 U	0.058 U	0.060 U
PeCDDs (total)	10		0.092 U	0.22 U	0.067 U	0.068 U	0.20 U	0.17 U
HxCDDs (total)	10		0.071 U	0.28 U	0.060 U	0.062 U	0.37 U	0.25 U

APPENDIX B

**ANALYTICAL DATA FOR
GROUNDWATER
SAMPLE EVENT NO. 1
FEBRUARY 1992**

Table B-1
Groundwater Sampling Event No. 1
Summary of Laboratory Analysis of Groundwater
Samples Collected from Site 5'

RPL/SI Technical Memorandum No. 2
NSB Kings Bay

Compounds Detected	Monitoring Well Number								
	CRQL	KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-4	KBA-5-4D	KBA-5-5	KBA-5-6	KBA-5-7
APPENDIX IX VOCs ($\mu\text{g/L}$)									
Acetone	10	72	12 U	10 U	10 U	12 U	12 U	14 U	10 U
Carbon Disulfide ³	5	2 J	1 J	2 J	5 U	5 U	1 J	5 U	5 U
Trichlorofluoromethane	5	5 U	5 U	5 U	5 U	5 U	5 U	7	5 U
4-Methyl-2-Pentanone ³	10	10 U	3 J	10 U	10 U	10 U	3 J	10 U	10 U
Ethylbenzene ³	5	5 U	5 U	5 U	5 U	5 U	1 J	5 U	5 U
Xylene (total) ¹	5	5 U	4 J	5 U	5 U	5 U	6	5 U	5 U
APPENDIX IX Inorganics ($\mu\text{g/L}$)									
Antimony ²	60	10.9 U	10.9 U	10.9 U	14.0 J	10.9 U	10.9 U	11.3 J	16.8 J
Arsenic	10	36.5	27.9	22.5	15.9	18.0	33.2	14.9	76.9
Barium ²	200	742	459	161 J	601	588	332	640	748
Beryllium ²	5	4.2 J	2.7 J	0.92 J	3.1 J	2.9 J	3.0 J	5.1	6.1
Cadmium ²	5	2.9 U	2.9 U	2.9 U	2.9 U	3.7 J	2.9 U	25.4	25.9
Chromium	10	134	95.7	29.5	103	101	102	152	228
Cobalt ²	50	36.4 J	21.3 J	11.8 J	28.5 J	29.1 J	29.2 J	30.4 J	48.4 J
Copper	25	37.8	51.5	77.6	31.7	36.9	77.4	63.3	73.4

Table B-1
Groundwater Sampling Event No. 1
Summary of Laboratory Analysis of Groundwater
Samples Collected from Site 5'

RFI/SI Technical Memorandum No. 2
 NSB Kings Bay

Lead	5	30.2	23.2	7.2	22.0	25.2	23.0	32.0	43.0
Mercury	0.2	0.16 U	0.40	0.16 U					
Nickel ¹	40	49.0	50.3	79.8	40.2 J	42.7 J	77.2	59.8	84.4
Selenium ²	5	1.3 U	1.4 J	1.3 U	2.0 J	1.6 J	2.2 J	1.3 U	1.7 J
Thallium ²	10	1.4 U	1.4 U	1.4 U	1.6 J	1.5 J	1.6 J	1.6 J	2.2 J
Tin	208	208 U	208 U	208 U	232	208 U	208 U	208 U	208 U
Vanadium ²	50	117	80.6	24.4 J	84.7	82.6	81.8	138	183
Zinc ⁴	20	168 J	322 J	100 J	153 J	177 J	200 J	235 J	260 J
Cyanide ³	10	1.8 U	1.9 J	5.6 J					
Sulfide	100	300	300	200	300	400	200	2100	300

Notes:

CRQL = Contract Required Quantitation Limit

U = not detected above or below CRQL

¹ No Appendix IX SVOCs, pesticides, PCBs, herbicides, dioxins, or furans were detected in groundwater samples.

Data Qualifiers

² Values flagged J as estimated because concentrations are less than the CRQL.

³ Values flagged J as estimated because preparation blank exhibited negative bias for nickel.

⁴ Values flagged J as estimated because the duplicate analysis for zinc was outside QC limits.

Table B-2
Groundwater Sampling Event No. 1
Summary of Laboratory Analysis of Groundwater Samples
Collected from Site 11'

RFI/SI Technical Memorandum No. 2
 NSB Kings Bay

Compounds Detected	Monitoring Well Number											
	KBA-	CRQL	11-1	11-2	11-3	11-3D	11-4	11-5	11-6	11-7	11-8	11-9
APPENDIX IX VOCs (µg/L)												
Vinyl Chloride ¹	10	10 U	18	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 J	10 U
1,2-Dichloroethene	5	5 U	7	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Methyl-2-Pentanone	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	3 J	10 U	10 U	10 U
Chlorobenzene	5	5 U	5 U	6	7	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Ethylbenzene ²	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	1 J	5 U
Xylene (total) ¹	5	5 U	5 U	5 U	5 U	5 U	5 U	2 J	2 J	5 U	5	3 J
1,4-Dichlorobenzene ³	5	5 U	5 U	13	15	5 U	5 U	1 J	5 U	5 U	5 U	5 U
APPENDIX IX SVOCs (µg/L)												
1,4-Dichlorobenzene ^{3,4}	10	10 U	10 U	4 J	7 J	10 U						
Diethylphthalate ^{3,4}	10	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	9 J	10 U
bis(2-Ethylhexyl)-Phthalate ¹	10	10 U	10 U	31 UJ	10 U	10 U	10 U	10 U	10 U	94	10 U	10 U
APPENDIX IX Inorganics (µg/L)												
Antimony ^{2,4}	60	10.9 U	10.9 UJ	11.1 J	10.9 UJ	11.4 J	10.9 U					
Arsenic ³	10	1.9 J	3.5 J	2.3 U	0.69 U	0.69 U	89.0	7.3 J	16.9	7.7 J	3.5 J	3.5 J
Barium ¹	200	61.6 J	228	155 J	280	192 J	617	262	285	102 J	135 J	135 J

Table B-2
Groundwater Sampling Event No. 1
Summary of Laboratory Analysis of Groundwater Samples
Collected from Site 11¹

RFI/SI Technical Memorandum No. 2
NSB Kings Bay

Beryllium ²	5	0.72 J	4.3 J	2.0 J	2.9 J	5.8	10.2	4.8 J	4.1 J	2.5 J	3.0 J
Cadmium ²	5	2.9 U	3.5 J	2.9 U	2.9 U	2.9 U	2.9 U				
Chromium ²	10	44.4 J	247	113	177	297 J	620 J	261 J	354 J	139 J	121 J
Cobalt ²	50	3.6 U	5.6 J	3.9 J	5.1 J	7.4 J	16.8 J	6.5 J	5.9 J	3.6 U	3.6 U
Copper	25	26.8 U	53.5 U	41.0 U	86.5 U	68.8	384	49.0	121	62.2	43.2
Lead ²	5	12.6 J	18.1 J	18.8 J	14.8 J	24.7 J	53.5 J	16.3 J	20.4 J	16.8 J	17.6 J
Mercury	0.2	0.16 U	0.60	0.60	0.67	1.4	2.9	1.0	1.9	0.58	0.28
Nickel ²	40	12.8 J	32.2 J	19.6 U	42.2	41.6	107	31.2 J	44.7	18.6 J	17.0 J
Selenium	5	6.9	25.6	24.5	26.0	14.6	9.4	13.8	10.4	11.4	6.4 U
Vanadium ²	50	24.8 J	94.6	87.4	138	209	314	108	143	67.8	80.2
Zinc	20	20.1 U	53.3 U	54.8 U	102	86.1	269	211	82.1	93.6	38.1
Cyanide ²	10	1.8 U	1.8 U	3.0 J	1.8 U	2.3 J	1.8 U	1.8 U	1.8 U	3.8 J	1.8 U
Sulfide	100	100 U	500	600	1000	1300	700	400	3400	300	200

Notes:

CRQL = Contract Required Quantitation Limit

U = not detected above or below CRQL

¹ No Appendix IX pesticides, PCBs, herbicides, or dioxins/furans were detected in groundwater samples.

Data Qualifiers

² Samples results flagged J as estimated because concentrations are less than the CRQL.

³ Samples results for KBA-11-3 flagged J/UJ as estimated because surrogate recoveries were below QC limits.

⁴ Technical Memorandum No. 1ed quantitation limits flagged UJ as estimated because matrix spike recoveries were below QC limits.

⁵ Sample results flagged J as estimated because duplicate analysis was outside QC limits.

Table B-3
Groundwater Sampling Event No. 1
Summary of Laboratory Analysis of Groundwater
Samples Collected from Site 16¹

RFI/SI Technical Memorandum No. 2
NSB Kings Bay

Compounds Detected	Monitoring Well Number				
	CRQL	KBA-16-1	KBA-16-2	KBA-16-3	KBA-16-4
APPENDIX IX VOCs (µg/L)					
4-Methyl-2-Pentanone ²	10	10 U	3 J	10 U	10 U
Ethylbenzene ²	5	5 U	2 J	5 U	5 U
Xylene (total) ²	5	5 U	3 J	5 U	5 U
APPENDIX IX Inorganics (µg/L)					
Antimony ²	60	18.5 J	13.3 J	11.4 J	10.9 U
Arsenic ²	10	29.9	19.3	25.8	4.9 J
Barium ²	200	171 J	478	519	386
Beryllium ²	5	2.5 J	6.2	13.1	2.4 J
Chromium	10	84.6	256	194	34.0
Cobalt ²	50	11.6 J	74.4	29.1 J	3.6 U
Lead	5	14.8 J	36.3 J	19.9 J	12.0 J
Mercury	0.2	0.16 U	0.60	0.82	0.16 U
Nickel	40	27.0 J	132	54.7	10.5 U
Selenium	5	3.2 J	8.0	1.3 U	2.3 J
Thallium	10	17.3 J	1.9 J	1.7 UJ	1.7 U
Vanadium	50	119	257	175	29.8 J
Zinc	20	50.0 U	297	182	43.6 U
Cyanide	10	3.4 J	2.6 J	1.9 J	1.8 U
Sulfide	100	400	1800	200	300

Notes:

CRQL = Contract Required Quantitation Limit

U = not detected above or below CRQL

¹ No Appendix IX semivolatile compounds, pesticides, PCBs, herbicides, or dioxins/furans were detected in groundwater samples.

Data Qualifiers

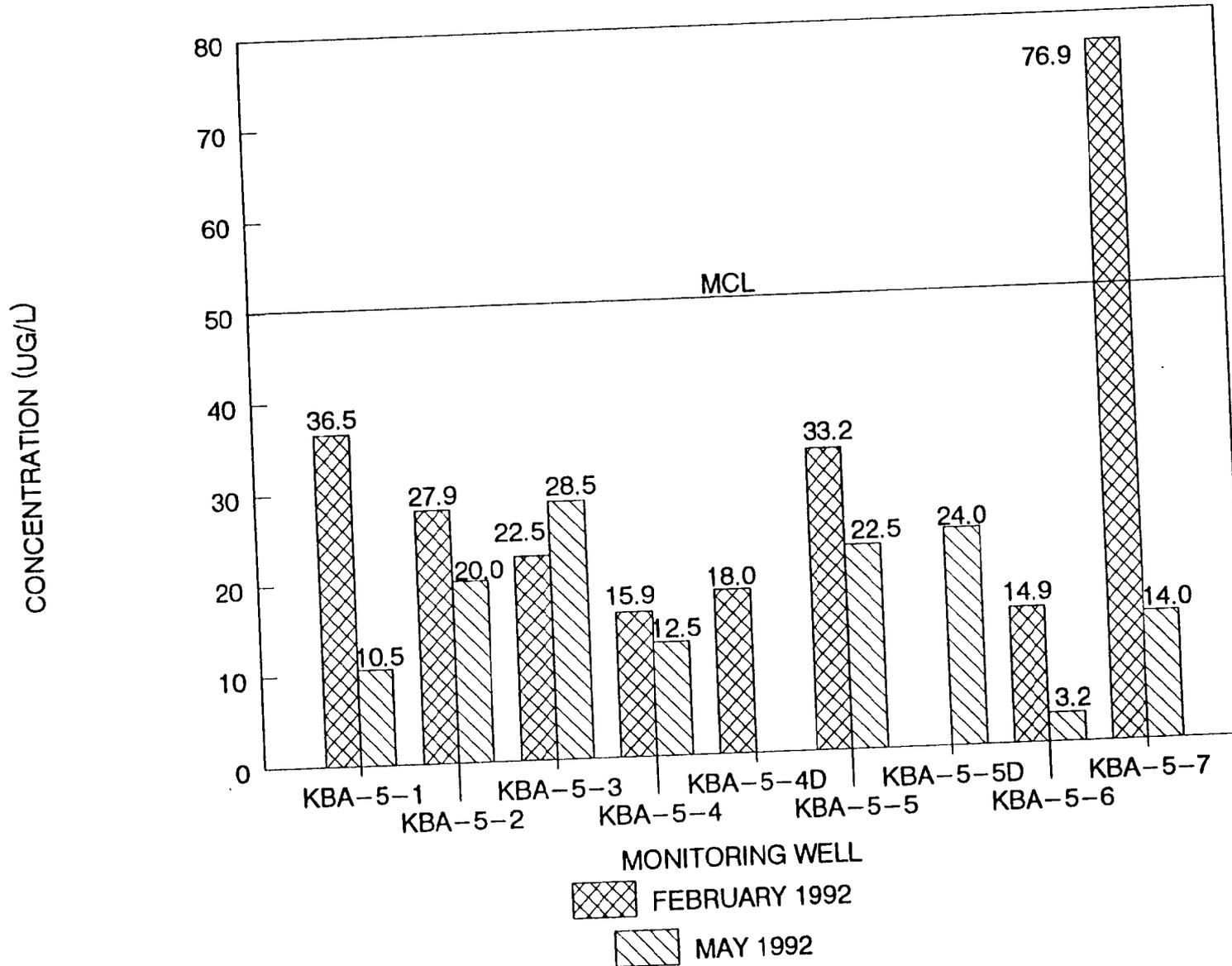
² Value(s) flagged J as estimated because concentrations are less than the CRQL.

³ Values flagged J as estimated because matrix spike recovery for lead was below QC limits.

APPENDIX C

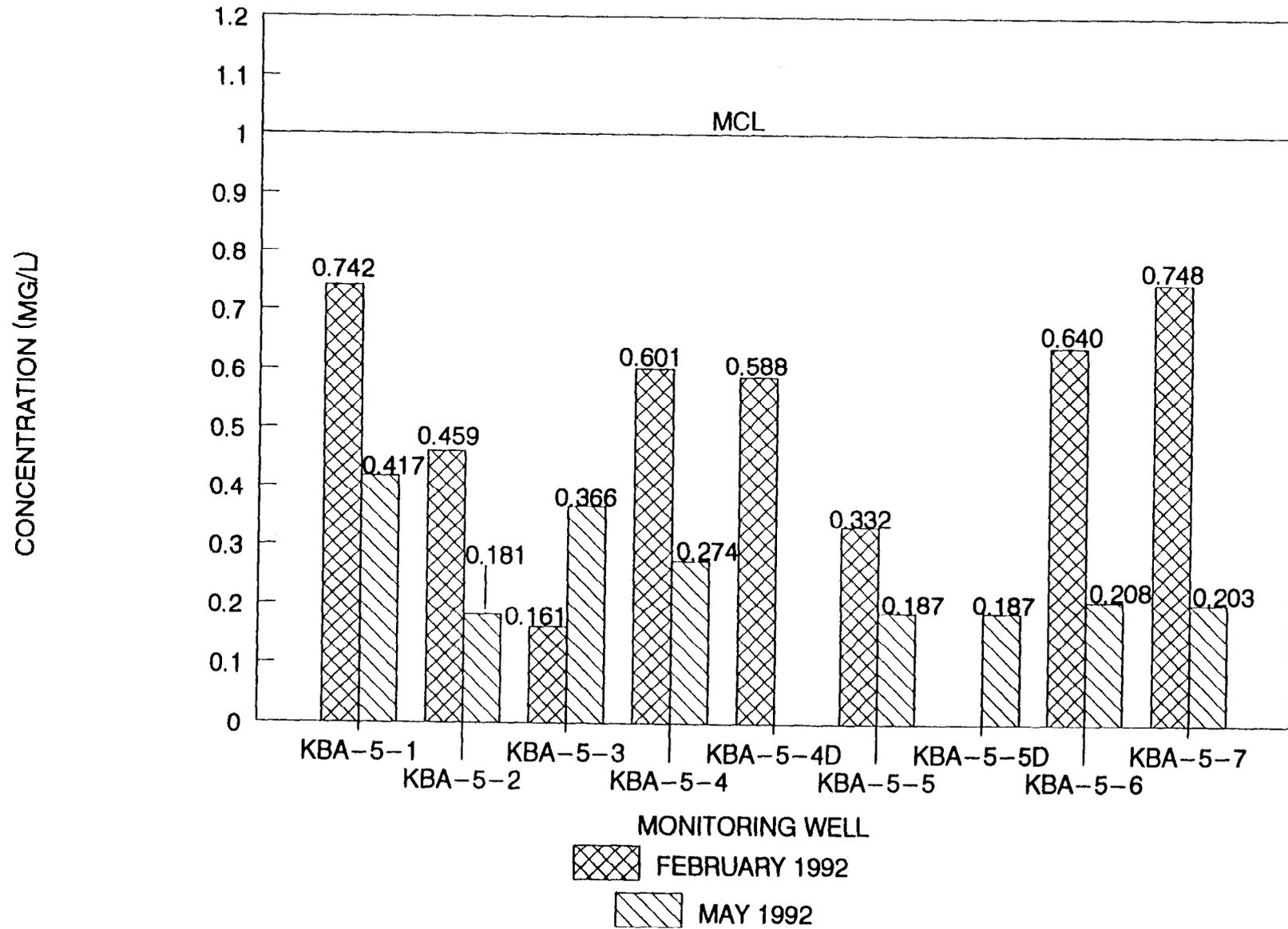
BAR-CHART GRAPHICS OF GROUNDWATER INORGANIC DATA

NSB KINGS BAY, GEORGIA
SITE 5 - ARSENIC IN GROUNDWATER

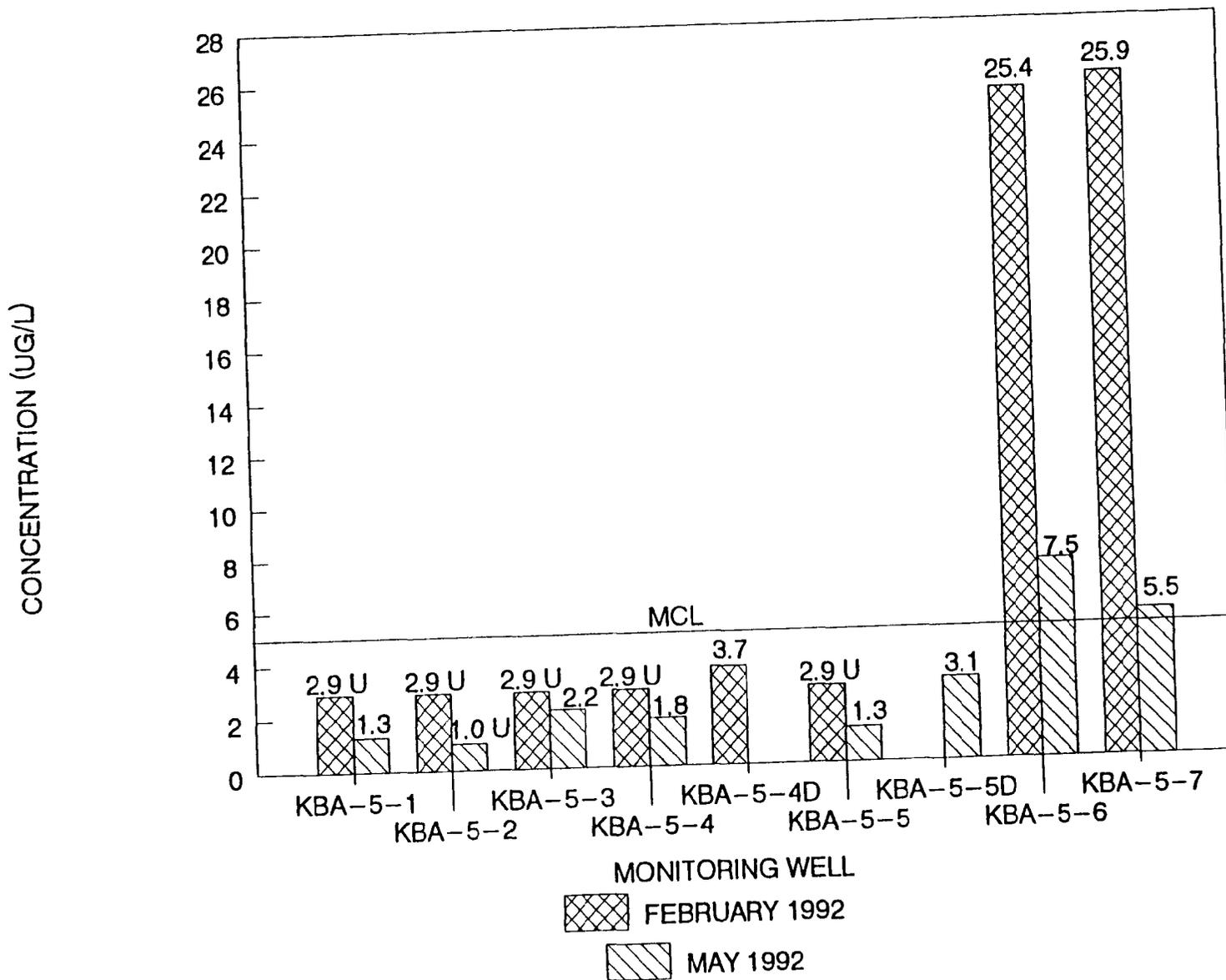


NSB KINGS BAY, GEORGIA

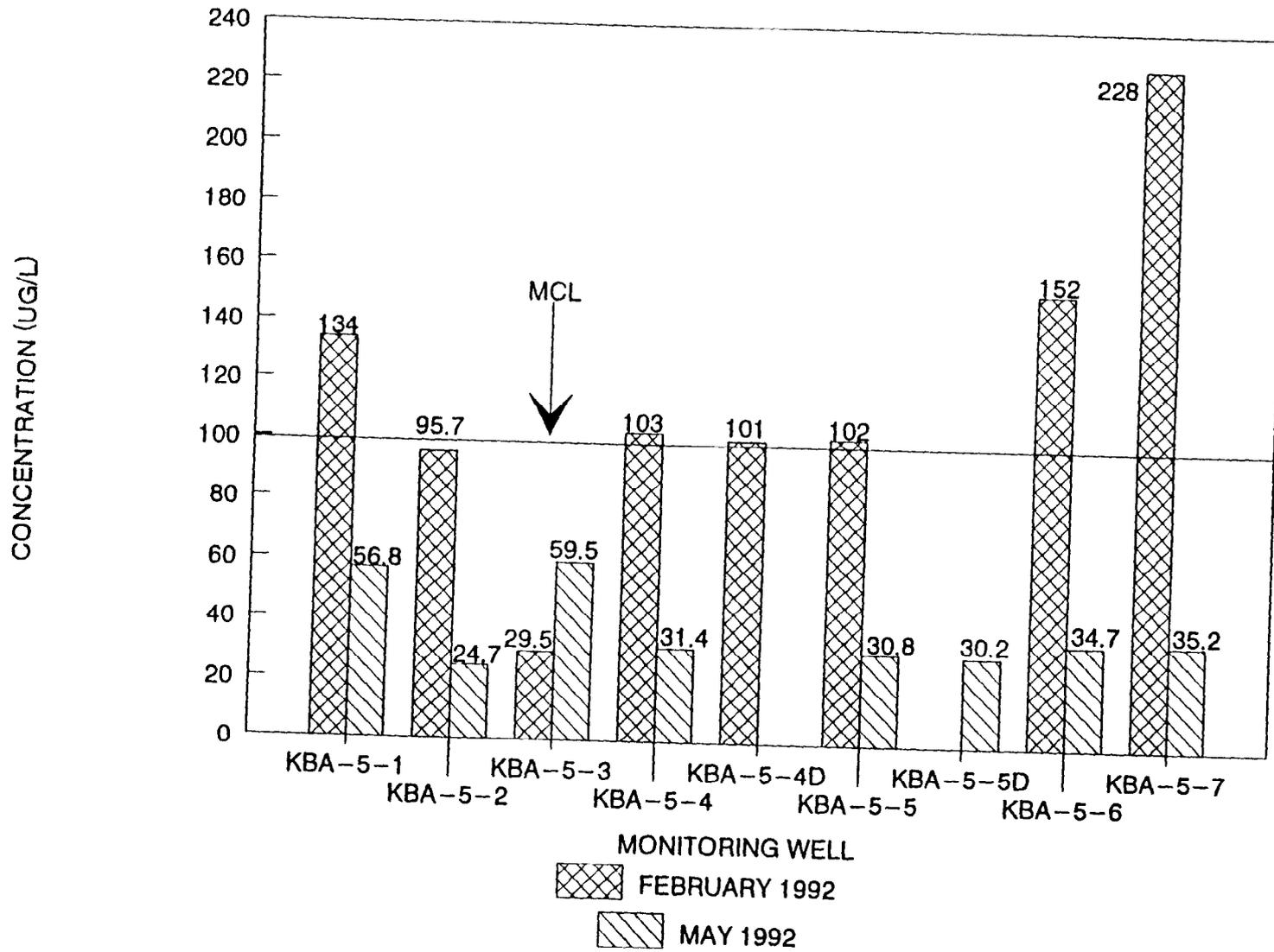
SITE 5 – BARIUM IN GROUNDWATER



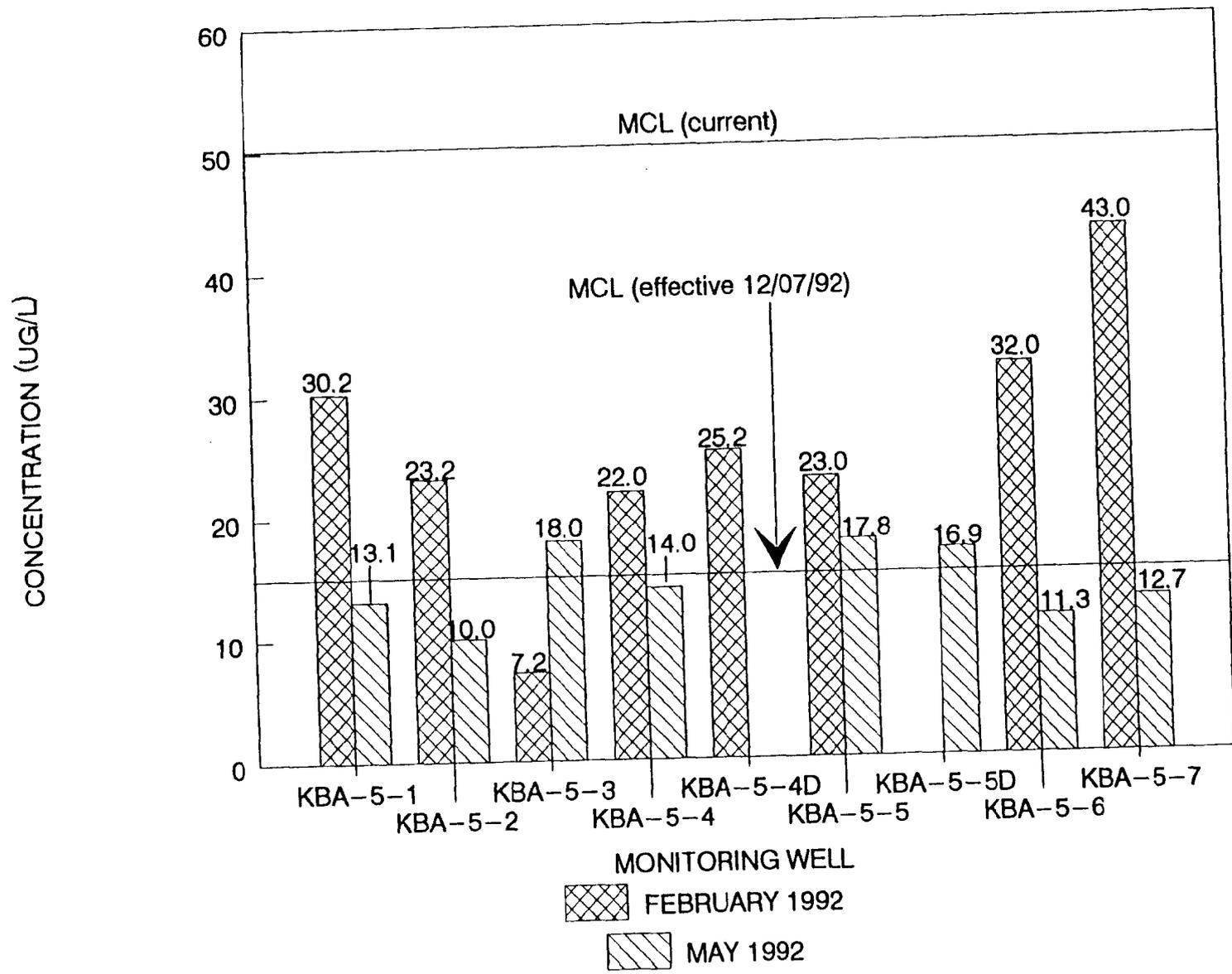
NSB KINGS BAY, GEORGIA
SITE 5 - CADMIUM IN GROUNDWATER



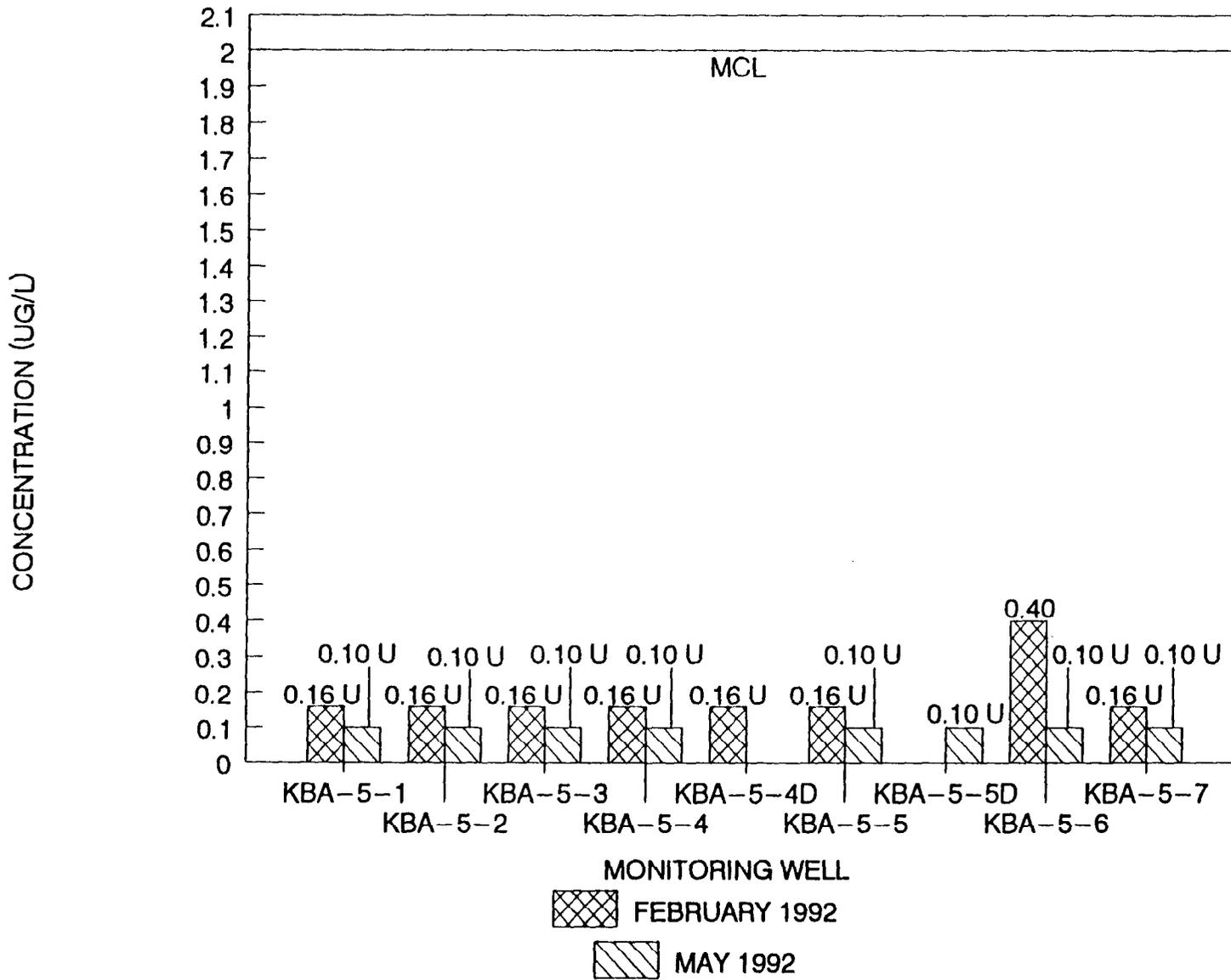
NSB KINGS BAY, GEORGIA
SITE 5 - CHROMIUM IN GROUNDWATER



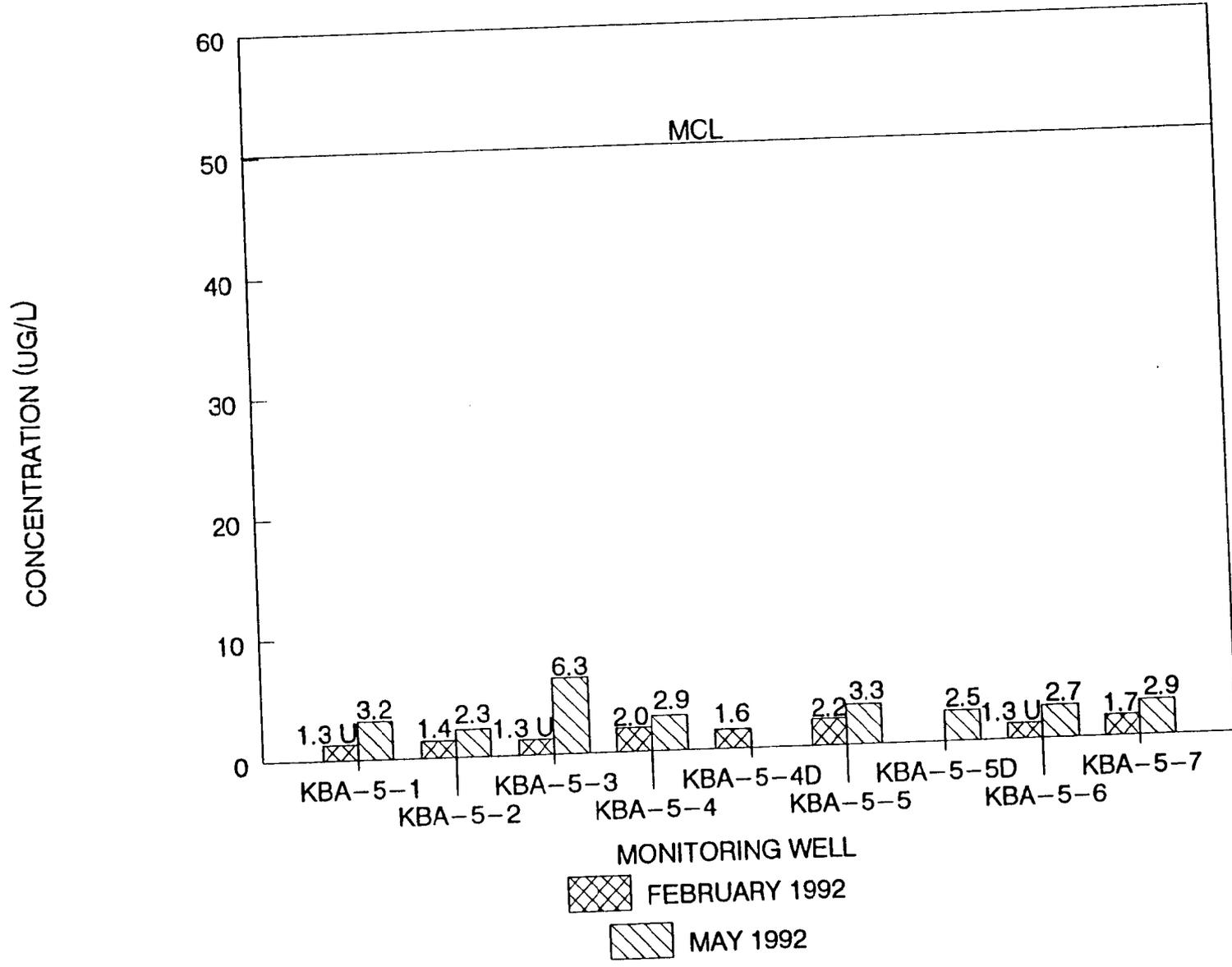
NSB KINGS BAY, GEORGIA
SITE 5 - LEAD IN GROUNDWATER



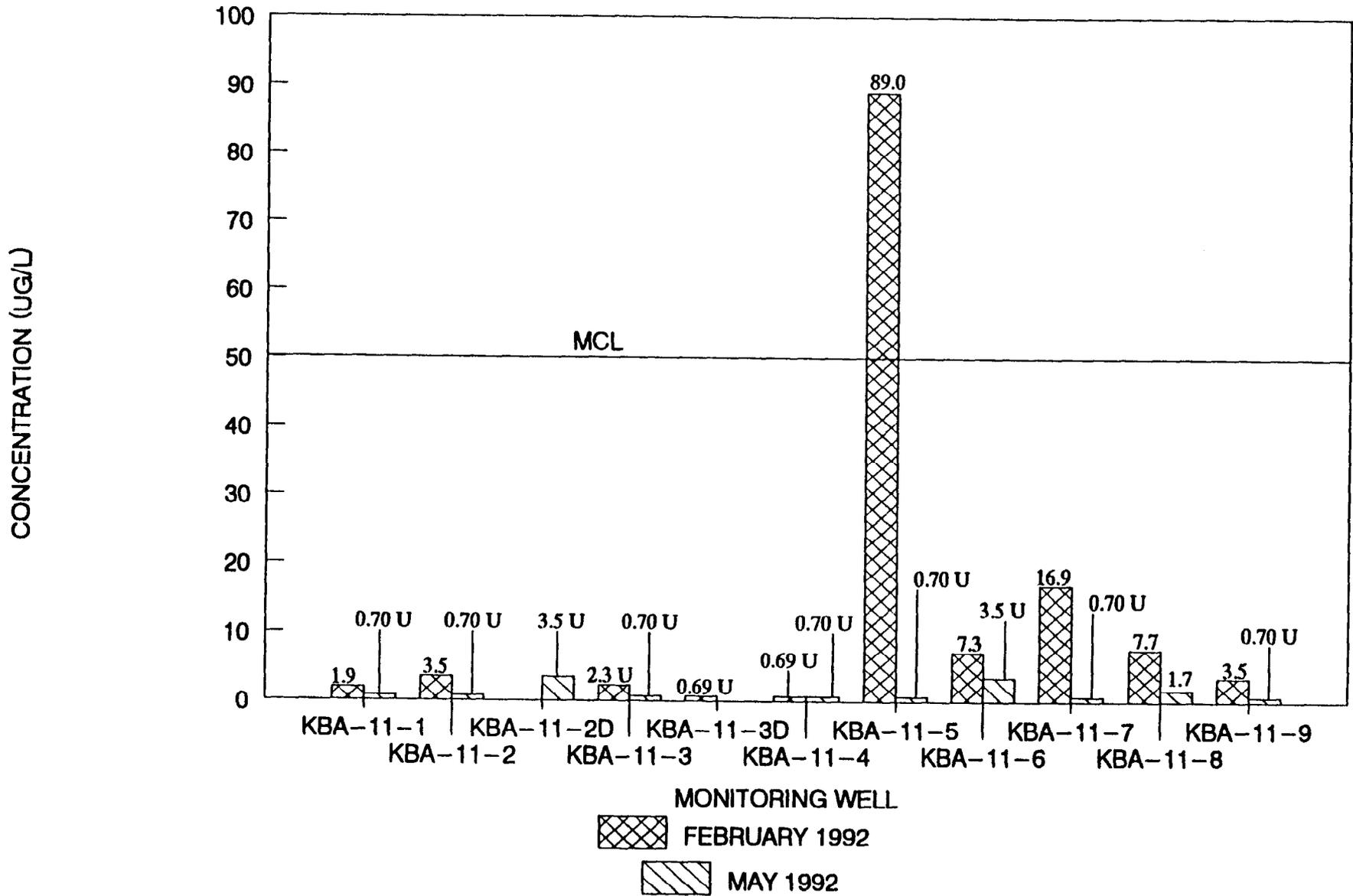
NSB KINGS BAY, GEORGIA
SITE 5 – MERCURY IN GROUNDWATER



NSB KINGS BAY, GEORGIA
SITE 5 - SELENIUM IN GROUNDWATER

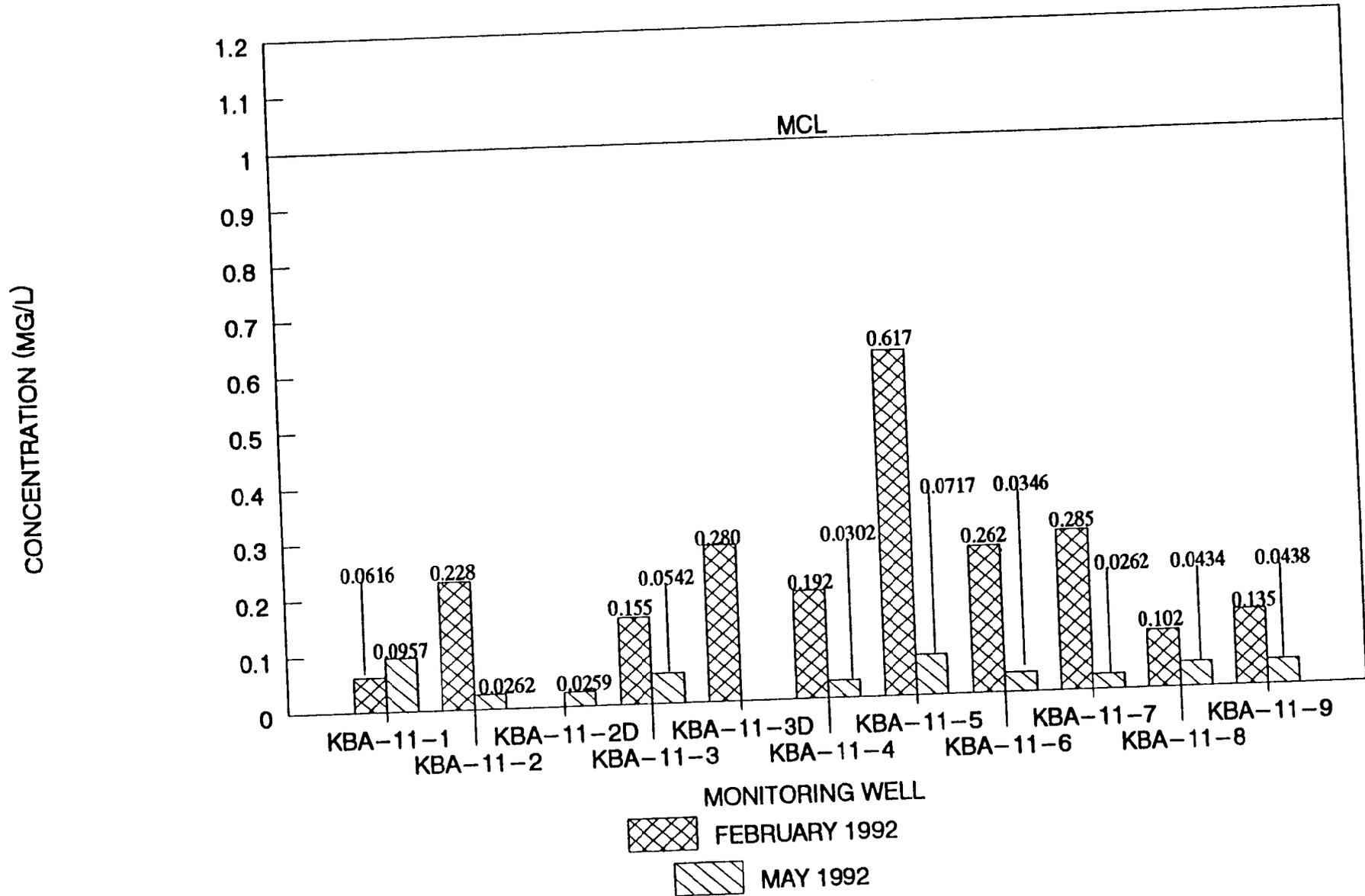


NSB KINGS BAY, GEORGIA
SITE 11 – ARSENIC IN GROUNDWATER



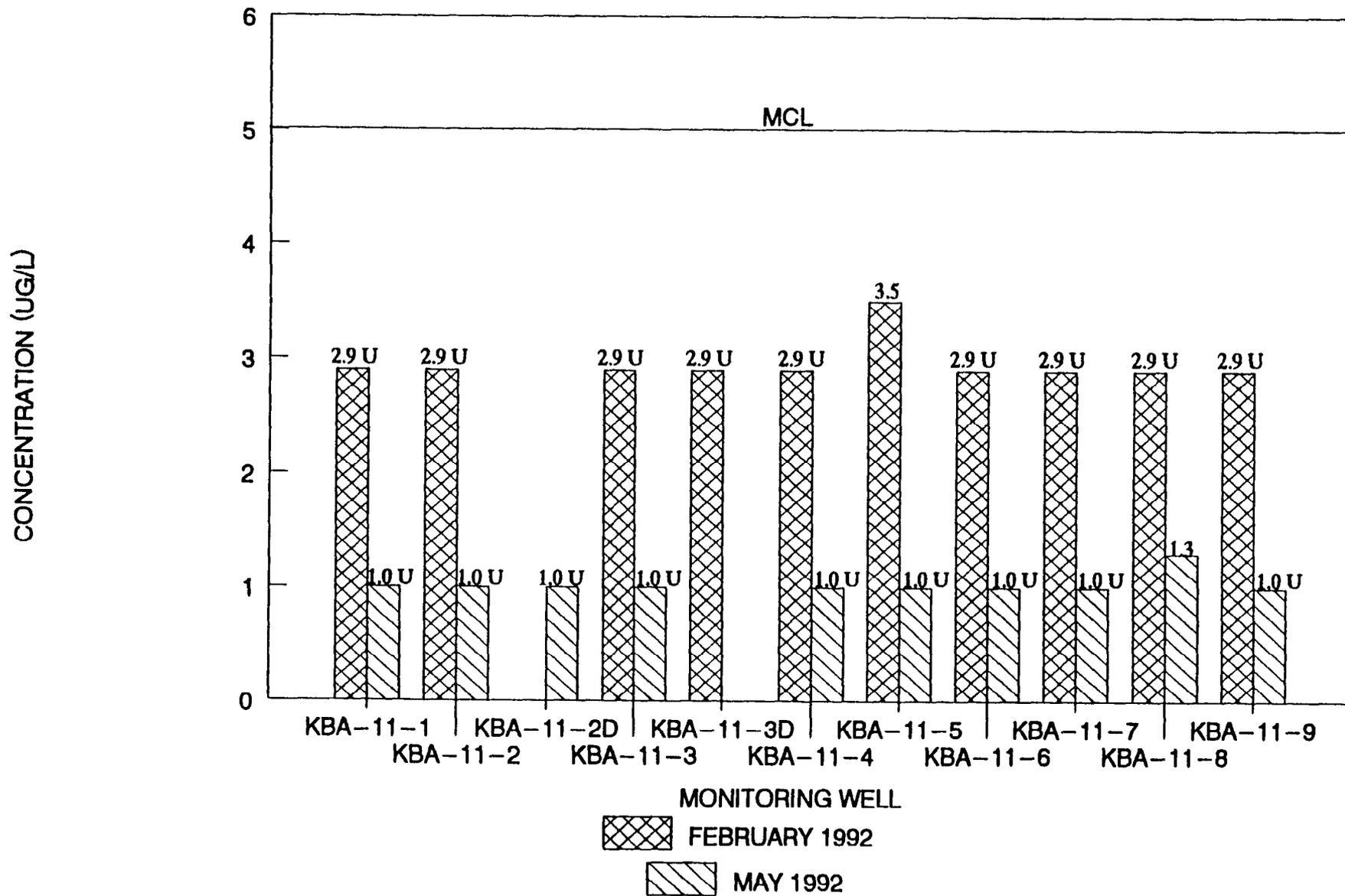
NSB KINGS BAY, GEORGIA

SITE 11 – BARIUM IN GROUNDWATER



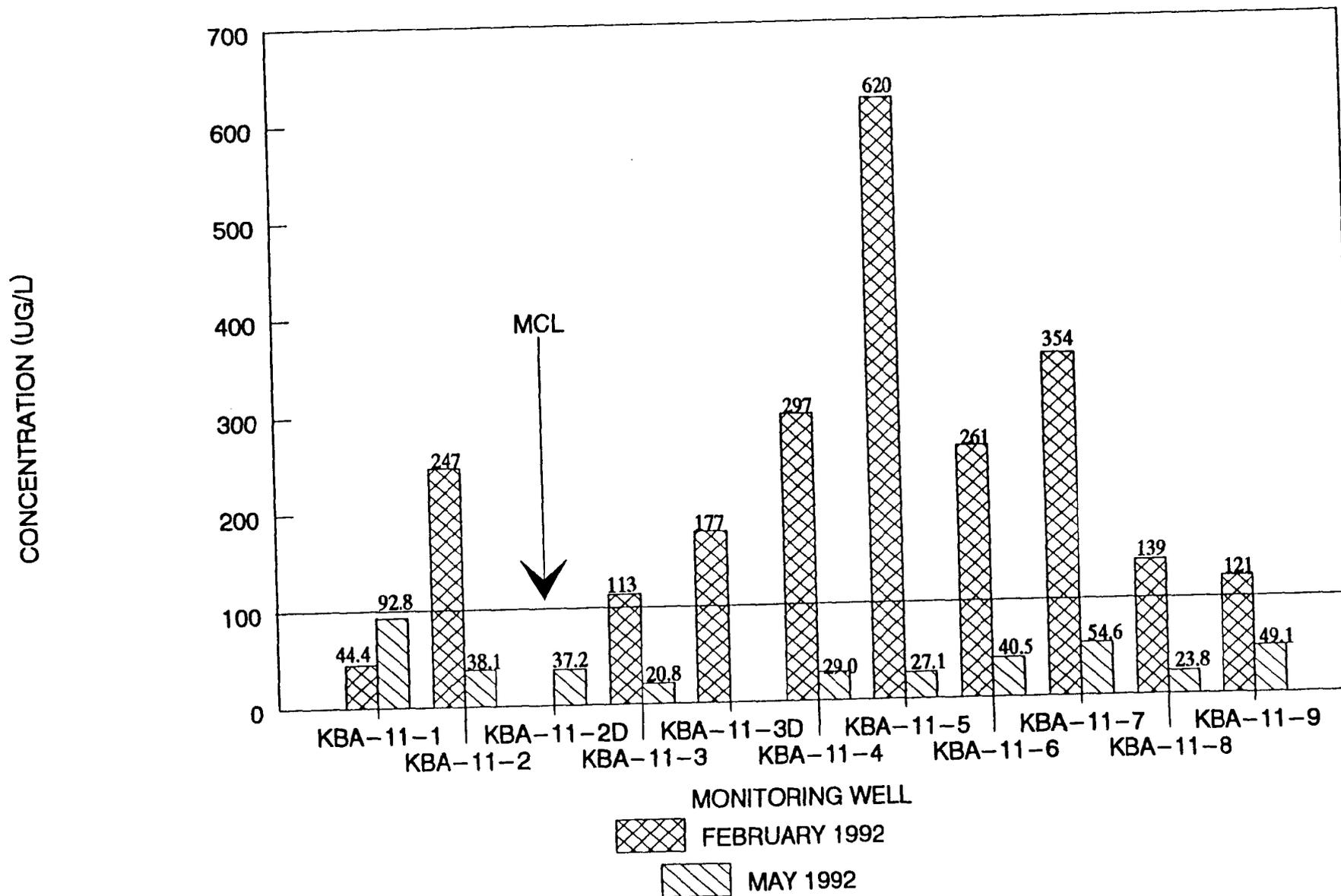
NSB KINGS BAY, GEORGIA

SITE 11 – CADMIUM IN GROUNDWATER



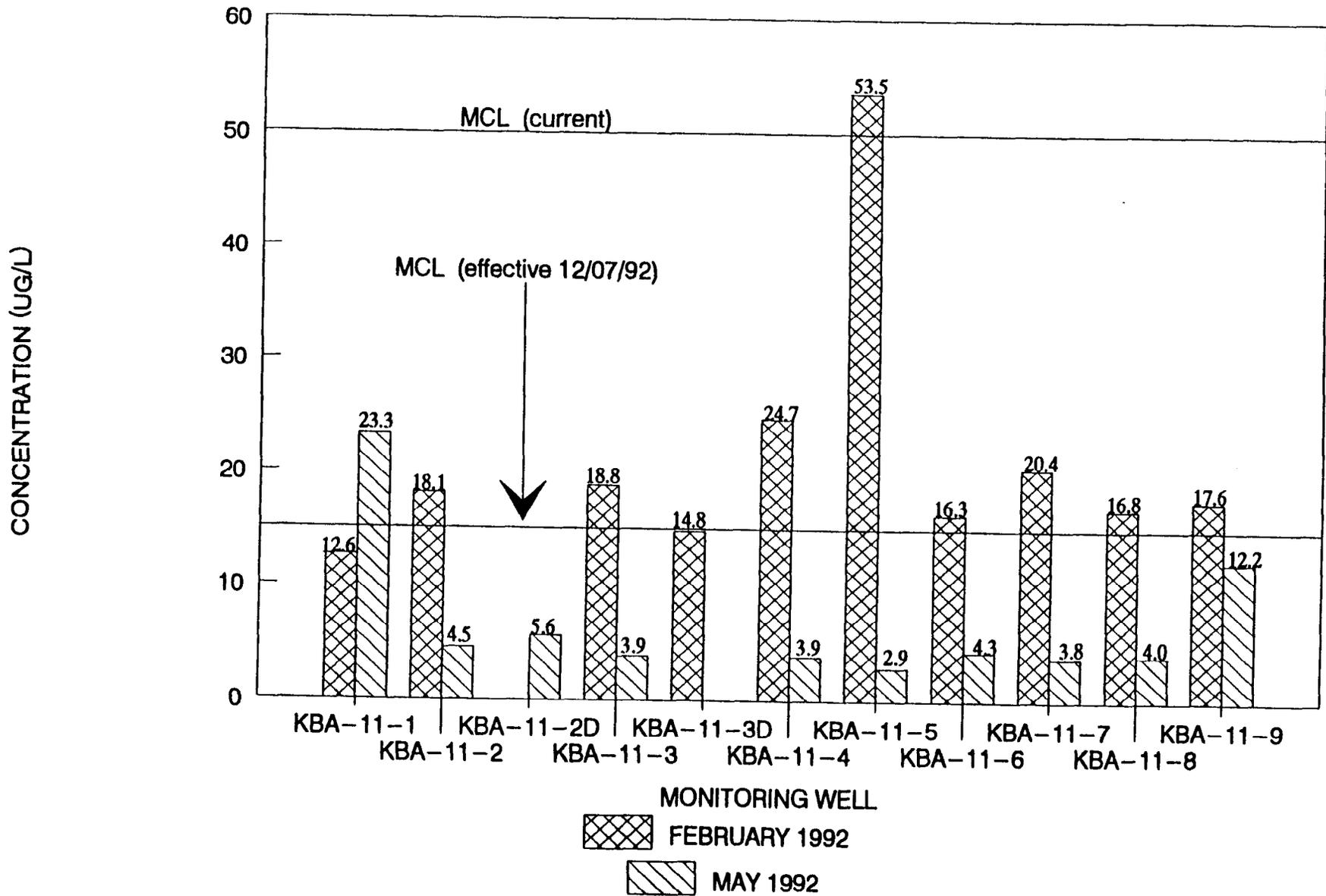
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SITE 11 - CHROMIUM IN GROUNDWATER



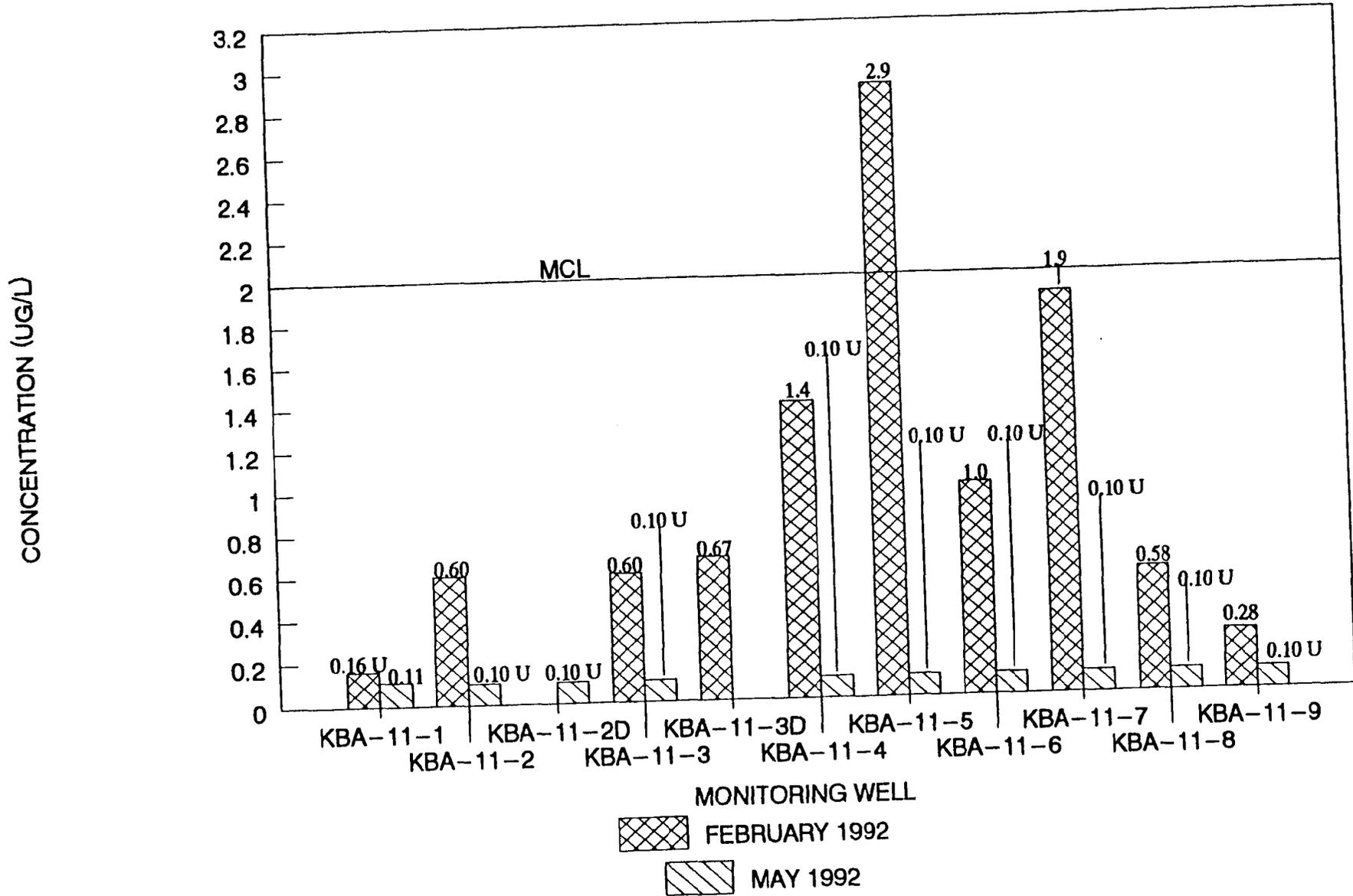
NSB KINGS BAY, GEORGIA

SITE 11 – LEAD IN GROUNDWATER

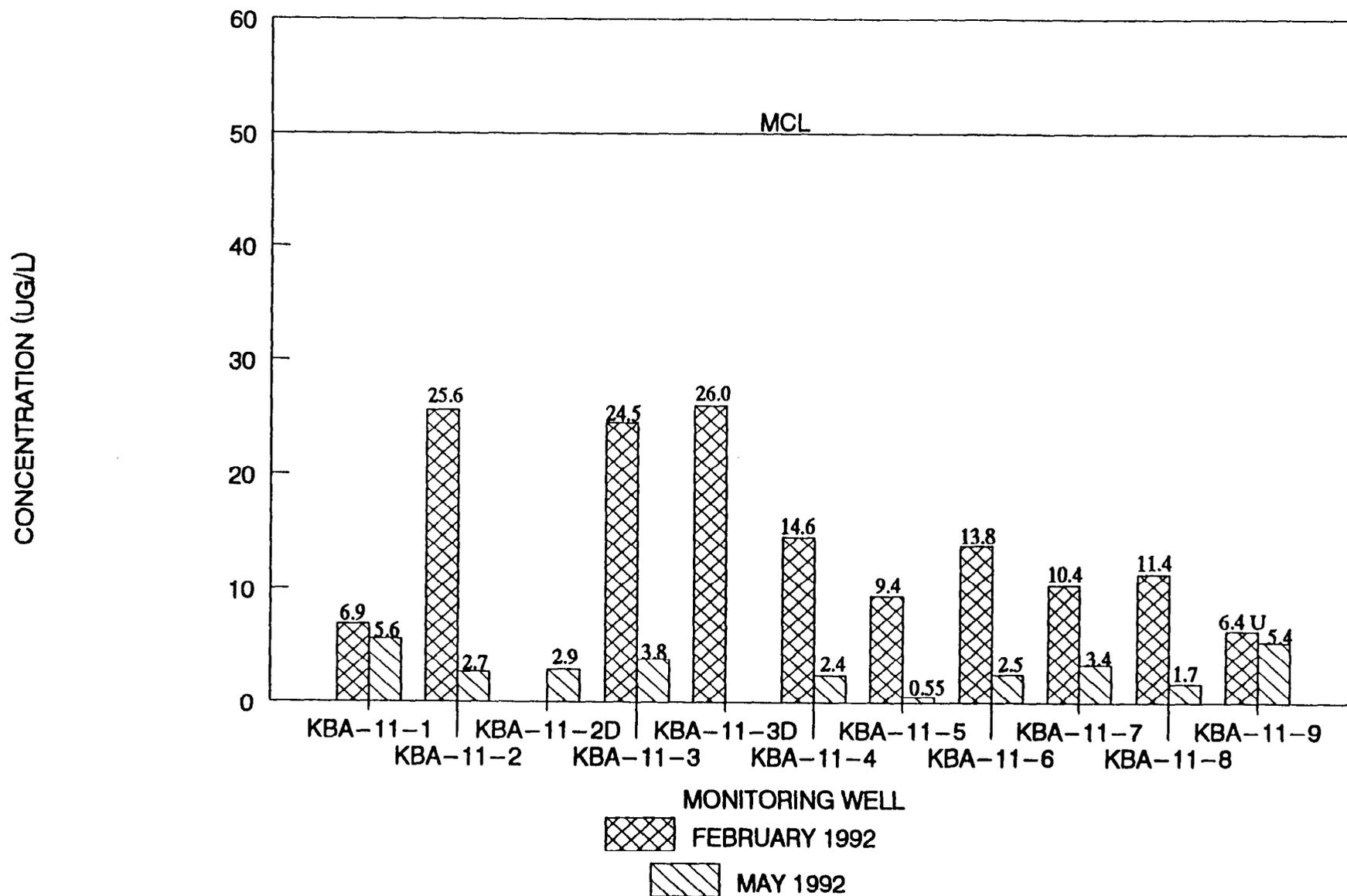


NSB KINGS BAY, GEORGIA

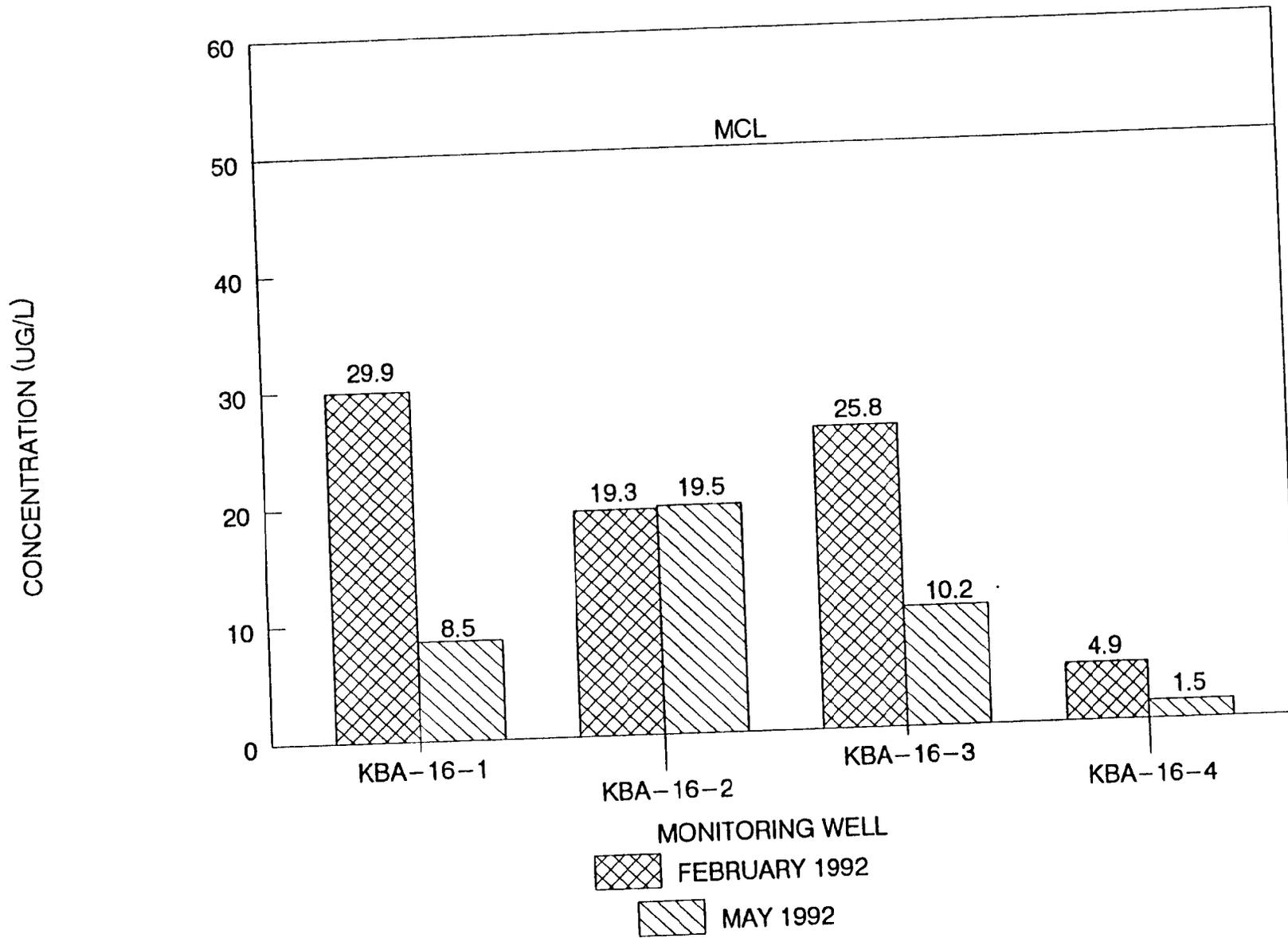
SITE 11 – MERCURY IN GROUNDWATER



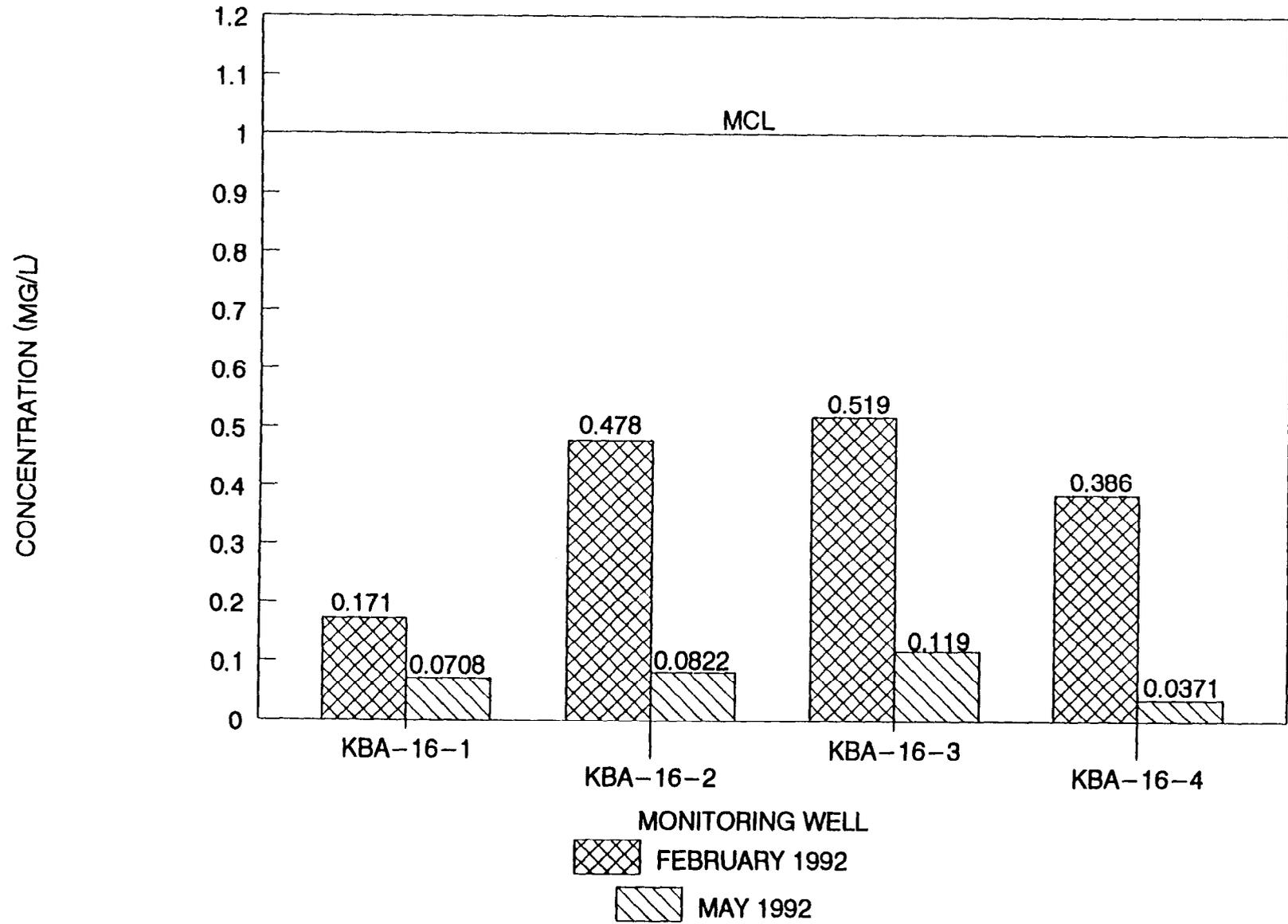
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SITE 11 – SELENIUM IN GROUNDWATER



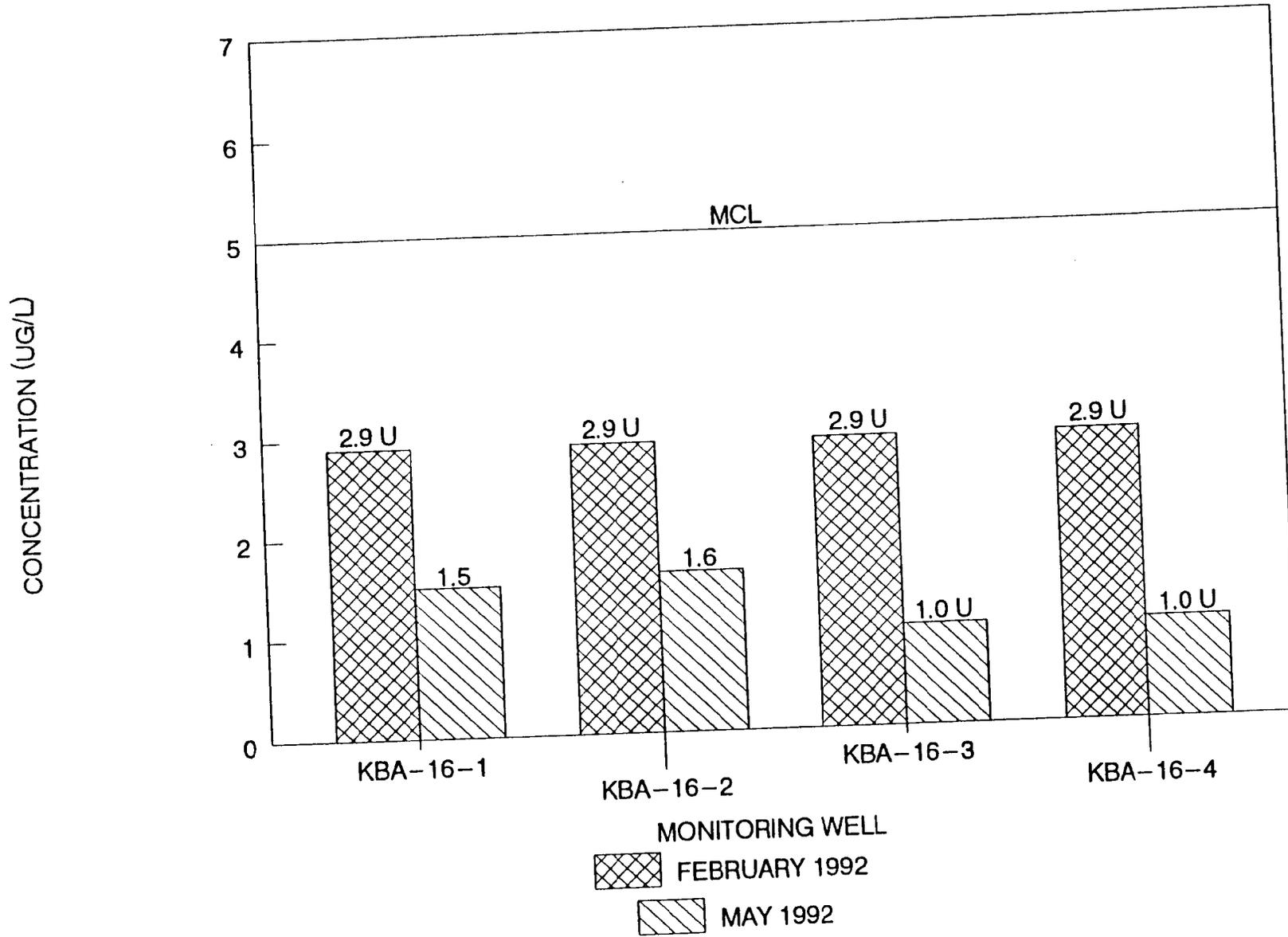
NSB KINGS BAY, GEORGIA
SITE 16 - ARSENIC IN GROUNDWATER



NSB KINGS BAY, GEORGIA
SITE 16 - BARIUM IN GROUNDWATER

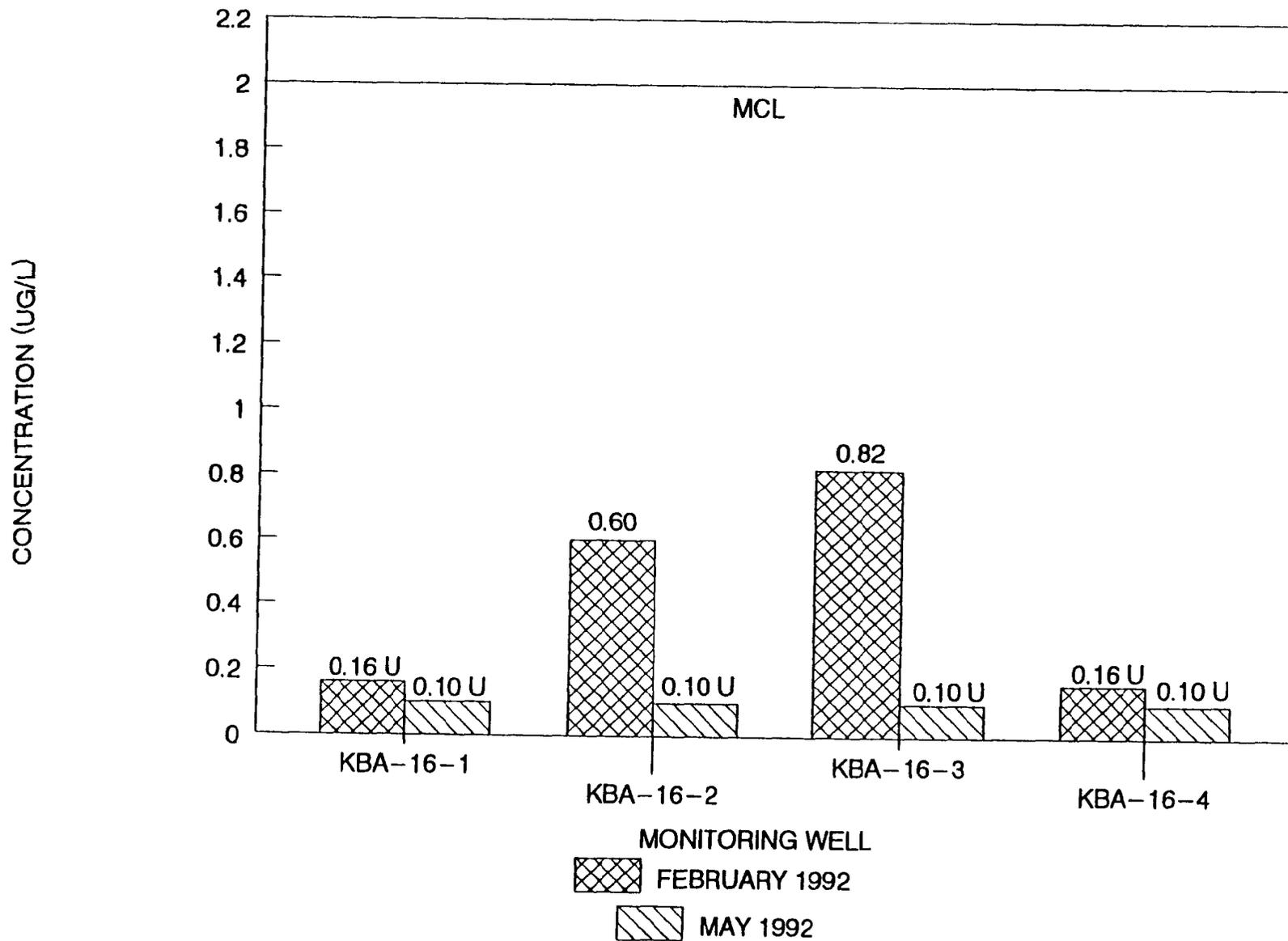


NSB KINGS BAY, GEORGIA
SITE 16 - CADMIUM IN GROUNDWATER

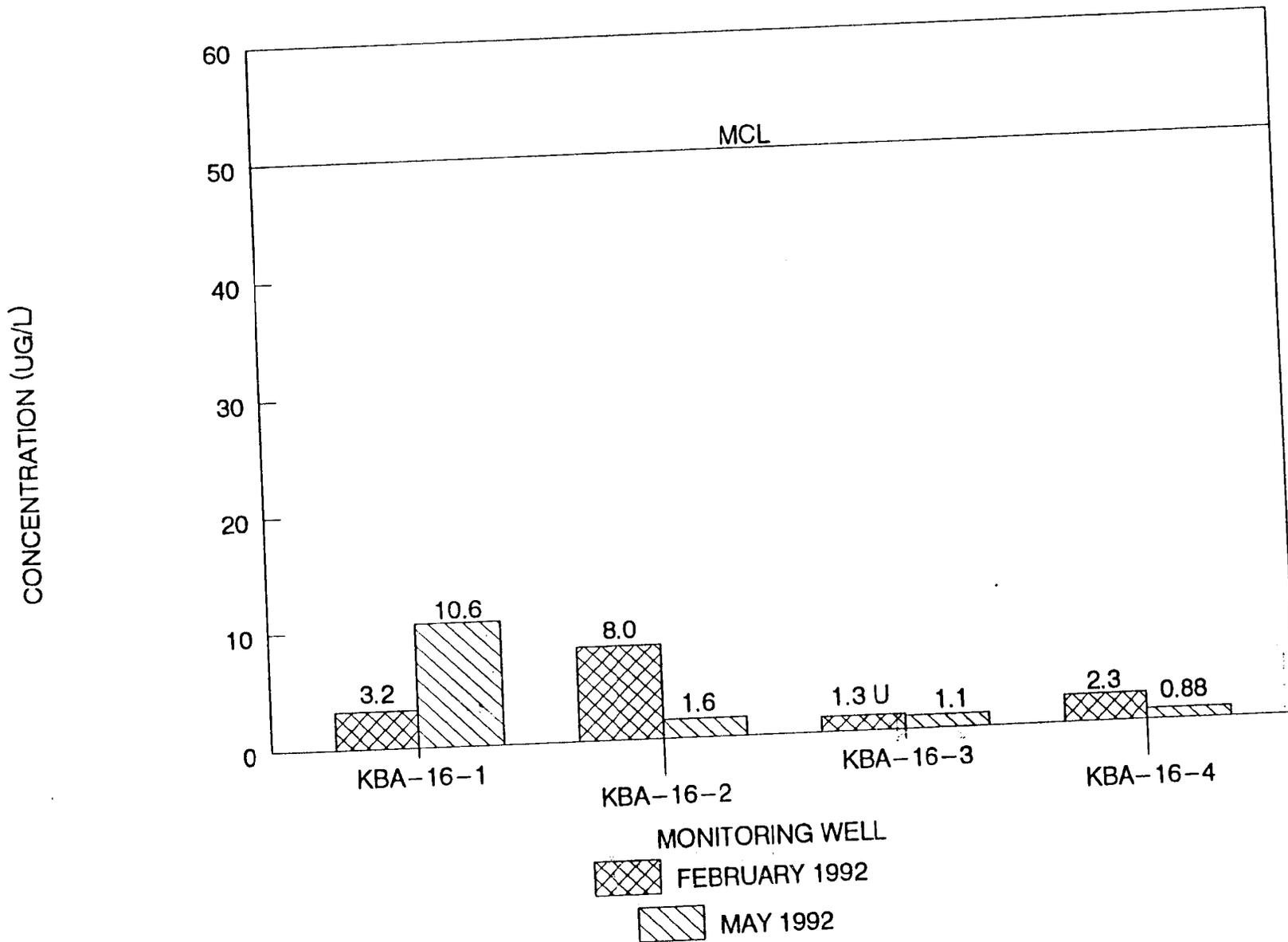


NSB KINGS BAY, GEORGIA

SITE 16 – MERCURY IN GROUNDWATER

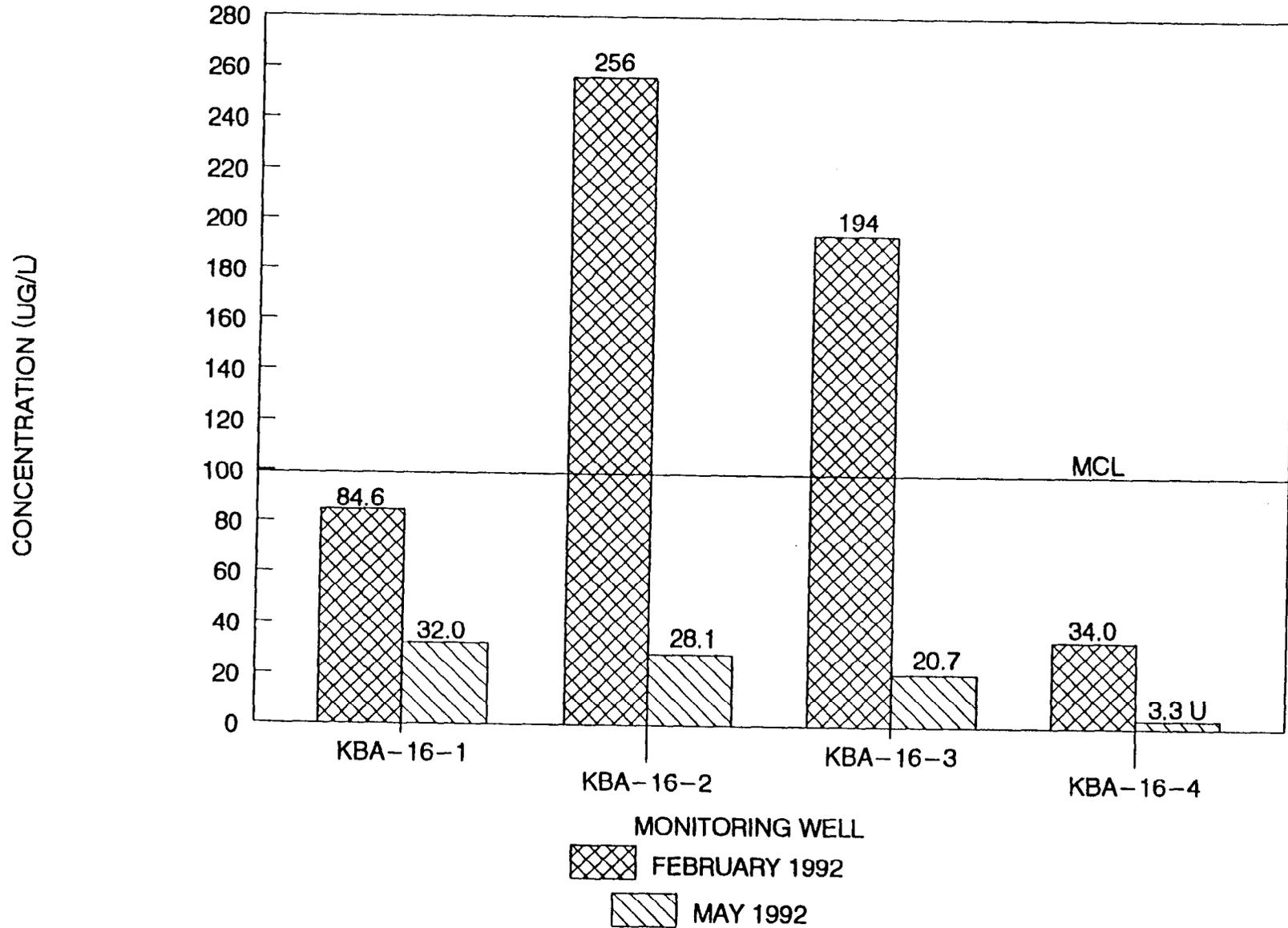


NSB KINGS BAY, GEORGIA
SITE 16 – SELENIUM IN GROUNDWATER



NSB KINGS BAY, GEORGIA

SITE 16 - CHROMIUM IN GROUNDWATER



NSB KINGS BAY, GEORGIA
SITE 16 - LEAD IN GROUNDWATER

