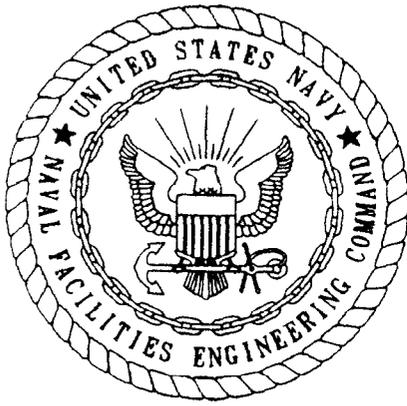


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FINAL RCRA FACILITY INVESTIGATION/SITE INSPECTION TECHNICAL MEMORANDUM  
NO. 5, VOLUME II SITE 5 AND 16 NSB KINGS BAY GA  
3/1/1993  
ABB ENVIRONMENTAL

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**RCRA FACILITY INVESTIGATION/SITE INSPECTION  
TECHNICAL MEMORANDUM NO. 5, VOLUME II  
SITE 5, ARMY RESERVE DISPOSAL AREA, TOWHEE TRAIL  
SITE 16, ARMY RESERVE DISPOSAL AREA, MOTOR MISSLE  
MAGAZINES**

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

**CONTRACT NO. N62467-89-D-0317**

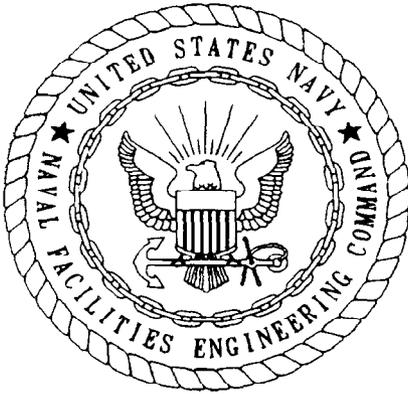
**MARCH 1993**



**SOUTHERN DIVISION  
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**RCRA FACILITY INVESTIGATION/SITE INSPECTION  
TECHNICAL MEMORANDUM NO. 5, VOLUME II  
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# **FINAL**

**RCRA FACILITY INVESTIGATION/  
SITE INSPECTION  
TECHNICAL MEMORANDUM No. 5  
VOLUME II  
SITE 5, ARMY RESERVE DISPOSAL AREA, TOWHEE TRAIL  
SITE 16, ARMY RESERVE DISPOSAL AREA,  
MOTOR MISSILE MAGAZINES**

**NAVAL SUBMARINE BASE  
KINGS BAY, GEORGIA**

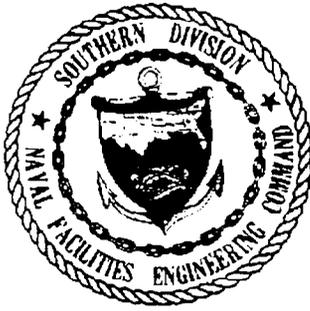
**Prepared for:**

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

**Prepared by:**

**ABB Environmental Services, Inc.  
1400 Centerpoint Blvd., Suite 158  
Knoxville, Tennessee 37932-1968**

**March 1993**



## 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 conducted originally 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 the 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 the Naval Submarine Base (NSB) in 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 and summarizes findings and results based on information and data collected as a result of the November 1992 field effort, which included the fifth of six groundwater sampling events. Certain Appendix IX parameters have been deleted from the groundwater monitoring program based on laboratory analytical results of environmental samples collected during the RFI/SI field program and during the first two groundwater sampling events.

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.

## 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 the Naval Submarine Base (NSB), in Kings Bay, Georgia. This technical memorandum is the last 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.

Groundwater sampling event No. 5 at Sites 5 and 16 involved collection of 14 groundwater samples, including three duplicate samples. Samples were submitted to CH2M HILL Laboratories in Montgomery, Alabama, for analysis of a modified list of Appendix IX parameters. The following paragraphs summarize the analytical results for groundwater samples collected from Sites 5 and 16 during the fifth groundwater sampling event.

Site-related volatile organic compounds (VOCs) were not detected in groundwater samples collected from Sites 5 and 16. VOCs will continue to be monitored for at both sites.

One site-related semivolatile organic compound (SVOC), naphthalene, was detected in one groundwater sample collected from Site 16. Groundwater samples collected from Site 5 did not require analysis for SVOCs because of the confirmed absence of SVOCs at this site during the second groundwater sampling event in May 1992.

Polychlorinated biphenyl (PCB) compounds were not detected in groundwater samples collected during the first four sampling events at Site 5 and also were not detected during the fifth sampling event. PCBs will continue to be monitored for at Site 5 because of the confirmation of low levels of the PCB Aroclor 1260 in surface soils collected during the third sampling event at Site 5.

Concentrations of inorganic constituents in groundwater samples from each monitoring well at Sites 5 and 16 were generally less than concentrations detected in samples collected in September 1992. Both filtered and unfiltered groundwater samples were collected during the fifth sampling event at Sites 5 and 16 and concentrations of inorganics were generally lower for filtered groundwater samples than for unfiltered samples at Site 11. The results for filtered samples are usually considered to be a more accurate representation of groundwater quality at Site 11 because of the presence and contribution of suspended solids to the total concentration of inorganics in unfiltered groundwater samples.

## 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, ABB-ES acknowledges the outstanding effort, dedication, and professionalism provided by the following people in the preparation of this report.

Name	Title	Position	Location
Ed Lohr	Engineer	Remedial Project Manager	SOUTHNAVFACENGCOM
John Garner	Engineer	Environmental Coordinator	NSB Kings Bay, GA

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RCRA Facility Investigation/Site Inspection  
 Technical Memorandum No. 5  
 Volume II, Sites 5 and 16

Naval Installation Restoration Program  
 Naval Submarine Base  
 Kings Bay, Georgia

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## GLOSSARY OF ACRONYMS

ABB-ES	ABB Environmental Services, Inc.
CLEAN	Comprehensive Long-Term Environmental Action, Navy
CMS	Corrective Measures Study
CRQL	contract required quantitation limit
CTO	Contract Task Order
FID	flame ionization detector
HSWA	Hazardous and Solid Waste Amendments
IAS	Initial Assessment Study
IR	Installation Restoration
MCL	Maximum Contaminant Level
mg/l	milligrams per liter
µg/l	micrograms per liter
µg/kg	micrograms per kilogram
NEESA	Naval Energy and Environmental Support Activity
NSB	Naval Submarine Base
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
ppm	parts per million
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SI	Site Inspection
SOUTHNAV- FACENCOM	Southern Division, Naval Facilities Engineering Command
SVOC	semivolatile organic compound
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 the Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), conducted site investigation activities at three of four former waste disposal sites at the Naval Submarine Base (NSB) in Kings Bay, Georgia. This Technical Memorandum is the last 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 contract (contract number N62467-89-D-0317, Contract Task Order 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. The IAS identified a total of 16 waste spill sites. None of the 16 sites required further action under the Navy Installation Restoration (IR) Program; however, four sites required further action under the Hazardous Waste Facility Permit. In February 1988, a RCRA and Hazardous and Solid Waste Amendments permit was issued to NSB Kings Bay by the Georgia Department of Natural Resources, 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, Motor Missile Magazines

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. The 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 extend into calendar year 1993.

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 and/or RCRA permit modification.

This Technical Memorandum No. 5, Volume II, presents summarized findings and results based on information and data collected from Sites 5 and 16 as a result of groundwater sampling event No. 5, which was performed on November 10 through 14, 1992. Technical Memorandum No. 5, Volume I, presents summarized findings and results based on information and data collected from Site 11 as a result of groundwater sampling event No. 5.

## 2.0 FIELD PROGRAM

2.1 GROUNDWATER SAMPLING. Groundwater sampling was performed from November 10 through 14, 1992. Groundwater samples were collected from each of the 11 wells installed at Sites 5 and 16 during the RFI/SI. Analysis of the samples included a modified list of Appendix IX parameters. Laboratory services were provided by CH2M HILL Laboratories, Inc., in Montgomery, Alabama. Naval Energy and Environmental Support Activity (NEESA) Level C data quality objectives and deliverables were specified for the analytical program (NEESA, 1988). Results of groundwater sample analyses are discussed in Sections 3.0 and 4.0.

Upon opening each monitoring well, the headspace was screened for volatile organic compounds (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. Decontaminated Teflon™ bailers were used to purge the monitoring wells and to collect samples. For unfiltered samples, groundwater was transferred from the bailer directly into labeled sample containers. For samples requiring filtration, groundwater was pumped from the bailer through a 0.45-micron filter using a Masterflex™ peristaltic pump with polyethylene tubing and then collected in a labeled sample container. 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 before 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 interference by testing an aliquot of the sample with lead acetate 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 from monitoring wells at Sites 5 and 16 during groundwater sampling event No. 5 at NSB Kings Bay. In addition, it assesses data quality and useability.

3.1 CHEMICAL ANALYSES. Sampling activities during the fifth groundwater sampling event at NSB Kings Bay included collection of 14 groundwater samples, including three 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 and 16 during the fifth sampling event. Samples were analyzed in accordance with U.S. Environmental Protection Agency (USEPA) SW-846 methods (USEPA, 1986) and NEESA Level C documentation (NEESA, 1988) for a modified list of Appendix IX VOCs, semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), inorganic analytes (including total cyanide and sulfide), total dissolved solids (TDS), and total suspended solids (TSS). Table 3-2 provides the modified list of Appendix IX compounds and corresponding USEPA 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 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 were 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 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) (Document 20.2-047B). 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. 5 were evaluated and validated according to NEESA Level C QC criteria 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 Subsection 7.3.2 of NEESA Document 20.2-047B (NEESA 1988). The following subsections discuss analytical performance and the evaluation of field and laboratory QC samples.

Table 3-1 Summary of Sampling and Analysis Program for Sites 5 and 16

Location and Type of Sampling	Laboratory Analysis				
	A	B	C	D	E
<b>Site 5</b>					
Groundwater	7	0	7	14	7
<b>Site 16</b>					
Groundwater	4	4	0	8	4
<b>Field Duplicates</b>					
Groundwater	1	1	1	2	1
<b>Quality Control Samples</b>					
Trip Blanks	3	0	0	0	0
Rinseate Blanks	3	1	2	3	3
Field Blanks	2	2	2	3	2

- A - Volatile Organic Compounds (VOCs)
- B - Semivolatile Organic Compounds (SVOCs)
- C - Polychlorinated Biphenyls (PCBs)
- D - Inorganic constituents (including cyanide and sulfide)
- E - Total Dissolved Solids (TDS) and Total Suspended Solids (TSS)

Table 3-2 Compounds and Analytical Methods for Groundwater Sampling Event No. 5 at Sites 5 and 16

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

Chloromethane	cis-1,3-Dichloropropene
Bromomethane	Trichloroethane
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	Tetrachloroethane
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

**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 3-2 (continued) Compounds and Analytical Methods for Groundwater Sampling Event No. 5 at Sites 5 and 16

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Parameter: Semivolatile Organic Compounds (base/neutral fraction)

Target Compound 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

---

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

For VOC analyses, all initial calibration standards, internal standard/surrogate recoveries, precision, and accuracy criteria were met. However, one continuing calibration standard contained acetone and 2-butanone with percentage differences exceeding QC limits. No qualification of data was required because acetone and 2-butanone were not detected in associated samples.

Two analytical blanks associated with certain VOC sample analyses contained detectable concentrations of methylene chloride and acetone, common laboratory solvents and frequently observed artifacts in laboratory method blanks. Qualifications of sample results for VOC compounds associated with blank contamination are made according to NEESA Level C QC guidelines. Table 3-3 summarizes VOC method blank analytical results. Sample results for all compounds associated with methylene chloride and acetone contamination were appropriately qualified as undetected because sample values were less than 10 times the method blank concentration (NEESA 1988).

For SVOC analyses, all initial calibration standards, internal standard/surrogate recoveries, precision, and accuracy criteria were met. However, one continuing calibration standard contained benzoic acid and bis(2-chloroisopropyl)ether with percentage differences exceeding QC limits. No qualification of data was required because these compounds were not detected in associated samples.

For PCB analyses, all initial and continuing calibration standards, surrogate recoveries, precision, and accuracy criteria were met. However, extraction holding times for the source water blanks, BS-13-FB and BS-15-FB, were exceeded by six days. Associated quantitation limits have been qualified as estimated and flagged with a "UJ" qualifier. The qualification of these source water blanks does not affect the interpretability of data because PCBs were not detected in associated groundwater samples.

For inorganic analyses, all applicable QC criteria were met. However, cadmium, copper, nickel, and antimony exhibited negative bias in method blanks. Table 3-3 summarizes inorganic preparation blank analytical results. If an inorganic analyte exhibiting negative bias in a method blank is not detected in associated samples, sample quantitation limits for that analyte are qualified as estimated. For sample concentrations less than 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 10 times the blank value if there is negative bias (NEESA, 1988).

3.2.2 Evaluation of Field QC Samples Three field blanks, three trip blanks, and three rinseate blanks were collected during the fifth groundwater sampling event at Sites 5 and 16. One field blank, BS-13-FB, represents organic-free, deionized water used as a final rinse during equipment decontamination procedures, and a second field blank, BS-15-FB, represents regular deionized water used as an intermediate rinse during equipment decontamination procedures. The third field blank, BS-14-FB, is a filter blank that represents organic-free, deionized water

Table 3-3 Summary of Organic Analyses of Method Blanks and Inorganic Analysis of Preparation Blanks

Blank Analysis Results				
Method Blank ID	Compound	Concentration	CRQL <sup>a</sup>	Associated Samples
Volatile Organic Chemical Aqueous Analysis (µg/l)				
VBLKW1	Methylene chloride	10	5	KBA-16-1, KBA-16-2, KBA-16-3, KBA-16-4, BT-30-FB, BT-31-FB, BS-29-ER, BS-30-ER, BS-13-FB, BS-15-FB, KBA-5-1, KBA-5-2, KBA-5-3, KBA-5-4, KBA-5-3D, KBA-5-5
	Acetone	4 J	10	
VBLKW2	Methylene chloride	7	5	KBA-5-6, KBA-5-7, BT-32-FB, BS-31-ER
Inorganic Aqueous Analysis (µg/l)				
23285	Copper	-8.52	5	KBA-16-1, KBA-16-1F, KBA-16-2, KBA-16-2F, KBA-16-3, KBA-16-3F, KBA-16-4, KBA-16-4F, BS-13-FB, BS-14-FB, BS-15-FB, BS-29-ER
	Nickel	-5.59	40	
23294	Cadmium	-3.57	5	KBA-5-1, KBA-5-1F, KBA-5-2, KBA-5-2F, KBA-5-3, KBA-5-3F, KBA-5-3D, KBA-5-3DF, KBA-5-4, KBA-5-4F, KBA-5-5, KBA-5-5F, BS-30-ER
	Nickel	-5.46	40	
23300	Antimony	-13.72	60	KBA-5-6, KBA-5-6F, KBA-5-7, KBA-5-7F, BS-31-ER

Notes:

<sup>a</sup>Contract required quantitation limit  
 J = indicates that the reported concentration is estimated because it is below the CRQL  
 µg/l = micrograms per liter

that has been passed through a 0.45-micron filter. The three equipment rinseate samples, BS-29-ER, BS-30-ER, and BS-31-ER, were collected during decontamination procedures involving Teflon™ bailers.

The VOC acetone was detected in one trip blank, BT-32-FB, at 70 micrograms per liter ( $\mu\text{g}/\text{l}$ ). No qualification was required because none of the associated groundwater samples contained acetone that was attributable to trip blank contamination. No VOCs, SVOCs, or PCBs were detected in rinseate blanks or source water blanks.

Four inorganic analytes were detected in two field blanks and two rinseate blanks as shown in Table 3-4. Concentrations for all but one analyte are below their respective Contract Required Quantitation Limits (CRQLs). Blanks containing inorganic analytes below the CRQL are below any regulatory limit in water, but are considered in the evaluation of environmental samples. Zinc was detected in one rinseate sample, BS-30-ER, at  $21.0 \mu\text{g}/\text{l}$ , which is just above the CRQL of  $20 \mu\text{g}/\text{l}$ . Zinc was also detected in associated groundwater samples collected from Site 5 at concentrations ranging from  $10.9 \mu\text{g}/\text{l}$  to  $193 \mu\text{g}/\text{l}$ . These concentrations are well below the Federal Secondary Drinking Water Standard Maximum Contaminant Level (MCL) for zinc ( $5,000 \mu\text{g}/\text{l}$ ); however, the presence of zinc in rinseate samples will be considered in the evaluation of environmental data collected from Site 5.

Review of the chemical concentrations in groundwater field duplicates showed good agreement. 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 replicate at or near the detection limit. Groundwater replication for inorganic analytes may also vary by factors of two to five times because of the variation in the amount of suspended solids in each sample and the nature of the inorganic constituents sorbed to those suspended solids.

Table 3-4 Summary of Inorganic Analyses of Rinseate Blanks and Field Blanks

Compounds Detected	Rinseate Blanks ( $\mu\text{g}/\text{l}$ )		Source Water Blanks ( $\mu\text{g}/\text{l}$ )	
	BS-30-ER	BS-31-ER	BS-13-FB	BS-15-FB
Barium	2.4 U	3.7 U	2.8 J	2.6 J
Chromium	2.9 U	2.9 U	2.9 U	3.7 J
Copper	2.3 U	8.8 J	2.3 UJ	2.3 UJ
Zinc	21.0	12.6 J	9.6 U	10.1 J

Notes:

J = estimated value

U = not detected at the reported value

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

#### 4.0 RESULTS OF INVESTIGATIONS

Section 4.0 presents the analytical results of groundwater samples collected during the fifth groundwater sampling event at Site 5, Army Reserve Disposal Area, Towhee Trail, and Site 16, Army Reserve Disposal Area, Motor Missile Magazines, in November 1992. Technical Memorandum No. 1 (ABB-ES, 1992a) presents discussions of the RFI/SI field program, including analyses of soil samples from Sites 5 and 16 and groundwater sampling event No. 1. Technical Memorandum Nos. 2, 3, 4 (ABB-ES, 1992b, c, and d) presents results from the second, third, and fourth groundwater sampling events.

The following subsections compare analytical data with data associated with previous sampling events at Sites 5 and 16. Appendix A contains tables of validated analytical data for samples collected in November 1992 at Sites 5 and 16. 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 four sampling events.

4.1 SITE 5, ARMY RESERVE DISPOSAL AREA, TOWHEE TRAIL. On November 12, 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 previous sampling events.

The headspaces of monitoring wells were screened for VOCs using an FID. The headspace for four monitoring wells at Site 5 contained detectable levels of VOCs, suspected of being naturally occurring methane (Table 4-1). Headspace screening concentrations ranged from 18 to 3,500 parts per million (ppm). VOCs were detected at similar concentrations in the headspaces of KBA-5-1 and KBA-5-6 during previous sampling events. No VOCs were detected in the headspaces of KBA-5-5 and KBA-5-7 during previous events. Groundwater analytical data for the last four sampling events do not indicate a source for the VOC headspace readings at these four wells.

Field measurements of pH, specific conductance, and temperature were taken during monitoring well purging. Table 4-1 summarizes the field measurements recorded during purging of monitoring wells at Site 5. Purging continued until at least three well volumes had been removed, and field parameters 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).

Nine groundwater samples, including two duplicate samples, were collected from seven monitoring wells at Site 5. Groundwater samples were analyzed for VOCs, PCBs, TDS, TSS, and inorganic analytes. Both filtered and unfiltered groundwater samples were collected for inorganic analysis. Table 3-2 lists specific compounds analyzed in groundwater samples collected during sampling event No. 5. Table 4-2 summarizes analytical data for compounds detected in groundwater at Site 5. Subsection 5.1 of this document describes the analytical program for sampling event No. 6.

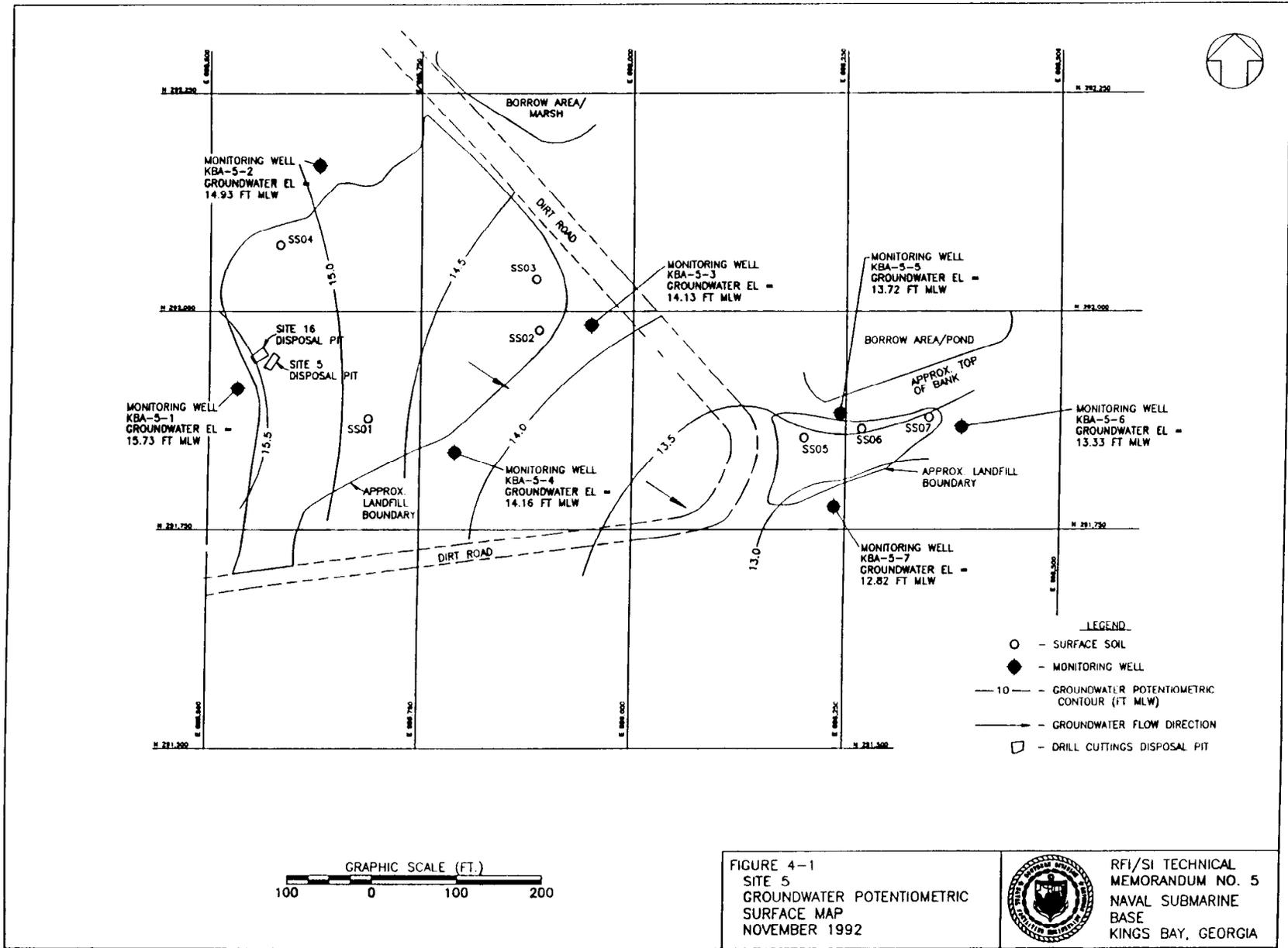


Table 4-1 Summary of Field Measurements for Monitoring Wells at Site 5

Monitoring Well No.	FID Headspace Data (ppm)	Field Data <sup>1</sup>	Well Volume No.				Total Purge Vol. (gal)
			1	2	3	4	
KBA-5-1	40	pH	4.7	4.8	4.7	4.7	5.4
		Cond.	139	110	149	136	
		Temp.	71.7	71.5	71.8	71.5	
KBA-5-2	0	pH	5.4	5.3	5.3	5.3	5.0
		Cond.	130	135	154	155	
		Temp.	71.8	72.1	72.1	72.0	
KBA-5-3	0	pH	4.9	4.8	4.8		4.5
		Cond.	149	155	156		
		Temp.	73.6	73.6	72.9		
KBA-5-4	0	pH	5.1	5.0	4.9	4.9	4.5
		Cond.	223	291	357	339	
		Temp.	71.9	71.6	71.5	71.4	
KBA-5-5	50	pH	5.0	4.9	4.9		4.2
		Cond.	120	122	120		
		Temp.	74.8	73.9	73.2		
KBA-5-6	3500	pH	5.4	5.2	5.2		3.5
		Cond.	292	241	243		
		Temp.	69.1	69.7	69.1		
KBA-5-7	18	pH	6.2	6.2	6.1		4.0
		Cond.	411	395	371		
		Temp.	66.7	67.6	68.8		

## 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 Fahrenheit (°F) for temperature.

Table 4-2 Summary of Compounds Detected in Groundwater Samples Collected from Site 5<sup>1</sup>

Compounds Detected		Monitoring Well Number								
		CRQL	KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-3D	KBA-5-4	KBA-5-5	KBA-5-6	KBA-5-7
<b>APPENDIX IX Inorganics (µg/l)</b>										
Antimony <sup>2,3</sup>	unfiltered	60	10.7 U	10.7 U	10.7 U	10.7 U	12.1 J	10.7 U	10.7 UJ	10.7 UJ
	filtered		10.7 U	10.7 U	10.7 U	10.7 U	10.7 U	10.7 U	10.7 UJ	10.7 UJ
Arsenic <sup>2</sup>	unfiltered	10	4.0 J	13.3	7.9 J	8.0 J	4.0 J	13.7	2.8 J	10.5
	filtered		2.7 J	11.1	4.8 J	4.2 J	1.0 U	10.3	1.0 U	5.5 J
Barium <sup>2</sup>	unfiltered	200	78.2 J	42.6 J	70.8 J	72.2 J	67.4 J	51.0 J	90.1 J	35.0 J
	filtered		59.0 J	29.9 J	38.6 J	35.4 J	30.6 J	28.7 J	28.5 J	28.9 J
Beryllium <sup>2</sup>	unfiltered	5	0.42 J	0.29 J	0.24 J	0.22 U	0.22 U	0.68 J	0.40 J	0.22 U
	filtered		0.38 J	0.30 J	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
Cadmium <sup>2,3</sup>	unfiltered	5	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.6 J	3.0 U
	filtered		3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.0 U	3.0 U
Chromium <sup>2</sup>	unfiltered	10	4.2 J	8.1 J	8.5 J	8.9 J	4.5 J	4.6 J	15.5	4.5 J
	filtered		2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U
Cobalt <sup>2</sup>	unfiltered	50	3.3 U	5.0 J	3.4 J	3.3 U	4.3 J	3.3 U	3.3 U	3.3 U
	filtered		3.3 U	4.3 J	4.9 J	3.8 J	3.3 U	3.3 U	3.3 U	4.8 J
Copper <sup>2</sup>	unfiltered	25	16.6 J	7.3 J	9.1 J	7.3 J	11.2 J	16.3 J	2.3 U	10.3 J
	filtered		2.3 U	10.9 J	2.7 J	4.2 J	2.3 U	3.0 J	2.3 U	3.5 J
Lead <sup>2</sup>	unfiltered	3	3.6	4.3	2.3 J	2.4 J	1.8 J	1.7 J	3.7	2.3 J
	filtered		1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	2.1 J	1.4 U
Mercury <sup>2</sup>	unfiltered	0.2	0.08 U	0.08 U	0.14 J	0.08 U	0.12 J	0.12 J	0.51	0.08 U
	filtered		0.10 J	0.10 J	0.08 U	0.08 U	0.10 J	0.08 U	0.08 U	0.08 U
Nickel <sup>2,3</sup>	unfiltered	40	5.3 UJ	10.9 J	12.6 J	5.3 UJ	5.3 UJ	8.8 J	6.5 J	5.9 J
	filtered		5.3 UJ	5.5 J	8.2 J	7.9 J	5.3 UJ	5.3 UJ	5.3 U	14.4 J
Vanadium <sup>2</sup>	unfiltered	50	4.1 J	9.6 J	8.2 J	7.8 J	3.9 J	4.1 J	13.5 J	8.9 J
	filtered		2.6 U	5.3 J	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U

See notes at end of table.

Table 4-2 (continued) Summary of Compounds Detected in Groundwater Samples Collected from Site 5<sup>1</sup>

Compounds Detected	CRQL	Monitoring Well Number								
		KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-3D	KBA-5-4	KBA-5-5	KBA-5-6	KBA-5-7	
<b>APPENDIX IX Inorganics (µg/l)</b>										
Cyanide <sup>2</sup>	unfiltered	10	0.84 U	0.84 U	0.84 U	0.84 U	5.6 J	2.0 J	0.84 U	1.1 J
	filtered		0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	1.2 J
Zinc <sup>2,4</sup>	unfiltered	20	36.7	193	30.7	25.3	45.4	38.2	41.2	23.2
	filtered		10.9 J	187	12.1 J	19.6 J	18.0 J	22.5	11.5 J	12.0 J
Sulfide	unfiltered	100	100	100 U	100 U	100 U	300	100 U	100 U	100 U
	filtered		100 U	100 U	100 U	100 U	100 U	100 U	200	100 U
<b>PHYSICAL PARAMETERS</b>										
Total Solids (mg/l)			195	1406	208	287	805	304	581	452
TDS (mg/l)			159	320	201	128	694	228	251	404
TSS (mg/l)			36	1086	7	159	111	76	330	48
% TSS			18	77	3	55	14	25	57	11

**Notes:**

CRQL = Contract Required Quantitation Limit

TSS = total suspended solids

TDS = total dissolved solids

U = not detected above or below the CRQL

<sup>1</sup> Groundwater samples were analyzed for VOCs, PCBs, and inorganic analytes only. No VOCs or PCBs were detected in groundwater samples.Data Qualifiers<sup>2</sup> Values flagged J as estimated because concentrations are less than the CRQL.<sup>3</sup> Quantitation limits flagged UJ as estimated because preparation blanks exhibited negative bias for antimony, cadmium, and nickel.<sup>4</sup> Samples results are considered bias high due to the presence of zinc in associated rinseate blanks.

4.1.1 Volatile Organic Compounds in Groundwater VOCs were not detected in groundwater samples collected from Site 5. VOCs were also not detected in groundwater samples collected during the second, third, and fourth sampling events at Site 5. VOCs will, however, continue to be monitored at Site 5.

4.1.2 Polychlorinated Biphenyls in Groundwater PCBs were not detected in groundwater samples collected from Site 5. PCBs were also not detected in groundwater samples collected during the first four sampling events at Site 5. PCBs will, however, continue to be monitored for at Site 5.

4.1.3 Inorganic Constituents in Groundwater With the exception of monitoring well KBA-5-2, concentrations of inorganic constituents in groundwater samples from each monitoring well at Site 5 were less than concentrations detected in samples collected during the fourth sampling event in September 1992. Decreased concentrations were observed in groundwater samples from both upgradient and downgradient monitoring wells. Therefore, the decrease in concentrations for these constituents may be caused by seasonal variations or decreased concentrations of TDS and TSS in groundwater samples collected during sampling event No. 5.

Concentrations of arsenic, chromium, vanadium, and zinc in groundwater samples collected from upgradient monitoring well KBA-5-2 increased when compared to concentrations detected in groundwater samples collected from this well during sampling event No. 4. Increased concentrations of these four inorganic analytes are most likely attributed to the increased concentrations of TDS and TSS in samples collected from KBA-5-2 during the fifth sampling event.

Both filtered and unfiltered groundwater samples were collected for inorganic analyses from the seven monitoring wells at Site 5. The purpose of collecting and analyzing filtered and unfiltered samples is to determine what fraction of the total concentration of inorganics in groundwater samples is attributable to suspended particulates. Groundwater samples from Site 5 were also analyzed for TDS and TSS to determine what percentage of the total solids in groundwater represent suspended particulates.

TDS and TSS results for groundwater samples are shown in Table 4-2. Total solids (the sum of TDS and TSS) in groundwater ranged from 195 milligrams per liter (mg/l) in KBA-5-1 to 1,406 mg/l in KBA-5-2. Both monitoring wells KBA-5-1 and KBA-5-2 are upgradient wells. The fraction of total solids in groundwater that represents suspended solids ranged from 3 percent (7 mg/l) for KBA-5-3 to 77 percent (1,086 mg/l) for KBA-5-2. The total amount of solids and suspended solids found in downgradient wells at Site 5 were within the range detected in the upgradient monitoring wells, KBA-5-1 and KBA-5-2. With the exception of KBA-5-2 and three downgradient wells (KBA-5-4, KBA-5-5, and KBA-5-6), the concentrations of TDS and TSS in monitoring wells were lower than concentrations detected in corresponding groundwater samples collected during the fourth sampling event.

The concentrations of TSS in upgradient well KBA-5-2 significantly increased from 24 mg/l (sampling event No.4) to 1,086 mg/l during the fifth sampling event. As mentioned, concentrations of four inorganic constituents in this monitoring well also increased when compared to concentrations detected in samples collected during the fourth sampling event. The difference in concentrations of TDS and TSS in monitoring wells at Site 5 is most likely caused by seasonal variations in the aquifer.

The concentrations of inorganic constituents detected in unfiltered samples collected from downgradient monitoring wells were compared to concentrations detected in upgradient, unfiltered groundwater samples. The following paragraphs discuss general observations regarding the constituents and concentrations detected in samples collected in November 1992. Table 4-2 summarizes inorganic analytes detected in groundwater samples collected from Site 5.

As shown in Table 4-2, chromium, mercury, and nickel were detected in the unfiltered groundwater sample collected from downgradient monitoring well KBA-5-3 at concentrations exceeding upgradient concentrations. Arsenic, beryllium, mercury, and cyanide were detected in the unfiltered groundwater sample collected from downgradient monitoring well KBA-5-5 at concentrations exceeding upgradient concentrations. However, concentrations for all analytes were less than three times upgradient concentrations or sample quantitation limits and did not exceed corresponding federal MCLs. Comparisons of downgradient concentrations to three times upgradient concentrations are made based on guidance criteria for the determination of an observed release of a chemical constituent to the environment (USEPA, 1992). Except for cobalt and nickel in KBA-5-3, concentrations of inorganic analytes detected in filtered samples collected from KBA-5-3 and KBA-5-5 were considerably lower and did not exceed concentrations in filtered samples from upgradient wells.

Antimony, mercury, and cyanide were detected in the unfiltered groundwater sample collected from downgradient monitoring well KBA-5-4 at concentrations exceeding upgradient concentrations. However, the concentration of mercury was less than three times the corresponding quantitation limit for mercury and did not exceed the corresponding federal MCL for mercury. Cyanide was detected in KBA-5-4 at 5.6 J  $\mu\text{g}/\text{l}$  but was not detected at 0.84  $\mu\text{g}/\text{l}$  in the upgradient wells. During the fourth sampling event, cyanide was also detected in KBA-5-4 but not in upgradient wells. Cyanide was not detected in the filtered sample collected from KBA-5-4 and the concentration in the unfiltered sample is well below the primary MCL for cyanide (200  $\mu\text{g}/\text{l}$ ). Antimony was detected in KBA-5-4 at 12.1 J  $\mu\text{g}/\text{l}$  but was not detected at 10.7  $\mu\text{g}/\text{l}$  in the upgradient wells. Both the concentration of antimony in KBA-5-4 and the method detection limit for antimony exceed the primary MCL for antimony (6  $\mu\text{g}/\text{l}$ ). Antimony was not detected in the filtered sample from KBA-5-4.

Barium, cadmium, chromium, vanadium, and mercury were detected in the unfiltered groundwater sample collected from downgradient monitoring well KBA-5-6 at concentrations exceeding upgradient concentrations. However, concentrations of barium, cadmium, chromium, and vanadium were less than three times upgradient concentrations and did not exceed corresponding federal MCLs. Mercury was detected in KBA-5-6 at 0.51  $\mu\text{g}/\text{l}$  but was not detected at 0.08  $\mu\text{g}/\text{l}$  in the unfiltered samples collected from upgradient wells. Mercury was not detected in the filtered sample collected from this well.

In general, the results for filtered groundwater samples are usually considered a more accurate representation of groundwater quality at Site 5 because of the presence and contribution of suspended solids to the total concentration of inorganics in unfiltered groundwater samples.

Concentrations of inorganic constituents in unfiltered groundwater samples collected from Site 5 were compared to Federal Primary Drinking Water Standard MCLs. Appendix C presents inorganic data for unfiltered groundwater samples collected at Site 5 during the first five sampling events. Data is presented in

bar chart form for eleven of the twelve inorganic constituents regulated under the Safe Drinking Water Act. Figure 4-2 summarizes concentrations of inorganics having MCLs for the filtered and unfiltered groundwater samples collected at Site 5 during the fifth sampling event. Environmental data for one inorganic constituent, antimony, could not be accurately compared to the corresponding primary MCL of 6 µg/l because this MCL is less than the method detection limit for antimony (10.7 µg/l). The status of antimony as a site-related contaminant at Site 5 will be evaluated through statistical analysis of the data obtained from the six groundwater sampling events.

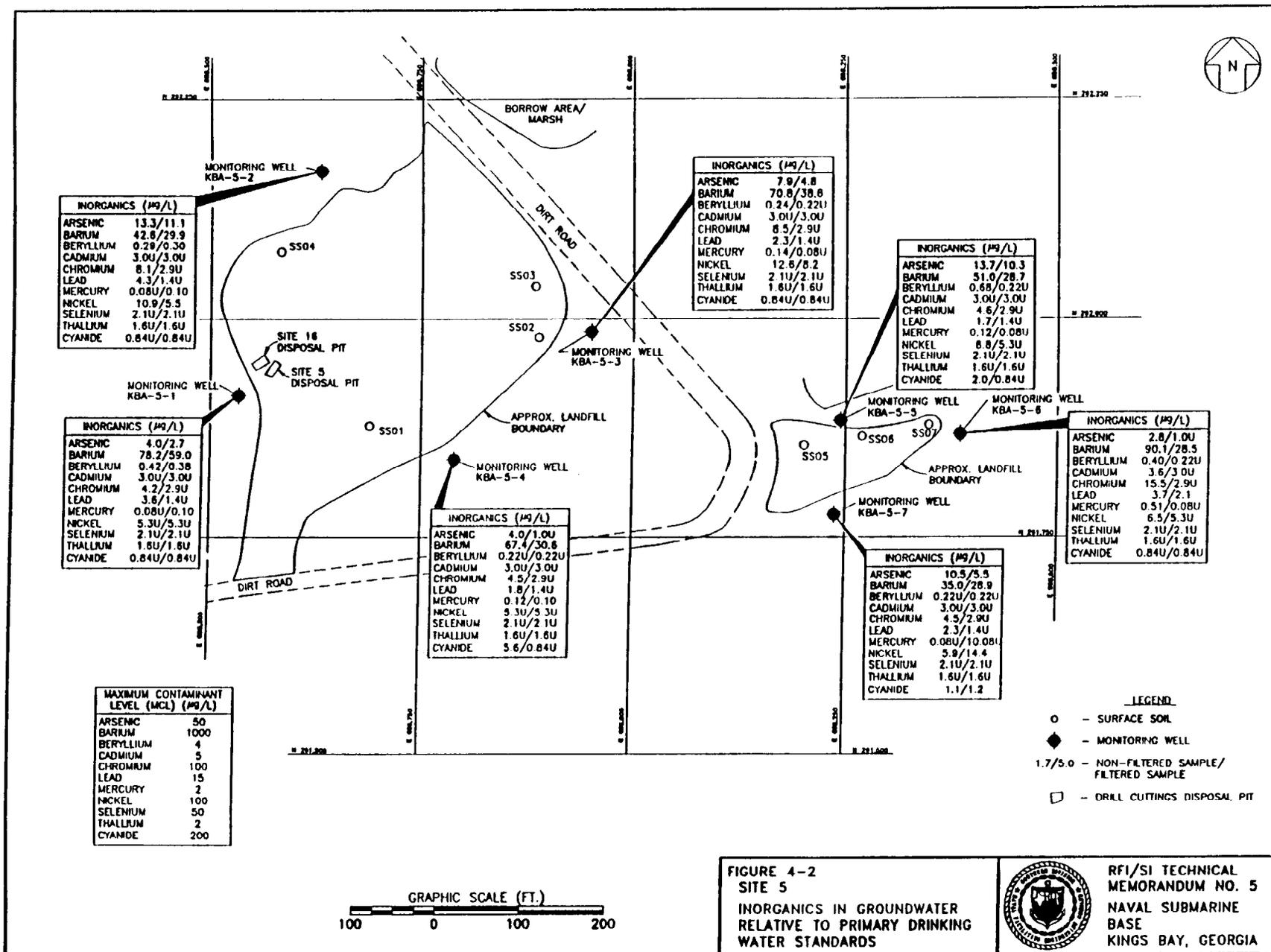
**4.2 SITE 16, ARMY RESERVE DISPOSAL AREA, MOTOR MISSILE MAGAZINES.** On November 12, 1992, groundwater level measurements were taken from four monitoring wells at Site 16. Figure 4-3 is a groundwater potentiometric surface map developed from these measurements. The configuration of the potentiometric surface and the groundwater flow direction are generally unchanged from previous sampling events.

The headspaces of monitoring wells were screened for VOCs using an FID. The headspaces of all four monitoring wells at Site 16 contained detectable levels of VOCs, suspected of being naturally occurring methane (Table 4-3). Headspace screening concentrations ranged from 50 to greater than 5,000 ppm. VOCs were detected at similar concentrations during previous sampling events at Site 16. Review of groundwater sample analytical data did not indicate the presence of a source of VOCs.

Field measurements of pH, specific conductance, and temperature were taken during monitoring well purging. Table 4-3 summarizes field measurements during purging of monitoring wells at Site 16. Purging continued until at least three well volumes were removed, and field parameters stabilized to within 10 percent. The final measurements of pH, specific conductance, and temperature are considered the measurements of record for the monitoring wells (USEPA, 1991).

Five groundwater samples, including one duplicate sample, were collected from four monitoring wells at Site 16. Groundwater samples were analyzed for VOCs, SVOCs, TDS, TSS, and inorganic analytes. Both filtered and unfiltered groundwater samples were collected for inorganic analysis. Table 3-2 provides a list of specific compounds analyzed for during sampling event No. 5. Table 4-4 summarizes analytical data for compounds detected in groundwater samples collected from Site 16. Subsection 5.1 of this document describes the analytical program for sampling event No. 6.

**4.2.1 Volatile Organic Compounds in Groundwater** VOCs were not detected in groundwater samples collected from Site 16 during the fifth groundwater sampling event. VOCs were also not detected in groundwater samples collected during the second and fourth sampling events in May and September of 1992 at Site 16. The VOC toluene was detected at 5 µg/l in a groundwater sample collected from monitoring well KBA-16-3 during the third groundwater sampling event but was not detected during the other four sampling events. VOCs will continue to be monitored for at this site.



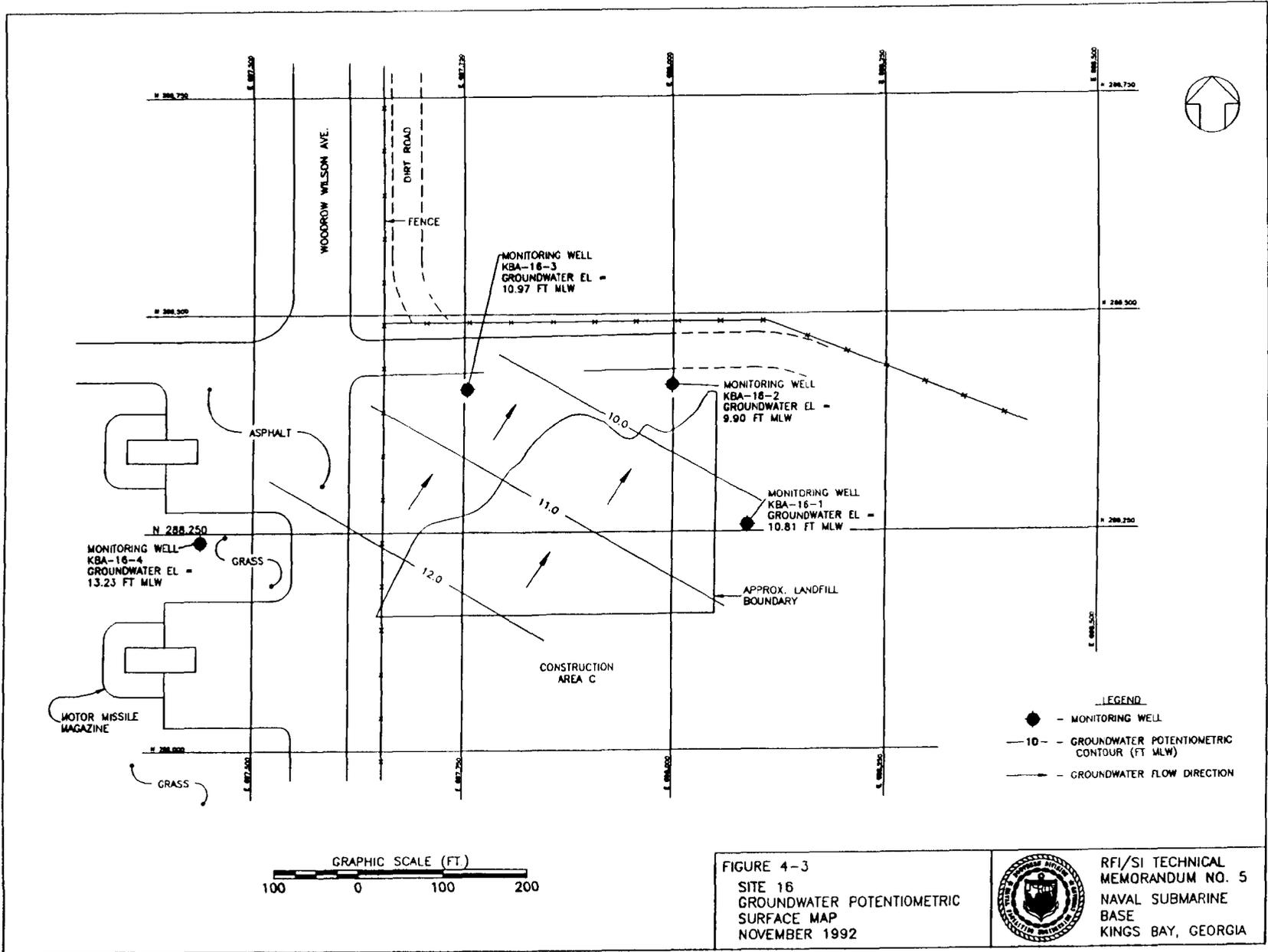


Table 4-3 Summary of Field Measurements for Monitoring Wells at Site 16

Monitoring Well No.	FID Headspace Data (ppm)	Field Data <sup>1</sup>	Well Volume No.				Total Purge Vol. (gal)
			1	2	3	4	
KBA-16-1	50	pH	5.4	5.5	5.5		3.3
		Cond.	575	577	549		
		Temp.	75.7	75.5	75.5		
KBA-16-2	>5000	pH	6.3	6.1	6.2	6.3	4.2
		Cond.	577	494	523	522	
		Temp.	75.9	75.8	75.7	75.6	
KBA-16-3	4000	pH	5.7	5.7	5.8	5.8	4.0
		Cond.	157	141	159	146	
		Temp.	77.6	77.7	77.8	77.7	
KBA-16-4	>5000	pH	5.6	5.7	5.8	5.7	5.0
		Cond.	615	733	790	780	
		Temp.	74.8	74.9	75.0	74.8	

## Notes:

FID = flame ionization detector

ppm = parts per million

1) Units are standard units (s.u.) for pH, micromhos per centimeter ( $\mu\text{mhos/cm}$ ) for specific conductance, and degrees Fahrenheit ( $^{\circ}\text{F}$ ) for temperature.

Table 4-4 Summary of Compounds Detected in Groundwater Samples Collected from Site 16<sup>1</sup>

Compounds Detected	CRQL	Monitoring Well Number					
		KBA-16-1	KBA-16-2	KBA-16-2D	KBA-16-3	KBA-16-4	
<b>APPENDIX IX SVOCs (µg/l)</b>							
Naphthalene <sup>2</sup>	10	10 U	2 J	10 U	10 U	10 U	
bis(2-Ethylhexyl)Phthalate <sup>2</sup>	10	10 U	4 J	3 J	10 U	10 U	
<b>APPENDIX IX Inorganics (µg/l)</b>							
Arsenic <sup>2</sup>	10	unfiltered	4.1 J	4.3 J	----	1.0 U	1.6 J
		filtered	1.0 U	2.0 J	----	6.2 J	1.0 U
Barium <sup>2</sup>	200	unfiltered	33.9 J	70.9 J	----	219	37.8 J
		filtered	16.0 J	21.0 J	----	24.7 J	23.1 J
Beryllium <sup>2</sup>	5	unfiltered	0.22 U	0.44 J	----	5.7	0.22 U
		filtered	0.22 U	0.22 U	----	0.22 U	0.22 U
Chromium <sup>2</sup>	10	unfiltered	15.7	32.3	----	90.6	10.3
		filtered	2.9 U	3.2 J	----	2.9 U	3.6 J
Cobalt <sup>2</sup>	50	unfiltered	3.3 U	8.1 J	----	13.3 J	3.3 U
		filtered	3.3 U	3.3 U	----	3.3 U	3.3 U
Copper <sup>2</sup>	25	unfiltered	15.3 J	65.1 J	----	31.0 J	64.5 J
		filtered	2.3 UJ	2.3 UJ	----	2.3 UJ	2.3 UJ
Lead	3	unfiltered	3.6	10.1	----	13.6	3.8
		filtered	1.4 U	1.4 U	----	1.4 U	1.4 U
Mercury	0.2	unfiltered	0.08 U	0.09 J	----	0.18 J	0.08 U
		filtered	0.08 U	0.08 U	----	0.08 U	0.08 U
Nickel <sup>2</sup>	40	unfiltered	5.3 UJ	34.6 J	----	32.4 J	40.1 J
		filtered	5.3 UJ	5.3 UJ	----	5.3 UJ	5.3 UJ
Selenium	5	unfiltered	2.5 J	2.1 U	----	2.1 U	2.1 U
		filtered	2.1 U	2.1 U	----	2.1 U	2.1 U
Vanadium <sup>2</sup>	50	unfiltered	18.6 J	34.2 J	----	89.9	10.7 J
		filtered	2.6 U	2.6 U	----	3.0 J	5.7 J
Zinc	20	unfiltered	25.6	96.4	----	110	84.1
		filtered	9.6 U	9.6 U	----	9.6 U	9.6 U
Cyanide <sup>2</sup>	10	unfiltered	0.84 U	0.84 U	----	1.2 J	11.6
		filtered	0.84 U	0.84 U	----	0.84 U	7.0 J
Sulfide	100	unfiltered	200	400	----	100 U	300
		filtered	200	400	----	100 U	1400

See notes at end of table.

Table 4-4 Summary of Compounds Detected in Groundwater Samples Collected from Site 16<sup>1</sup> (continued)

Compounds Detected	Monitoring Well Number					
	CRQL	KBA-16-1	KBA-16-2	KBA-16-2D	KBA-16-3	KBA-16-4
<b>PHYSICAL PARAMETERS</b>						
Total Solids (mg/l)		539	631	----	677	463
TDS		350	261	----	183	181
TSS (mg/l)		189	370	----	494	282
% TSS		35	59	----	73	61

**Notes:**

CRQL = Contract Required Quantitation Limit

U = not detected above or below CRQL

---- = analysis not required or performed

TDS = total dissolved solids

TSS = total suspended solids

Data Qualifiers

<sup>1</sup> Groundwater samples were analyzed for VOCs, SVOCs, and inorganic constituents only. No VOCs were detected in groundwater samples.

<sup>2</sup> Values flagged J as estimated because concentrations are less than the CRQL.

<sup>3</sup> Sample values and quantitation limits flagged J and UJ as estimated because preparation blank exhibited negative bias for copper and lead.

4.2.2 Semivolatile Organic Compounds in Groundwater Two SVOCs, naphthalene and bis(2-ethylhexyl)phthalate, were detected in groundwater samples collected from monitoring well KBA-16-2 during the fifth groundwater sampling event. As shown in Table 4-4, naphthalene was detected in one sample collected from KBA-16-2 at an estimated concentration of 2 J  $\mu\text{g}/\text{l}$  but was not detected in the replicate sample collected from this well. Bis(2-ethylhexyl)phthalate was detected in both samples collected from KBA-16-2 at 4 J  $\mu\text{g}/\text{l}$  and 3 J  $\mu\text{g}/\text{l}$ . These levels are well below the CRQL of 10  $\mu\text{g}/\text{l}$  and are near the instrument detection limit for these compounds.

Naphthalene was also detected in KBA-16-2 (1  $\mu\text{g}/\text{l}$ ) during the fourth sampling event in September 1992. Naphthalene is a polynuclear aromatic hydrocarbon (PAH) and its presence in monitoring well KBA-16-2 may be related to the detection of PAHs in the subsurface soil sample collected during the installation of this well in February 1992. Concentrations of PAHs detected in the soil boring sample from KBA-16-2 ranged from 61 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ) to 1,700  $\mu\text{g}/\text{kg}$ , and compounds detected include acenaphthene, fluorene, phenanthrene, fluoranthene, pyrene, chrysene, benzo(a)anthracene, benzo(b)anthracene, benzo(k)anthracene, and benzo(a)pyrene. No PAHs were detected in groundwater samples collected from Site 16 during the first three groundwater sampling events.

Bis(2-ethylhexyl)phthalate was detected in monitoring wells at Site 16 during previous sampling events. Phthalates were also detected in method blanks and field blanks associated with previous sampling events. Phthalates are common laboratory and sampling artifacts that can easily be introduced into sampling media through sample containers, plastic gloves, coolers, and other plastic materials used in support of laboratory and sampling activities. The presence of phthalates at Site 16 is not considered attributable to waste disposal at this site.

The base/neutral fraction of SVOCs will remain on the list of parameters to monitor at Site 16 because of the presence of site-related PAHs in the subsurface soil sample and groundwater samples collected from the downgradient soil boring and monitoring well KBA-16-2.

4.2.3 Inorganic Constituents in Groundwater Except for concentrations of copper, nickel, and zinc in two monitoring wells, concentrations of all inorganic constituents detected in groundwater samples collected from two or more monitoring wells at Site 16 decreased when compared to concentrations detected in groundwater samples collected during sampling event No. 4 (September 1992). Decreased concentrations of inorganic constituents were observed in groundwater samples from both upgradient and downgradient monitoring wells. Therefore, the increase in concentrations for the detected constituents may be caused by seasonal variations or decreased concentrations of TDS and TSS in groundwater samples collected during sampling event No. 5.

Both filtered and unfiltered groundwater samples were collected for inorganic analyses from the four monitoring wells at Site 16. The purpose of collecting and analyzing filtered and unfiltered samples is to determine what fraction of the total concentration of inorganics in groundwater samples is attributable to suspended particulates. Groundwater samples from Site 16 were also analyzed for TDS and TSS to establish what percentage of the total solids in groundwater are suspended particulates.

TDS and TSS results for groundwater samples are shown in Table 4-4. Total solids (the sum of TDS and TSS) in groundwater ranged from 463 mg/l for KBA-16-4 to 677 mg/l for KBA-16-3. The fraction of total solids in groundwater that represents suspended solids ranged from 35 percent (189 mg/l) for KBA-16-1 to 73 percent (494 mg/l) for KBA-16-3. The total amount of solids in the upgradient monitoring well KBA-16-4 was lower than the total solids found in all three downgradient wells. However, the concentrations of TDS and TSS in all four monitoring wells were lower than concentrations detected in corresponding groundwater samples collected during the fourth sampling event.

The concentrations of inorganic constituents detected in unfiltered samples collected from downgradient monitoring wells KBA-16-1, KBA-16-2, and KBA-16-3 were compared to concentrations detected in the upgradient, unfiltered groundwater sample. The following paragraphs discuss general observations regarding the constituents and concentrations detected in samples collected in November 1992. Table 4-4 summarizes inorganic analytes detected in groundwater samples collected from Site 16.

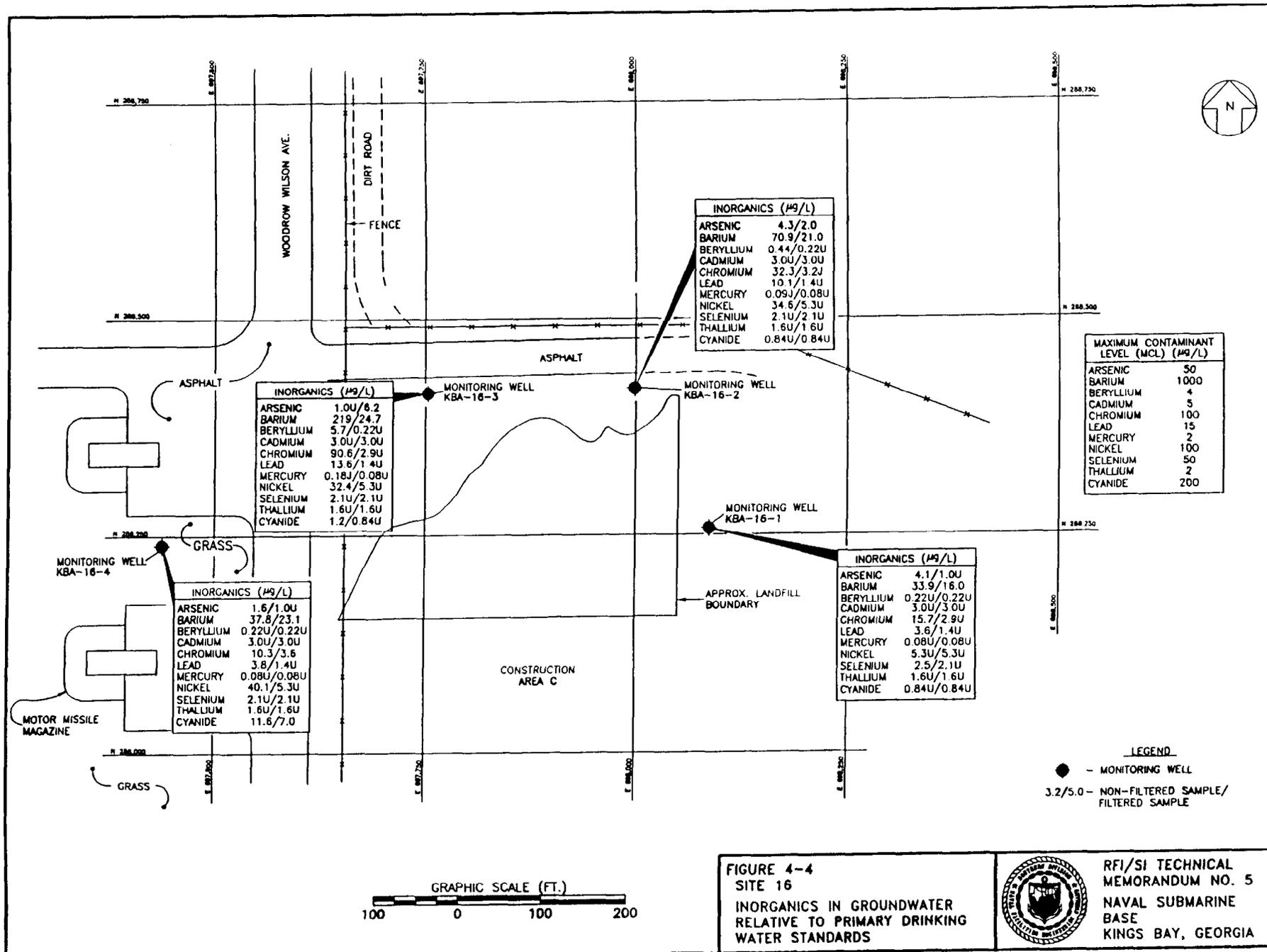
As shown in Table 4-4, arsenic, chromium, vanadium, and selenium were detected in the unfiltered groundwater sample collected from downgradient monitoring well KBA-16-1 at concentrations exceeding upgradient concentrations. However, concentrations of arsenic, chromium, and vanadium were less than three times upgradient concentrations and did not exceed corresponding federal MCLs. Comparisons of downgradient concentrations to three times upgradient concentrations are made based on guidance criteria for the determination of an observed release of a chemical constituent to the environment (USEPA, 1992). Concentrations of inorganic analytes detected in the filtered sample collected from KBA-16-1 were considerably lower and did not exceed concentrations in the filtered, upgradient sample.

Several inorganic analytes were detected in the unfiltered sample from KBA-16-2 at concentrations exceeding concentrations in the unfiltered, upgradient sample. However, concentrations for all analytes (except for chromium and cobalt) were less than three times upgradient concentrations. Concentrations of inorganic analytes detected in the filtered sample collected from KBA-16-2 were considerably lower and were comparable to concentrations in the filtered, upgradient sample. None of the inorganic analytes detected in the unfiltered and filtered samples from KBA-16-2 were at concentrations above corresponding federal MCLs.

Barium, beryllium, chromium, cobalt, lead, and vanadium were detected in the unfiltered sample from KBA-16-3 at concentrations that exceeded three times the concentrations in the unfiltered, ungradient sample. With the exception of arsenic, concentrations of inorganic analytes detected in the filtered sample collected from KBA-16-2 were considerably lower and were comparable to concentrations in the filtered, upgradient sample. Arsenic was not detected in the unfiltered sample from KBA-16-3 but was detected at 6.2 J  $\mu\text{g/l}$  in the filtered sample. Arsenic was not detected in the filtered, upgradient sample. The concentration of arsenic in the filtered sample is well below the corresponding Federal Primary Drinking Water Standard MCL of 50  $\mu\text{g/l}$ . Beryllium was detected in the unfiltered sample from KBA-16-3 at 5.7  $\mu\text{g/l}$ , which exceeds the primary MCL for beryllium (4  $\mu\text{g/l}$ ). Beryllium was not detected in the upgradient sample collected from Site 16. Concentrations of beryllium in KBA-16-3 during previous sampling events also exceeded the MCL of 4  $\mu\text{g/l}$ . Beryllium was not detected in the filtered sample collected from KBA-16-3.

In general, the results for filtered groundwater samples are usually considered a more accurate representation of groundwater quality at Site 16 because of the presence and contribution of suspended solids to the total concentration of inorganics in unfiltered groundwater samples.

Concentrations of inorganic constituents in unfiltered groundwater samples collected from Site 16 were compared to Federal Primary Drinking Water Standard MCLs. Appendix C presents inorganic data for unfiltered groundwater samples collected at Site 16 during the first five sampling events. Data are presented in bar chart form for eleven of the twelve inorganic constituents regulated under the Safe Drinking Water Act. Figure 4-4 summarizes concentrations of inorganics having MCLs for the filtered and unfiltered groundwater samples collected at Site 16 during the fifth sampling event. Environmental data for one inorganic constituent, antimony, could not be accurately compared to the corresponding primary MCL of 6  $\mu\text{g}/\text{l}$  because this MCL is less than the method detection limit for antimony (10.7  $\mu\text{g}/\text{l}$ ). The status of antimony as a site-related contaminant at Site 16 will be evaluated through statistical analysis of the data obtained from the six groundwater sampling events.



## 5.0 SUMMARY

This section summarizes results from the fifth groundwater sampling event at Sites 5 and 16 and outlines the groundwater monitoring analytical program for groundwater sampling event No. 6 at Sites 5 and 16. The analytical program has been developed based on information obtained from analysis of soil samples collected during the RFI/SI field program and five groundwater sampling events at NSB, Kings Bay, Georgia.

5.1 SITE 5, ARMY RESERVE DISPOSAL AREA, TOWHEE TRAIL. Groundwater samples collected during the fifth groundwater sampling event at Site 5 were analyzed for a modified list of Appendix IX constituents, including VOCs, PCBs, inorganic constituents, TDS, and TSS.

VOCs and PCBs were not detected in groundwater samples collected from monitoring wells at Site 5 during the fifth sampling event. VOCs and PCBs will continue to be monitored at this site because of the presence of VOCs in groundwater samples collected during the first groundwater sampling event (February 1992) and the presence of PCBs in surface soil samples collected from Site 5.

With few exceptions, concentrations of inorganic constituents in groundwater samples from each monitoring well at Site 5 were less than concentrations detected in samples collected during the fourth sampling event in September 1992. Both filtered and unfiltered groundwater samples were collected during the fifth sampling event and concentrations of inorganics were generally lower for filtered groundwater samples than for unfiltered samples at Site 5. The results for filtered samples are usually considered to be a more accurate representation of groundwater quality at Site 5 because of the presence and contribution of suspended solids to the total concentration of inorganics in unfiltered groundwater samples.

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

5.2 SITE 16, ARMY RESERVE DISPOSAL AREA, MOTOR MISSILE MAGAZINES. Groundwater samples collected during the fifth groundwater sampling event at Site 16 were analyzed for a modified list of Appendix IX constituents, including VOCs, SVOCs, inorganic constituents, TDS, and TSS.

VOCs were not detected in groundwater samples collected from monitoring wells at Site 16 during the fifth sampling event. VOCs will continue to be monitored at this site because of the presence of VOCs in groundwater samples collected during the first and third groundwater sampling events (February and July of 1992).

One possible site-related SVOC, naphthalene, was detected in a groundwater sample collected from a downgradient monitoring well (KBA-16-2) during the fifth groundwater sampling event. Naphthalene was also detected in KBA-16-2 during the fourth sampling event (September 1992). Naphthalene is a PAH and its presence in monitoring well KBA-16-2 may be related to the detection of PAHs in the subsurface soil sample collected during the installation of this well in February 1992. The base/neutral fraction of SVOCs will remain on the list of parameters to monitor for at Site 16 because of the presence of site-related PAHs in the

Table 5-1 Summary of Sampling and Analysis Program for Groundwater Sampling Event No. 5 and 6 at Sites 5 and 16

Location and Type of Sampling	Laboratory Analysis				
	A	B	C	D	E
<b>Site 5</b>					
Groundwater	7	0	7	14	7
<b>Site 16</b>					
Groundwater	4	4	0	8	4
<b>Field Duplicates</b>					
Groundwater	1	1	1	2	1
<b>Quality Control Samples</b>					
Trip Blanks	3	0	0	0	0
Rinseate Blanks	3	1	2	3	3
Field Blanks	2	2	2	3	2

- A - Volatile Organic Compounds (VOCs)
- B - Semivolatile Organic Compounds (SVOCs)
- C - Polychlorinated Biphenyls (PCBs)
- D - Inorganic constituents (including cyanide and sulfide)
- E - Total Dissolved Solids (TDS) and Total Suspended Solids (TSS)

Table 5-2 Compounds and Analytical Methods for Groundwater Sampling Event No. 6 at Sites 5 and 16

**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

**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 Event No. 6 at Sites 5 and 16

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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-Chlorophenylphenylether
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

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subsurface soil sample and groundwater samples collected from the downgradient soil boring and monitoring well KBA-16-2.

With few exceptions, concentrations of inorganic constituents in groundwater samples from each monitoring well at Site 16 were less than concentrations detected in samples collected during the fourth sampling event in September 1992. Both filtered and unfiltered groundwater samples were collected during the fifth sampling event and concentrations of inorganics were generally lower for filtered groundwater samples than for unfiltered samples at Site 16. Beryllium was detected in an unfiltered groundwater sample from one downgradient monitoring well, KBA-16-3, at a concentration that exceeds the Federal Primary Drinking Water MCL for beryllium. However, beryllium was not detected filtered sample collected from this well. The results for filtered samples are usually considered to be a more accurate representation of groundwater quality at Site 16 because of the presence and contribution of suspended solids to the total concentration of inorganics in unfiltered groundwater samples.

Table 5-1 is a summary of the sampling and analysis program for groundwater sampling event No. 6 at Site 16. Table 5-2 lists the compounds and analytical methods included in the analytical program.

## REFERENCES

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- USEPA, 1992. Guidance for Performing Site Inspections under CERCLA. Interim Final., Document 540-R92-021, USEPA, 1992.

**APPENDIX A  
ANALYTICAL DATA VALIDATION  
SUMMARY TABLES  
SAMPLE EVENT NO. 5  
NOVEMBER 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-5-7	KBA-16-1	KBA-16-2	KBA-16-3	KBA-16-4			
LAB NUMBER:	34466004	34465006	34465005	34465004	34465003			
DATE SAMPLED:	11/14/92	11/12/92	11/12/92	11/12/92	11/12/92			
DATE ANALYZED:	11/27/92	11/25/92	11/25/92	11/25/92	11/25/92			
DILUTION FACTOR:	1.0	1.0	1.0	1.0	1.0			
VOLATILES -- METHOD 8240								
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	5 U	5 U	5 U	5 U		
Acetone	10	11 U	10 U	10 U	10 U	10 U		
Carbon Disulfide	5	5 U	5 U	5 U	5 U	5 U		
Trichlorofluoromethane	5	5 U	5 U	5 U	5 U	5 U		
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	5 U	5 U	5 U	5 U	5 U		
1,2-Dichloroethane	5	5 U	5 U	5 U	5 U	5 U		
2-Butanone	10	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		
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	5 U	5 U	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	5 U	5 U	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		
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	5 U	5 U	5 U	5 U	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		

KingsBay(TM5) [Site11] -93/209-PLR

A-4

PROJECT: NSB KINGS BAY, GEORGIA		SEMIVOLATILE AQUEOUS ANALYSES (ug/l)					Validation/Summary Table	
SAMPLE LOCATION:	KBA-16-1	KBA-16-2	KBA-16-2D	KBA-16-3	KBA-16-4			
LAB NUMBER:	23285007	23285006	23285010	23285005	23285003			
DATE SAMPLED:	11/12/92	11/12/92	11/12/92	11/12/92	11/12/92			
DATE EXTRACTED:	11/17/92	11/17/92	11/17/92	11/17/92	11/17/92			
DATE ANALYZED:	12/22/92	12/22/92	12/22/92	12/22/92	12/22/92			
DILUTION FACTOR:	1.0	1.0	1.0	1.0	1.0			
SEMIVOLATILES -- METHOD 8270								
ANALYTE	CRQL							
bis (2-Chloroethyl) Ether	10	10 U	10 U	10 U	10 U	10 U		
1,3-Dichlorobenzene	10	10 U	10 U	10 U	10 U	10 U		
1,4-Dichlorobenzene	10	10 U	10 U	10 U	10 U	10 U		
Benzyl Alcohol	10	10 U	10 U	10 U	10 U	10 U		
1,2-Dichlorobenzene	10	10 U	10 U	10 U	10 U	10 U		
bis (2-Chloroisopropyl) Ether	10	10 U	10 U	10 U	10 U	10 U		
N-Nitroso-Di-n-Propylamine	10	10 U	10 U	10 U	10 U	10 U		
Hexachloroethane	10	10 U	10 U	10 U	10 U	10 U		
Nitrobenzene	10	10 U	10 U	10 U	10 U	10 U		
Isophorone	10	10 U	10 U	10 U	10 U	10 U		
bis (2-Chloroethoxy) Methane	10	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		
Naphthalene	10	10 U	2 J	10 U	10 U	10 U		
4-Chloroaniline	10	10 U	10 U	10 U	10 U	10 U		
Hexachlorobutadiene	10	10 U	10 U	10 U	10 U	10 U		
2-Methylnaphthalene	10	10 U	10 U	10 U	10 U	10 U		
Hexachlorocyclopentadiene	10	10 U	10 U	10 U	10 U	10 U		
2-Chloronaphthalene	10	10 U	10 U	10 U	10 U	10 U		
2-Nitroaniline	50	50 U	50 U	50 U	50 U	50 U		
Dimethylphthalate	10	10 U	10 U	10 U	10 U	10 U		
Acenaphthylene	10	10 U	10 U	10 U	10 U	10 U		
2,6-Dinitrotoluene	10	10 U	10 U	10 U	10 U	10 U		
3-Nitroaniline	50	50 U	50 U	50 U	50 U	50 U		
Acenaphthene	10	10 U	10 U	10 U	10 U	10 U		
Dibenzofuran	10	10 U	10 U	10 U	10 U	10 U		
2,4-Dinitrotoluene	10	10 U	10 U	10 U	10 U	10 U		
Diethylphthalate	10	10 U	10 U	10 U	10 U	10 U		
4-Chlorophenyl-phenylether	10	10 U	10 U	10 U	10 U	10 U		
Fluorene	10	10 U	10 U	10 U	10 U	10 U		
4-Nitroaniline	50	50 U	50 U	50 U	50 U	50 U		
N-Nitrosodiphenylamine	10	10 U	10 U	10 U	10 U	10 U		
4-Bromophenyl-phenylether	10	10 U	10 U	10 U	10 U	10 U		
Hexachlorobenzene	10	10 U	10 U	10 U	10 U	10 U		
Phenanthrene	10	10 U	10 U	10 U	10 U	10 U		
Anthracene	10	10 U	10 U	10 U	10 U	10 U		
Di-n-Butylphthalate	10	10 U	10 U	10 U	10 U	10 U		
Fluoranthene	10	10 U	10 U	10 U	10 U	10 U		
Pyrene	10	10 U	10 U	10 U	10 U	10 U		
Butylbenzylphthalate	10	10 U	10 U	10 U	10 U	10 U		
3,3'-Dichlorobenzidine	20	20 U	20 U	20 U	20 U	20 U		
Benzo (a) Anthracene	10	10 U	10 U	10 U	10 U	10 U		
Chrysene	10	10 U	10 U	10 U	10 U	10 U		
bis (2-Ethylhexyl) Phthalate	10	10 U	4 J	3 J	10 U	10 U		
Di-n-Octyl Phthalate	10	10 U	10 U	10 U	10 U	10 U		
Benzo (b) Fluoranthene	10	10 U	10 U	10 U	10 U	10 U		
Benzo (k) Fluoranthene	10	10 U	10 U	10 U	10 U	10 U		
Benzo (a) Pyrene	10	10 U	10 U	10 U	10 U	10 U		
Indeno (1,2,3-cd) Pyrene	10	10 U	10 U	10 U	10 U	10 U		
Dibenz (a,h) Anthracene	10	10 U	10 U	10 U	10 U	10 U		
Benzo (g,h,i) Perylene	10	10 U	10 U	10 U	10 U	10 U		

PROJECT: NSB KINGS BAY, GEORGIA		PCB AQUEOUS ANALYSES (ug/l)						Validation/Summary Table	
SAMPLE LOCATION:	KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-3D	KBA-5-4	KBA-5-5	KBA-5-6		
LAB NUMBER:	23294002	23294003	23294004	23294005	23294009	23294010	23300005		
DATE SAMPLED:	11/13/92	11/13/92	11/13/92	11/13/92	11/13/92	11/13/92	11/14/92		
DATE EXTRACTED:	11/18/92	11/18/92	11/18/92	11/18/92	11/18/92	11/18/92	11/19/92		
DATE ANALYZED:	12/24/92	12/24/92	12/24/92	12/24/92	12/24/92	12/24/92	12/24/92		
DILUTION:	1.0	1.0	1.0	1.0	1.0	1.0	1.0		
POLYCHLORINATED BIPHENYLS (PCBs) -- METHOD 8080									
ANALYTE	CRQL								
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	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	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	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	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	0.50 U
Aroclor-1254	0.50	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Aroclor-1260	0.50	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U

PROJECT: NSB KINGS BAY, GEORGIA		PCB AQUEOUS ANALYSES (ug/l)						Validation/Summary Table	
SAMPLE LOCATION:	KBA-5-7								
LAB NUMBER:	23300002								
DATE SAMPLED:	11/14/92								
DATE EXTRACTED:	11/19/92								
DATE ANALYZED:	12/24/92								
DILUTION:	1.0								
POLYCHLORINATED BIPHENYLS (PCBs) -- METHOD 8080									
ANALYTE	CRQL								
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	0.50 U							
Aroclor-1260	1.0	0.50 U							

PROJECT: NSB KINGS BAY, GEORGIA		INORGANIC AQUEOUS ANALYSES (ug/l)					Validation/Summary Table	
SAMPLE LOCATION:	KBA-5-1	KBA-5-1F	KBA-5-2	KBA-5-2F	KBA-5-3	KBA-5-3F	KBA-5-3D	
LAB NUMBER:	23294002	23294011	23294003	23294012	23294004	23294006	23294005	
DATE SAMPLED:	11/13/92	11/13/92	11/13/92	11/13/92	11/13/92	11/13/92	11/13/92	
ANALYTE	CRQL							
Antimony	60	10.7 U	10.7 U	10.7 U	10.7 U	10.7 U	10.7 U	
Arsenic	10	4.0 J	2.7 J	13.3	11.1	7.9 J	4.8 J	8.0 J
Barium	200	78.2 J	59.0 J	42.6 J	29.9 J	70.8 J	38.6 J	72.2 J
Beryllium	5	0.42 J	0.38 J	0.29 J	0.30 J	0.24 J	0.22 U	0.22 U
Cadmium	5	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ
Chromium	10	4.2 J	2.9 U	8.1 J	2.9 U	8.5 J	2.9 U	8.9 J
Cobalt	50	3.3 U	3.3 U	5.0 J	4.3 J	3.4 J	4.9 J	3.3 U
Copper	25	16.6 J	2.3 U	7.3 J	10.9 J	9.1 J	2.7 J	7.3 J
Lead	3	3.6	1.4 U	4.3	1.4 U	2.3 J	1.4 U	2.4 J
Mercury	0.2	0.08 U	0.10 J	0.08 U	0.10 J	0.14 J	0.08 U	0.08 U
Nickel	40	5.3 UJ	5.3 UJ	10.9 J	5.5 J	12.6 J	8.2 J	5.3 UJ
Selenium	5	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Silver	10	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Thallium	10	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
Vanadium	50	4.1 J	2.6 U	9.6 J	5.3 J	8.2 J	2.6 U	7.8 J
Zinc	20	36.7	10.9 J	193	187	30.7	12.1 J	25.3
Cyanide	10	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U
Tin	200	12.7 U	12.7 U	12.7 U	12.7 U	12.7 U	12.7 U	12.7 U
Sulfide	100	100	100 U	100 U				
Total Dissolved Solids (mg/L)		159	---	320	---	201	---	128
Total Suspended Solids (mg/L)		36	---	1086	---	7	---	159

PROJECT: NSB KINGS BAY, GEORGIA		INORGANIC AQUEOUS ANALYSES (ug/l)					Validation/Summary Table	
SAMPLE LOCATION:	KBA-5-3DF	KBA-5-4	KBA-5-4F	KBA-5-5	KBA-5-5F	KBA-5-6	KBA-5-6F	
LAB NUMBER:	23294007	23294009	23294013	23294010	23294014	23300005	23300006	
DATE SAMPLED:	11/13/92	11/13/92	11/13/92	11/13/92	11/13/92	11/14/92	11/14/92	
ANALYTE	CRQL							
Antimony	60	10.7 U	12.1 J	10.7 U	10.7 U	10.7 U	10.7 UJ	10.7 UJ
Arsenic	10	4.2 J	4.0 J	1.0 U	13.7	10.3	2.8 J	1.0 U
Barium	200	35.4 J	67.4 J	30.6 J	51.0 J	28.7 J	90.1 J	28.5 J
Beryllium	5	0.22 U	0.22 U	0.22 U	0.68 J	0.22 U	0.40 J	0.22 U
Cadmium	5	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.0 UJ	3.6 J	3.0 U
Chromium	10	2.9 U	4.5 J	2.9 U	4.6 J	2.9 U	15.5	2.9 U
Cobalt	50	3.8 J	4.3 J	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Copper	25	4.2 J	11.2 J	2.3 U	16.3 J	3.0 J	2.3 U	2.3 U
Lead	3	1.4 U	1.8 J	1.4 U	1.4 U	1.4 U	3.7	2.1 J
Mercury	0.2	0.08 U	0.12 J	0.10 J	0.12 J	0.08 U	0.51	0.08 U
Nickel	40	7.9 J	5.3 UJ	5.3 UJ	8.8 J	5.3 UJ	6.5 J	5.3 U
Selenium	5	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Silver	10	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Thallium	10	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
Vanadium	50	2.6 U	3.9 J	2.6 U	4.1 J	2.6 U	13.5 J	2.6 U
Zinc	20	19.6 J	45.4	18.0 J	38.2	22.5	41.2	11.5 J
Cyanide	10	0.84 U	5.6 J	0.84 U	2.0 J	0.84 U	0.84 U	0.84 U
Tin	200	12.7 U	12.7 U	12.7 U	12.7 U	12.7 U	12.7 U	12.7 U
Sulfide	100	100 U	300	100 U	100 U	100 U	100 U	200
Total Dissolved Solids (mg/L)		---	694	---	228	---	251	---
Total Suspended Solids (mg/L)		---	111	---	78	---	330	---

PROJECT: NSB KINGS BAY, GEORGIA		INORGANIC AQUEOUS ANALYSES (ug/l)						Validation/Summary Table	
SAMPLE LOCATION:		KBA-5-7	KBA-5-7F	KBA-16-1	KBA-16-1F	KBA-16-2	KBA-16-2F	KBA-16-3	
LAB NUMBER:		23300002	23300003	23285007	23285014	23285006	23285011	23285005	
DATE SAMPLED:		11/14/92	11/14/92	11/12/92	11/12/92	11/12/92	11/12/92	11/12/92	
ANALYTE	CRQL								
Antimony	60	10.7 UJ	10.7 UJ	10.7 U	10.7 U	10.7 U	10.7 U	10.7 U	10.7 U
Arsenic	10	10.5	5.5 J	4.1 J	1.0 U	4.3 J	2.0 J	1.0 U	1.0 U
Barium	200	35.0 J	28.9 J	33.9 J	16.0 J	70.9 J	21.0 J	219	219
Beryllium	5	0.22 U	0.22 U	0.22 U	0.22 U	0.44 J	0.22 U	5.7	5.7
Cadmium	5	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Chromium	10	4.5 J	2.9 U	15.7	2.9 U	32.3	3.2 J	90.6	90.6
Cobalt	50	3.3 U	4.8 J	3.3 U	3.3 U	8.1 J	3.3 U	13.3 J	13.3 J
Copper	25	10.3 J	3.5 J	15.3 J	2.3 UJ	65.1 J	2.3 UJ	31.0 J	31.0 J
Lead	3	2.3 J	1.4 U	3.6	1.4 U	10.1	1.4 U	13.6	13.6
Mercury	0.2	0.08 U	0.08 U	0.08 U	0.08 U	0.09 J	0.08 U	0.18 J	0.18 J
Nickel	40	5.9 J	14.4 J	5.3 UJ	5.3 UJ	34.6 J	5.3 UJ	32.4 J	32.4 J
Selenium	5	2.1 U	2.1 U	2.5 J	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Silver	10	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Thallium	10	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
Vanadium	50	8.9 J	2.6 U	18.6 J	2.6 U	34.2 J	2.6 U	89.9	89.9
Zinc	20	23.2	12.0 J	25.6	9.6 U	96.4	9.6 U	110	110
Cyanide	10	1.1 J	1.2 J	0.84 U	0.84 U	0.84 U	0.84 U	1.2 J	1.2 J
Tin	200	12.7 U	12.7 U	12.7 U	12.7 U	12.7 U	12.7 U	12.7 U	12.7 U
Sulfide	100	100 U	100 U	200	200	400	400	100 U	100 U
Total Dissolved Solids (mg/L)		404	---	350	---	261	---	183	183
Total Suspended Solids (mg/L)		48	---	189	---	370	---	494	494

PROJECT: NSB KINGS BAY, GEORGIA		INORGANIC AQUEOUS ANALYSES (ug/l)			Validation/Summary Table		
SAMPLE LOCATION:		KBA-16-3F	KBA-16-4	KBA-16-4F			
LAB NUMBER:		23285013	23285003	23285004			
DATE SAMPLED:		11/12/92	11/12/92	11/12/92			
ANALYTE	CRQL						
Antimony	60	10.7 U	10.7 U	10.7 U			
Arsenic	10	6.2 J	1.6 J	1.0 U			
Barium	200	24.7 J	37.8 J	23.1 J			
Beryllium	5	0.22 U	0.22 U	0.22 U			
Cadmium	5	3.0 U	3.0 U	3.0 U			
Chromium	10	2.9 U	10.3	3.6 J			
Cobalt	50	3.3 U	3.3 U	3.3 U			
Copper	25	2.3 UJ	64.5 J	2.3 UJ			
Lead	3	1.4 U	3.8	1.4 U			
Mercury	0.2	0.08 U	0.08 U	0.08 U			
Nickel	40	5.3 UJ	40.1 J	5.3 UJ			
Selenium	5	2.1 U	2.1 U	2.1 U			
Silver	10	2.0 U	2.0 U	2.0 U			
Thallium	10	1.6 U	1.6 U	1.6 U			
Vanadium	50	3.0 J	10.7 J	5.7 J			
Zinc	20	9.6 U	84.1	9.6 U			
Cyanide	10	0.84 U	11.6	7.0 J			
Tin	200	12.7 U	12.7 U	12.7 U			
Sulfide	100	100 U	300	1400			
Total Dissolved Solids (mg/L)		---	181	---			
Total Suspended Solids (mg/L)		---	282	---			

Note: --- analysis not requested or performed  
KBA-XX-X unfiltered sample  
KBA-XX-XD duplicate, unfiltered sample  
KBA-XX-XF filtered sample  
KBA-XX-XDF duplicate, filtered sample

**TRIP BLANKS  
SOURCE WATER BLANKS  
SAMPLE EVENT NO. 5  
NOVEMBER 1992**



PROJECT: NSB KINGS BAY, GEORGIA		SEMIVOLATILE AQUEOUS ANALYSES (ug/l)			Validation/Summary Table	
SAMPLE LOCATION:		BS-29-ER	BS-13-FB	BS-15-FB		
LAB NUMBER:		23285002	23285008	23285009		
DATE SAMPLED:		11/12/92	11/12/92	11/12/92		
DATE EXTRACTED:		11/17/92	11/17/92	11/17/92		
DATE ANALYZED:		12/22/92	12/22/92	12/22/92		
DILUTION FACTOR:		1.0	1.0	1.0		
SEMIVOLATILES -- METHOD 8270						
ANALYTE	CRQL					
bis (2-Chloroethyl) Ether	10	10 U	10 U	10 U		
1,3- Dichlorobenzene	10	10 U	10 U	10 U		
1,4- Dichlorobenzene	10	10 U	10 U	10 U		
Benzyl Alcohol	10	10 U	10 U	10 U		
1,2- Dichlorobenzene	10	10 U	10 U	10 U		
bis (2- Chloroisopropyl) Ether	10	10 U	10 U	10 U		
N-Nitroso-Di-n-Propylamine	10	10 U	10 U	10 U		
Hexachloroethane	10	10 U	10 U	10 U		
Nitrobenzene	10	10 U	10 U	10 U		
Isophorone	10	10 U	10 U	10 U		
bis (2-Chloroethoxy) Methane	10	10 U	10 U	10 U		
1,2,4- Trichlorobenzene	10	10 U	10 U	10 U		
Naphthalene	10	10 U	10 U	10 U		
4-Chloroaniline	10	10 U	10 U	10 U		
Hexachlorobutadiene	10	10 U	10 U	10 U		
2-Methylnaphthalene	10	10 U	10 U	10 U		
Hexachlorocyclopentadiene	10	10 U	10 U	10 U		
2-Chloronaphthalene	10	10 U	10 U	10 U		
2-Nitroaniline	50	50 U	50 U	50 U		
Dimethylphthalate	10	10 U	10 U	10 U		
Acenaphthylene	10	10 U	10 U	10 U		
2,6-Dinitrotoluene	10	10 U	10 U	10 U		
3-Nitroaniline	50	50 U	50 U	50 U		
Acenaphthene	10	10 U	10 U	10 U		
Dibenzofuran	10	10 U	10 U	10 U		
2,4-Dinitrotoluene	10	10 U	10 U	10 U		
Diethylphthalate	10	10 U	10 U	10 U		
4-Chlorophenyl-phenylether	10	10 U	10 U	10 U		
Fluorene	10	10 U	10 U	10 U		
4-Nitroaniline	50	50 U	50 U	50 U		
N-Nitrosodiphenylamine	10	10 U	10 U	10 U		
4-Bromophenyl-phenylether	10	10 U	10 U	10 U		
Hexachlorobenzene	10	10 U	10 U	10 U		
Phenanthrene	10	10 U	10 U	10 U		
Anthracene	10	10 U	10 U	10 U		
Di-n-Butylphthalate	10	10 U	10 U	10 U		
Fluoranthene	10	10 U	10 U	10 U		
Pyrene	10	10 U	10 U	10 U		
Butylbenzylphthalate	10	10 U	10 U	10 U		
3,3'-Dichlorobenzidine	20	20 U	20 U	20 U		
Benzo (a) Anthracene	10	10 U	10 U	10 U		
Chrysene	10	10 U	10 U	10 U		
bis (2-Ethylhexyl) Phthalate	10	10 U	10 U	10 U		
Di-n-Octyl Phthalate	10	10 U	10 U	10 U		
Benzo (b) Fluoranthene	10	10 U	10 U	10 U		
Benzo (k) Fluoranthene	10	10 U	10 U	10 U		
Benzo (a) Pyrene	10	10 U	10 U	10 U		
Indeno (1,2,3-cd) Pyrene	10	10 U	10 U	10 U		
Dibenz (a,h) Anthracene	10	10 U	10 U	10 U		
Benzo (g,h,i) Perylene	10	10 U	10 U	10 U		

KingsBay(TMS) [Site1] - 93/209 .PLR

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PROJECT: NSB KINGS BAY, GEORGIA		PCB AQUEOUS ANALYSES (ug/l)				Validation/Summary Table	
SAMPLE LOCATION:	BS-30-ER	BS-31-ER	BS-13-FB	BS-12-FB			
LAB NUMBER:	23294008	23300001	23285008	23285009			
DATE SAMPLED:	11/13/92	11/14/92	11/12/92	11/12/92			
DATE EXTRACTED:	11/18/92	11/19/92	11/25/92	11/25/92			
DATE ANALYZED:	12/24/92	12/24/92	12/24/92	12/24/92			
DILUTION:	1.0	1.0	1.0	1.0			
POLYCHLORINATED BIPHENYLS (PCBs) -- METHOD 8080							
ANALYTE	CRQL						
Aroclor-1016	0.05	0.05 U	0.05 U	0.05 UJ	0.05 UJ		
Aroclor-1221	0.05	0.05 U	0.05 U	0.05 UJ	0.05 UJ		
Aroclor-1232	0.05	0.05 U	0.05 U	0.05 UJ	0.05 UJ		
Aroclor-1242	0.05	0.05 U	0.05 U	0.05 UJ	0.05 UJ		
Aroclor-1248	0.05	0.05 U	0.05 U	0.05 UJ	0.05 UJ		
Aroclor-1254	0.05	0.05 U	0.05 U	0.05 UJ	0.05 UJ		
Aroclor-1260	0.05	0.05 U	0.05 U	0.05 UJ	0.05 UJ		

KingsBay(TM5)Site11]-93/209.PLR

PROJECT: NSB KINGS BAY, GEORGIA		INORGANIC AQUEOUS ANALYSES (ug/l)					Validation/Summary Table	
SAMPLE LOCATION:	BS-29-ER	BS-30-ER	BS-31-ER	BS-13-FB	BS-14-FB	BS-15-FB		
LAB NUMBER:	23285002	22727003	23300001	23285008	23285012	23285009		
DATE SAMPLED:	11/12/92	11/13/92	11/14/92	11/12/92	11/12/92	11/12/92		
ANALYTE	CRQL							
Antimony	60	10.7 U	10.7 U	10.7 UJ	10.7 U	10.7 U	10.7 U	
Arsenic	10	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Barium	200	0.46 U	2.4 U	3.7 U	2.8 J	0.65 U	2.6 J	
Beryllium	5	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	
Cadmium	5	3.0 U	3.0 UJ	3.0 U	3.0 U	3.0 U	3.0 U	
Chromium	10	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	3.7 J	
Cobalt	50	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	
Copper	25	2.3 UJ	2.3 U	8.8 J	2.3 UJ	2.3 UJ	2.3 UJ	
Lead	3	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	
Mercury	0.2	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	
Nickel	40	5.3 UJ	5.3 UJ	5.3 U	5.3 UJ	5.3 UJ	5.3 UJ	
Selenium	5	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	
Silver	10	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	
Thallium	10	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	
Vanadium	50	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	
Zinc	20	9.6 U	21.0	12.6 J	9.6 U	9.6 U	10.1 J	
Cyanide	10	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	0.84 U	
Tin	200	12.7 U	12.7 U	12.7 U	12.7 U	12.7 U	12.7 U	
Sulfide	100	100 U	100 U	100 U	100 U	100 U	100 U	
Total Dissolved Solids (mg/L)		10 U	42	38	20	---	40	
Total Suspended Solids (mg/L)		4 U	4 U	4 U	4 U	---	4 U	

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**APPENDIX B  
ANALYTICAL DATA FOR  
GROUNDWATER  
SAMPLE EVENT NOs. 1, 2, 3, and 4  
FEBRUARY 1992  
MAY 1992  
JULY 1992  
SEPTEMBER 1992**

Table B-1 Groundwater Sampling Event No. 1, Summary of Laboratory Analysis of Groundwater Samples Collected from Site 5' - February 1992, RFI/SI Technical Memorandum No. 3, 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
<b>APPENDIX IX VOCs (<math>\mu\text{g/L}</math>)</b>									
Acetone	10	72	12 U	10 U	10 U	12 U	12 U	14 U	10 U
Carbon Disulfide <sup>1</sup>	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 <sup>2</sup>	10	10 U	3 J	10 U	10 U	10 U	3 J	10 U	10 U
Ethylbenzene <sup>1</sup>	5	5 U	5 U	5 U	5 U	5 U	1 J	5 U	5 U
Xylene (total) <sup>1</sup>	5	5 U	4 J	5 U	5 U	5 U	6	5 U	5 U
<b>APPENDIX IX Inorganics (<math>\mu\text{g/L}</math>)</b>									
Antimony <sup>2</sup>	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 <sup>2</sup>	200	742	459	161 J	601	588	332	640	748
Beryllium <sup>1</sup>	5	4.2 J	2.7 J	0.92 J	3.1 J	2.9 J	3.0 J	5.1	6.1
Cadmium <sup>1</sup>	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 <sup>2</sup>	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
Lead	5	30.2	23.2	7.2	22.0	25.2	23.0	32.0	43.0
Mercury	0.2	0.16 U	0.16 U	0.40	0.16 U				
Nickel <sup>1</sup>	40	49.0	50.3	79.8	40.2 J	42.7 J	77.2	59.8	84.4

See notes at end of table.

Kings Bay (TMS) Sites 161-93/210, PLR  
 Table B-1 (continued) Groundwater Sampling Event No. 1, Summary of Laboratory Analysis of Groundwater Samples Collected from Site 5<sup>1</sup> - February 1992, RFI/SI Technical Memorandum No. 3, NSB Kings Bay

Compounds Detected	Monitoring Well Number								
Selenium <sup>2</sup>	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 <sup>2</sup>	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 <sup>2</sup>	50	117	80.6	24.4 J	84.7	82.6	81.8	138	183
Zinc <sup>4</sup>	20	168 J	322 J	100 J	153 J	177 J	200 J	235 J	260 J
Cyanide <sup>2</sup>	10	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.9 J	5.6 J
Sulfide	100	300	300	200	300	400	200	2100	300

B-2 Notes:

CRQL = Contract Required Quantitation Limit  
 U = not detected above or below CRQL

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

Data Qualifiers

<sup>2</sup> Values flagged J as estimated because concentrations are less than the CRQL.

<sup>3</sup> Values flagged J as estimated because preparation blank exhibited negative bias for nickel.

<sup>4</sup> 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 16' - February 1992, 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
<b>APPENDIX IX VOCs (<math>\mu\text{g/L}</math>)</b>					
4-Methyl-2-Pentanone <sup>2</sup>	10	10 U	3 J	10 U	10 U
Ethylbenzene <sup>2</sup>	5	5 U	2 J	5 U	5 U
Xylene (total) <sup>1</sup>	5	5 U	3 J	5 U	5 U
<b>APPENDIX IX Inorganics (<math>\mu\text{g/L}</math>)</b>					
Antimony <sup>2</sup>	60	18.5 J	13.3 J	11.4 J	10.9 U
Arsenic <sup>2</sup>	10	29.9	19.3	25.8	4.9 J
Barium <sup>2</sup>	200	171 J	478	519	386
Beryllium <sup>2</sup>	5	2.5 J	6.2	13.1	2.4 J
Chromium	10	84.6	256	194	34.0
Cobalt <sup>2</sup>	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

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

Data Qualifiers

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

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

Table B-3 Summary of Laboratory Analysis of Groundwater Samples Collected from Site 5<sup>1</sup> - May 1992

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
<b>APPENDIX IX SVOCs (µg/l)</b>									
bis(2-Ethylhexyl)-Phthalate <sup>2</sup>	10	10 U	2 J	10 U	10 U	18	10 U	10 U	10 U
<b>APPENDIX IX Inorganics (µg/l)</b>									
Arsenic <sup>3</sup>	10	10.5 J	20.0 J	28.5	12.5	22.5 J	24.0 J	3.2 J	14.0 J
Barium <sup>2</sup>	200	417	181 J	366	274	187 J	187 J	208	203
Beryllium <sup>2</sup>	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 <sup>2,4</sup>	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 <sup>2</sup>	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 <sup>2</sup>	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 <sup>2,4</sup>	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 <sup>2</sup>	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 <sup>2</sup>	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 <sup>2,4</sup>	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
Cyanide <sup>2</sup>	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

<sup>1</sup> No Appendix IX VOCs, pesticides, PCBs, herbicides, dioxins, or furans were detected in groundwater samples.**Data Qualifiers**<sup>2</sup> Values flagged J as estimated because concentrations are less than the CRQL.<sup>3</sup> Quantitation limits flagged UJ as estimated and values flagged J as estimated due to low matrix spike recovery for arsenic and selenium.<sup>4</sup> Values flagged J as estimated because the preparation blank exhibited negative bias for cadmium, nickel, and vanadium.

Table B-4 Summary of Laboratory Analysis of Groundwater Samples Collected from Site 16<sup>1</sup> - May 1992, RFI/SI Technical Memorandum No. 3, NSB Kings Bay

Compounds Detected	Monitoring Well Number				
	CRQL	KBA-16-1	KBA-16-2	KBA-16-3	KBA-16-4
<b>APPENDIX IX SVOCs (µg/L)</b>					
Di-n-Butylphthalate <sup>2</sup>	10	10 U	10 U	2 J	10 U
bis(2-Ethylhexyl)Phthalate	10	10 U	28	75	10 U
<b>APPENDIX IX Inorganics (µg/L)</b>					
Antimony <sup>2</sup>	60	11.0 U	11.0 U	11.0 U	11.3 J
Arsenic <sup>2,3</sup>	10	8.5 J	19.5	10.2 J	1.5 J
Barium <sup>2</sup>	200	70.8 J	82.2 J	119 J	37.1 J
Beryllium <sup>2</sup>	5	1.1 J	1.7 J	4.7 J	0.80 U
Cadmium <sup>2,4</sup>	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 <sup>2</sup>	50	7.8 U	9.1 J	7.8 U	7.8 U
Copper <sup>2</sup>	25	9.2 J	3.8 J	5.5 J	4.2 J
Lead <sup>2</sup>	5	7.6	11.5	4.3 J	2.5 U
Nickel <sup>4,5</sup>	40	7.8 UJ	19.4 J	7.8 U	7.8 U
Selenium <sup>2</sup>	5	10.6	1.6 J	1.1 J	0.88 J
Silver <sup>2</sup>	10	1.4 J	1.4 U	1.4 U	1.4 U
Thallium <sup>2</sup>	10	0.90 J	0.80 U	0.80 U	0.80 U
Vanadium <sup>2</sup>	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 <sup>2</sup>	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

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

Data Qualifiers

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

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

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

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

Table B-5 Summary of Laboratory Analysis of Groundwater Samples Collected from Site 5<sup>1</sup> - July 1992

Compounds Detected		CRQL	Monitoring Well Number								
			KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-3D	KBA-5-4	KBA-5-5	KBA-5-5D	KBA-5-6	KBA-5-7
<b>APPENDIX IX Inorganics (µg/l)</b>											
Arsenic <sup>3</sup>	non-filtered	10	5.1 J	21.4	6.7 J	5.8 J	5.9 J	37.0	---	6.3 J	135
	filtered		1.6 J	18.4	2.8 J	---	5.2 J	2.6 J	8.3 J	3.0 J	2.7 J
Barium <sup>2</sup>	non-filtered	200	132 J	115 J	92.8 J	82.6 J	132 J	207	---	131 J	1080
	filtered		62.2 J	15.9 U	46.1 J	---	23.2 U	51.8 J	22.9 U	30.3 J	32.0 J
Beryllium <sup>2,3</sup>	non-filtered	5	0.48 J	0.41 J	0.20 U	0.26 J	0.41 J	1.7 J	---	0.56 J	8.2
	filtered		0.20 U	0.20 U	0.20 U	---	0.24 UJ	0.24 UJ	0.24 UJ	0.24 UJ	0.24 UJ
Cadmium <sup>2</sup>	non-filtered	5	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	---	2.7 U	27.4
	filtered		3.1 J	2.7 U	2.7 U	---	2.7 U	2.7 U	2.7 U	3.0 J	2.7 U
Chromium <sup>2,3</sup>	non-filtered	10	13.0 J	21.2 J	13.5 J	12.9 J	18.4	46.4	---	23.0	271
	filtered		1.9 UJ	4.2 J	1.9 UJ	---	1.9 U	1.9 U	1.9 U	1.9 J	1.9 U
Cobalt <sup>2,3</sup>	non-filtered	50	4.8 J	4.0 J	3.3 J	1.6 U	1.6 UJ	10.8 J	---	1.6 UJ	62.6 J
	filtered		2.1 J	3.5 J	2.5 J	---	1.6 UJ	1.6 UJ	1.6 UJ	1.6 UJ	1.6 UJ
Copper <sup>2,4</sup>	non-filtered	25	26.2 J	37.3 J	61.8 J	89.9 J	76.5	38.2	---	19.1 J	249
	filtered		6.3 UJ	15.1 J	6.5 UJ	---	2.7 J	1.8 J	13.1 J	19.1 J	19.1 J
Lead <sup>2,3</sup>	non-filtered	5	9.1 J	10.0 J	6.1 J	14.7 J	7.0 U	36.9	---	10.7 U	68.9
	filtered		4.0 J	2.0 J	0.96 J	---	2.1 U	1.8 U	5.4 U	1.8 U	1.8 U
Mercury	non-filtered	0.2	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.27	---	0.16 U	0.41
	filtered		0.16 U	0.16 U	0.16 U	---	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
Nickel <sup>2</sup>	non-filtered	40	15.4 J	10.7 U	109	30.2 J	42.6	56.9	---	25.0 J	128
	filtered		10.7 U	10.7 U	10.7 U	---	10.7 U	10.7 U	10.7 U	10.7 U	10.7 U
Selenium <sup>2</sup>	non-filtered	5	1.9 U	2.4 J	1.9 U	1.9 U	1.9 U	1.9 U	---	1.9 U	1.9 U
	filtered		1.9 U	1.9 U	1.9 U	---	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U
Thallium <sup>2</sup>	non-filtered	10	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	3.0 J	---	2.1 U	3.4 J
	filtered		2.1 U	2.1 U	2.1 U	---	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Vanadium <sup>2</sup>	non-filtered	50	13.6 J	20.6 J	12.7 J	9.2 J	12.1 J	42.1 J	---	18.4 J	251
	filtered		1.3 U	4.9 J	1.6 J	---	1.3 U	1.9 J	1.3 U	1.5 J	1.3 U

See notes at end of table.

KingsBay(TMS) [Sites5&16]-93/210.PLR

B-6

Table B-5 (continued) Summary of Laboratory Analysis of Groundwater Samples Collected from Site 5<sup>1</sup>

Compounds Detected	CRQL	Monitoring Well Number									
		KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-3D	KBA-5-4	KBA-5-5	KBA-5-5D	KBA-5-6	KBA-5-7	
<b>APPENDIX IX Inorganics (µg/l)</b>											
Zinc <sup>2</sup>	non-filtered	20	85.6 J	162 J	199 J	123 J	129	135	---	68.8	519
	filtered		20.5 J	132 J	26.6 J	---	20.0	30.8	23.9	27.2	40.4
Sulfide	non-filtered	100	200	200	100 U	200	300	300	---	300	300
	filtered		100 U	100 U	100 U	---	100 U	200	200	200	100 U
<b>PHYSICAL PARAMETERS</b>											
Total Solids (mg/l)			413	658	256	312	834	1557	---	471	3278
TSS (mg/l)			292	464	79	152	294	1450	---	355	2990
% TSS			71	71	31	49	35	93	---	75	91

**Notes:**

CRQL = Contract Required Quantitation Limit

TSS = total suspended solids

U = not detected above or below CRQL

--- = Analysis not required/performed

<sup>1</sup> Groundwater samples were analyzed for VOCs, PCBs, and inorganic analytes only. No VOCs or PCBs were detected in groundwater samples.Data Qualifiers<sup>2</sup> Values flagged J as estimated because concentrations are less than the CRQL.<sup>3</sup> Values flagged J and UJ as estimated because the preparation blank exhibited negative bias for beryllium, chromium, and cobalt.<sup>4</sup> Values flagged J and UJ as estimated because duplicate analysis for copper and zinc exceeded QC limits.<sup>5</sup> Values flagged J as estimated because matrix spike recovery for lead was outside QC limits.

Table B-6 Summary of Laboratory Analysis of Groundwater Samples Collected from Site 16<sup>1</sup> - July 1992

Compounds Detected	CRQL	Monitoring Well Number					
		KBA-16-1	KBA-16-2	KBA-16-2D	KBA-16-3	KBA-16-4	
<b>APPENDIX IX VOCs (µg/l)</b>							
Toluene	5	5 U	5 U	---	5	5 U	
<b>APPENDIX IX SVOCs (µg/l)</b>							
bis(2-Ethylhexyl) Phthalate <sup>2</sup>	10	10 U	3 J	6 J	7 J	3 J	
<b>APPENDIX IX Inorganics (µg/l)</b>							
Arsenic <sup>2,3</sup>	non-filtered	10	4.4 J	21.4 J	---	8.3 J	3.5 J
	filtered		1.1 J	3.2 J	---	6.2 J	1.00 UJ
Barium <sup>2</sup>	non-filtered	200	35.4 J	74.2 J	---	83.3 J	38.4 J
	filtered		18.2 J	17.4 J	---	19.5 J	24.9 J
Beryllium <sup>2</sup>	non-filtered	5	0.24 U	0.64 J	---	1.5 J	0.24 U
	filtered <sup>2a</sup>		0.24 U	0.24 U	---	0.24 U	0.24 U
Cadmium <sup>2</sup>	non-filtered	5	3.4 J	2.7 U	---	2.7 U	2.7 U
	filtered		2.7 U	2.7 U	---	2.7 U	2.7 U
Chromium	non-filtered	10	16.4	40.7	---	31.2	11.3 U
	filtered		4.1 U	4.0 U	---	4.7 U	4.0 U
Copper <sup>2</sup>	non-filtered	25	23.9 J	30.4	---	82.8	14.6 U
	filtered		18.6 J	24.8 J	---	15.8 U	11.8 U
Lead <sup>2,3</sup>	non-filtered	5	12.5 J	14.9 J	---	6.2 J	5.2 J
	filtered		1.4 J	0.94 UJ	---	0.94 UJ	1.0 J
Nickel <sup>2</sup>	non-filtered	40	10.7 U	24.3 J	---	274	10.9 J
	filtered		10.7 U	10.7 U	---	10.7 U	10.7 U
Selenium <sup>2</sup>	non-filtered	5	2.1 J	2.2 J	---	1.9 U	1.9 U
	filtered		1.9 U	1.9 U	---	1.9 U	1.9 U
Silver <sup>2</sup>	non-filtered	10	1.5 U	1.6 J	---	1.5 U	1.5 U
	filtered		1.5 J	1.5 J	---	1.5 U	1.5 U
Vanadium <sup>2</sup>	non-filtered	50	16.4 J	40.7 J	---	28.1 J	10.6 J
	filtered		2.4 J	2.9 J	---	5.3 J	5.7 J
Zinc	non-filtered	20	31.3 U	77.0	---	268	32.6 U
	filtered		55.5 U	41.7 U	---	31.6 U	35.2 U
Sulfide	non-filtered	100	200	500	---	200	400
	filtered		300	100 U	---	300	500
<b>PHYSICAL PARAMETERS</b>							
Total Solids (mg/l)			734	1016	---	606	830
TSS (mg/l)			304	716	---	326	171
% TSS			41	70	---	54	21

**Notes:**

CRQL = Contract Required Quantitation Limit

U = not detected above or below CRQL

--- = Analysis not required/performed

TSS = total suspended solids

Data Qualifiers

<sup>1</sup> Groundwater samples were analyzed for VOCs, SVOCs, and inorganic constituents only.

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

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

Table B-7 Summary of Compounds Detected in Groundwater Samples Collected from Site 5<sup>1</sup> - September 1992

Compounds Detected		Monitoring Well Number									
		CRQL	KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-3D	KBA-5-4	KBA-5-5	KBA-5-5D	KBA-5-6	KBA-5-7
<b>APPENDIX IX Inorganics (µg/l)</b>											
Antimony <sup>2</sup>	unfiltered	60	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U	17.0 J	-----	12.4 U	12.4 U
	filtered		12.4 U	12.4 U	12.4 U	-----	12.4 U	12.4 U	12.4 U	12.4 U	12.4 U
Arsenic <sup>2</sup>	unfiltered	10	5.5 J	5.3 J	10.4	7.6 J	3.9 J	9.9 J	-----	7.5 J	8.3 J
	filtered		1.0 J	3.3 J	1.7 J	-----	1.0 U	2.3 J	2.3 J	1.5 J	2.3 J
Barium <sup>2</sup>	unfiltered	200	146 J	124 J	124 J	119 J	53.4 J	93.6 J	-----	180 J	82.1 J
	filtered		64.2 U	109 U	49.6 U	-----	36.6 U	29.4 U	28.4 U	28.7 U	38.3 U
Beryllium <sup>2</sup>	unfiltered	5	0.76 J	0.89 J	1.0 J	0.66 J	0.24 U	0.72 J	-----	1.6 J	0.68 J
	filtered		0.31 U	0.74 U	0.24 U	-----	0.26 U	0.24 U	0.27 U	0.24 U	0.24 U
Cadmium <sup>2</sup>	unfiltered	5	2.7 U	2.7 U	2.7 U	2.7 U	4.1 J	2.7 U	-----	4.3 J	2.7 U
	filtered		2.7 U	2.7 U	2.7 U	-----	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
Chromium <sup>2</sup>	unfiltered	10	16.8	4.3 J	24.6	17.2	5.6 J	21.6	-----	44.5	15.7
	filtered		2.0 J	2.7 J	1.9 U	-----	1.9 U	1.9 U	4.2 J	2.0 J	5.3 J
Cobalt <sup>2</sup>	unfiltered	50	5.5 J	6.8 J	7.2 J	4.8 J	5.6 J	6.4 J	-----	11.0 J	3.2 J
	filtered		2.1 U	6.6 U	1.6 U	-----	5.4 U	1.6 U	1.6 U	3.2 U	1.6 U
Copper <sup>2</sup>	unfiltered	25	17.6 J	7.4 J	14.9 J	18.7 J	4.5 J	14.5 J	-----	29.2	4.7 J
	filtered		4.8 J	10.1 J	5.0 J	-----	6.8 J	1.8 U	1.8 U	1.8 U	1.8 U
Lead <sup>2</sup>	unfiltered	5	5.3 J	2.4 J	5.2 J	4.7 J	2.4 J	9.6	-----	14.5	7.6
	filtered		1.4 U	7.2 J	3.1 J	-----	3.2 J	2.2 U	1.6 U	1.8 U	1.0 U
Mercury	unfiltered	0.2	0.49	0.49	0.37	0.26	0.37	0.26 U	-----	0.42 U	0.38 U
	filtered		0.37	0.03 J	0.61	-----	0.49	0.14 U	0.14 U	0.26 U	0.14 U
Nickel <sup>4</sup>	unfiltered	40	18.1 U	13.0 U	20.4 U	15.1 U	15.1 U	10.8 J	-----	25.1 J	10.7 U
	filtered		10.7 U	14.8 U	10.7 U	-----	10.7 U	10.7 U	10.7 U	10.7 U	10.7 U
Silver <sup>2</sup>	unfiltered	5	1.6 J	1.5 U	1.5 U	1.5 U	1.6 J	1.5 U	-----	4.5 J	3.0 J
	filtered		1.5 U	1.5 U	1.5 U	-----	2.7 J	1.5 U	1.5 U	1.6 J	1.5 U

See notes at end of table.

KingsBay(TMS) [Site5&16]-93/210.PLR

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Table B-7 (continued) Summary of Compounds Detected in Groundwater Samples Collected from Site 5 - September 1992

Compounds Detected		Monitoring Well Number									
		CRQL	KBA-5-1	KBA-5-2	KBA-5-3	KBA-5-3D	KBA-5-4	KBA-5-5	KBA-5-5D	KBA-5-6	KBA-5-7
<b>APPENDIX IX Inorganics (µg/l)</b>											
Cyanide <sup>1</sup>	unfiltered	10	2.2 U	2.2 U	2.2 U	2.2 U	7.4 J	2.2 UJ	-----	3.6 J	2.2 UJ
	filtered		2.2 U	2.2 U	2.2 U	-----	2.2 U	3.8 J	2.2 UJ	2.2 UJ	2.2 UJ
Vanadium <sup>2</sup>	unfiltered	50	17.6 J	7.8 U	23.1 J	15.7 J	5.9 U	18.8 J	-----	32.7 J	13.0 J
	filtered		2.5 U	4.4 U	1.3 U	-----	3.8 U	1.3 U	1.3 U	1.3 U	1.3 U
Zinc <sup>4</sup>	unfiltered	20	50.2 J	78.1 J	54.5 J	48.4 J	39.9 J	45.2	-----	66.9	28.8
	filtered		14.6 J	89.4 J	12.4 J	-----	33.2 J	14.4 J	12.7 J	16.4 J	10.0 J
Sulfide	unfiltered	100	100	300	200	200	200	200	-----	200	300
	filtered		100	300	100 U	-----	100 U	100 U	100 U	200	100 U
<b>PHYSICAL PARAMETERS</b>											
Total Solids (mg/l)			515	314	517	488	847	405	-----	694	379
TDS (mg/l)			225	290	214	254	763	102	-----	122	212
TSS (mg/l)			290	24	303	234	84	303	-----	572	167
% TSS			56	8	59	48	10	75	-----	82	44

**Notes:**

CRQL = Contract Required Quantitation Limit

TSS = total suspended solids

TDS = total dissolved solids

U = not detected above or below CRQL

--- = Analysis not required/performed

<sup>1</sup> Groundwater samples were analyzed for VOCs, PCBs, and inorganic analytes only. No VOCs or PCBs were detected in groundwater samples.**Data Qualifiers**<sup>2</sup> Values flagged J as estimated because concentrations are less than the CRQL.<sup>3</sup> Values flagged J and UJ as estimated because matrix spike recovery for lead was below QC limits.<sup>4</sup> Values flagged J as estimated because matrix spike recovery for nickel and zinc was above QC limits.<sup>5</sup> Values flagged J as estimated because matrix spike recovery for cyanide was outside QC limits.

Table B-8 Summary of Compounds Detected in Groundwater Samples Collected from Site 16<sup>1</sup> - September 1992

Compounds Detected	CRQL	Monitoring Well Number					
		KBA-16-1	KBA-16-2	KBA-16-2D	KBA-16-3	KBA-16-4	
<b>APPENDIX IX SVOCs (µg/l)</b>							
Naphthalene <sup>2</sup>	10	10 UJ	1 J	10 U	10 UJ	10 UJ	
bis(2-Ethylhexyl)Phthalate <sup>2</sup>	10	10 UJ	10 UJ	1 J	10 UJ	10 UJ	
<b>APPENDIX IX Inorganics (µg/L)</b>							
Arsenic <sup>3</sup>	unfiltered	10	12.1	23.4	-----	63.2	5.4 J
	filtered		2.4 J	5.1 J	-----	4.2 J	1.0 U
Barium <sup>4</sup>	unfiltered	200	82.8 J	83.6 J	-----	538	109 J
	filtered		15.1 U	17.4 U	-----	1.4 U	26.8 U
Beryllium <sup>5</sup>	unfiltered	5	1.4 J	1.1 J	-----	15.9	2.0 J
	filtered		0.24 U	0.24 U	-----	0.24 U	0.24 U
Chromium <sup>6</sup>	unfiltered	10	38.6	41.6	-----	205	46.5
	filtered		1.9 U	3.5 J	-----	1.9 U	6.2 J
Copper <sup>7</sup>	unfiltered	25	53.4	5.9 J	-----	35.4	32.5
	filtered		1.8 U	1.8 U	-----	1.8 U	2.4 J
Cobalt <sup>8</sup>	unfiltered	50	6.7 J	12.0 J	-----	39.0 J	5.0 J
	filtered		1.6 U	1.6 U	-----	1.6 U	1.6 U
Lead	unfiltered	5	16.9	17.6	-----	40.5	13.4
	filtered		1.5 U	1.6 U	-----	0.71 U	1.1 U
Mercury	unfiltered	0.2	0.34 U	0.34 U	-----	0.80	0.42 U
	filtered		0.30 U	0.14 U	-----	0.14 U	0.14 U
Nickel <sup>9</sup>	unfiltered	40	20.2 J	30.6 J	-----	66.2	30.2 J
	filtered		10.7 U	10.7 U	-----	10.7 U	12.5 J
Silver <sup>10</sup>	unfiltered	10	3.6 J	1.5 U	-----	1.5 U	1.9 J
	filtered		1.5 U	1.5 U	-----	1.5 U	1.5 J
Vanadium <sup>11</sup>	unfiltered	50	51.2	44.1 J	-----	199	40.0 J
	filtered		1.9 U	2.2 U	-----	1.3 U	7.4 U
Zinc	unfiltered	20	39.3	61.0	-----	210	42.5
	filtered		10.0 J	7.6 U	-----	22.9	8.6 J
Cyanide <sup>4</sup>	unfiltered	10	2.2 UJ	2.2 UJ	-----	2.2 UJ	11.0 UJ
	filtered		3.7 J	4.0 J	-----	2.2 UJ	11.0 UJ
Sulfide	unfiltered	100	200	200	-----	300	500
	filtered		100 U	300	-----	100 U	500

See notes at end of table.

Table B-8 (continued) Summary of Compounds Detected in Groundwater Samples Collected from Site 16<sup>1</sup>

Compounds Detected	Monitoring Well Number					
	CRQL	KBA-16-1	KBA-16-2	KBA-16-2D	KBA-16-3	KBA-16-4
<b>PHYSICAL PARAMETERS</b>						
Total Solids (mg/l)		869	1104	-----	5150	1203
TDS		419	389	-----	630	623
TSS (mg/l)		450	715	-----	4520	580
% TSS		52	65	-----	88	48

**Notes:**

CRQL = Contract Required Quantitation Limit

U = not detected above or below CRQL

--- = Analysis not required/performed

TDS = total dissolved solids

TSS = total suspended solids

Data Qualifiers

<sup>1</sup> Groundwater samples were analyzed for VOCs, SVOCs, and inorganic constituents only. No VOCs were detected in groundwater samples.

<sup>2</sup> Sample values and quantitation limits flagged J and UJ as estimated due to low surrogate recoveries.

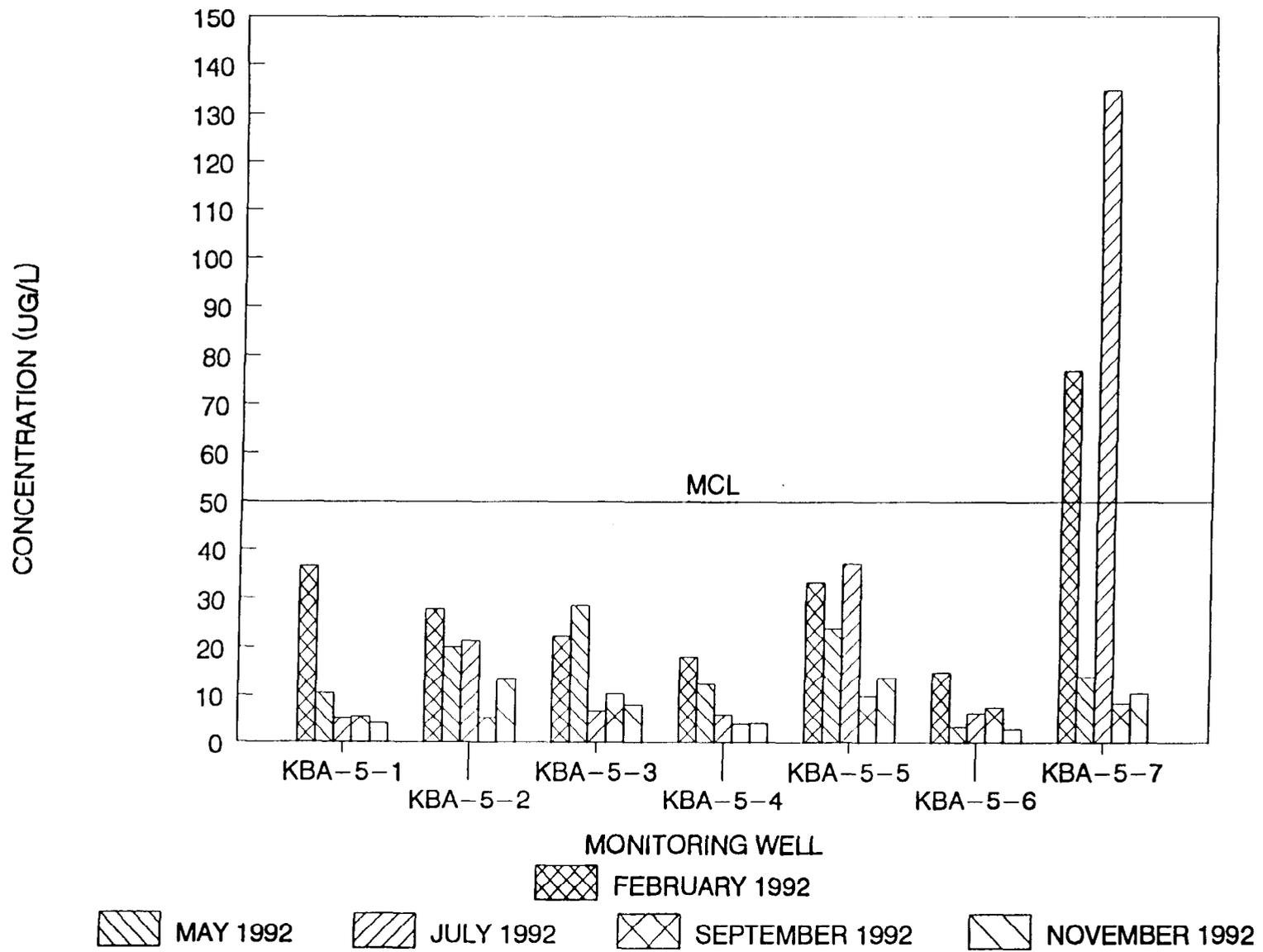
<sup>3</sup> Values flagged J as estimated because concentrations are less than the CRQL.

<sup>4</sup> Sample values and quantitation limits flagged J and UJ as estimated because duplicate analysis for cyanide was outside QC limits.

**APPENDIX C  
BAR-CHART GRAPHICS  
OF GROUNDWATER  
INORGANIC DATA**

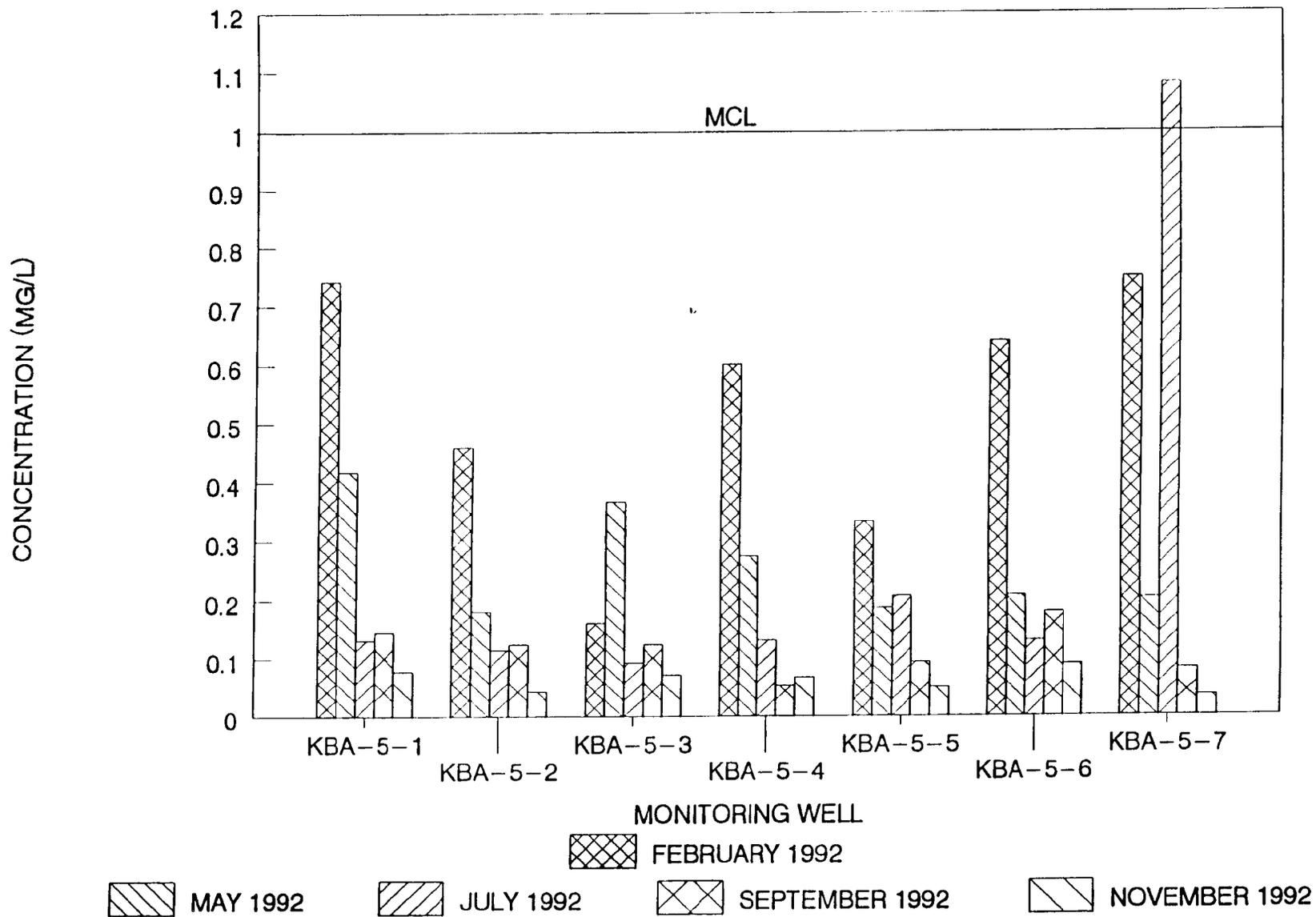
# NSB KINGS BAY, GEORGIA

## SITE 5 - ARSENIC IN GROUNDWATER



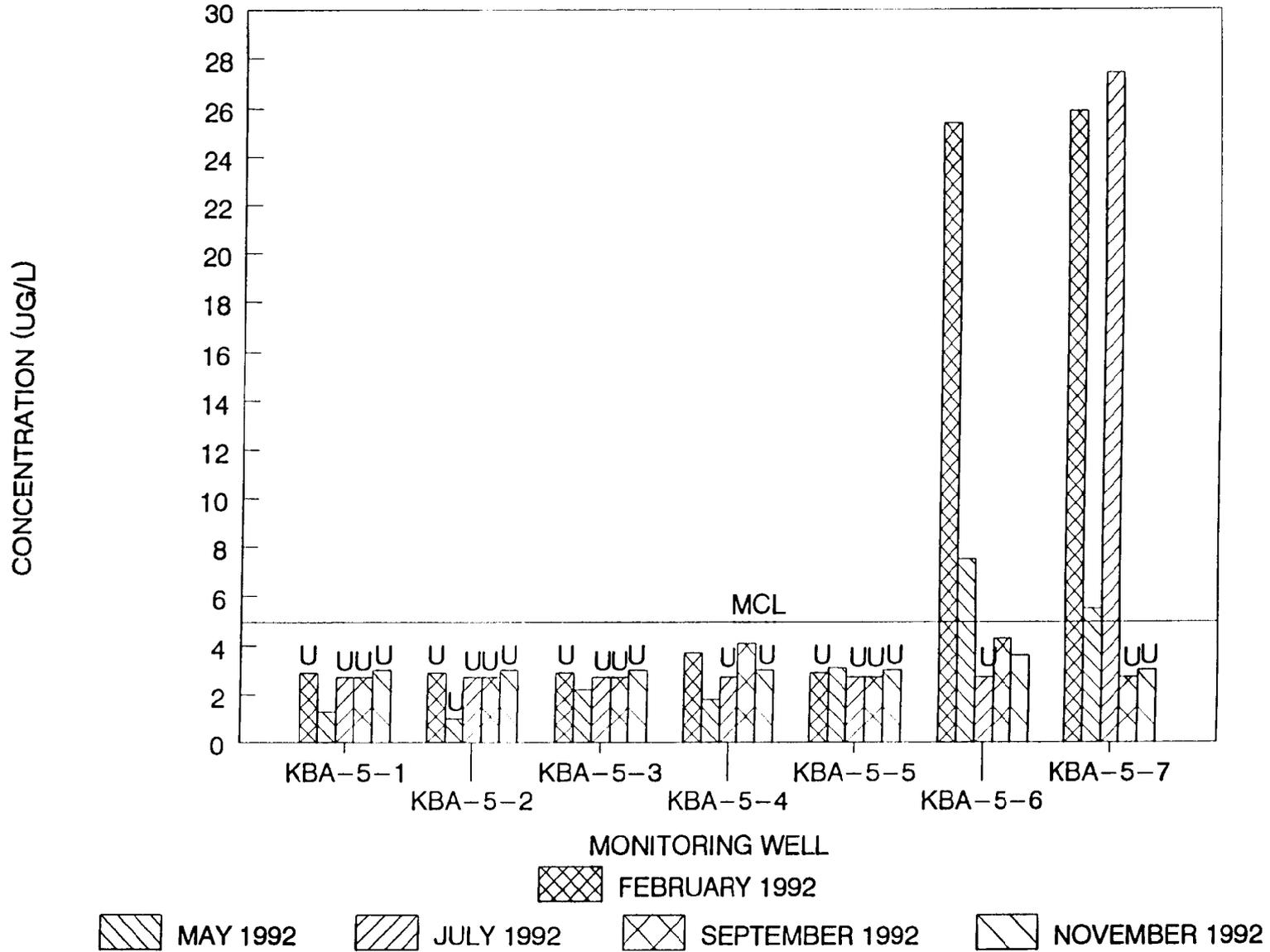
## NSB KINGS BAY, GEORGIA

### SITE 5 – BARIUM IN GROUNDWATER

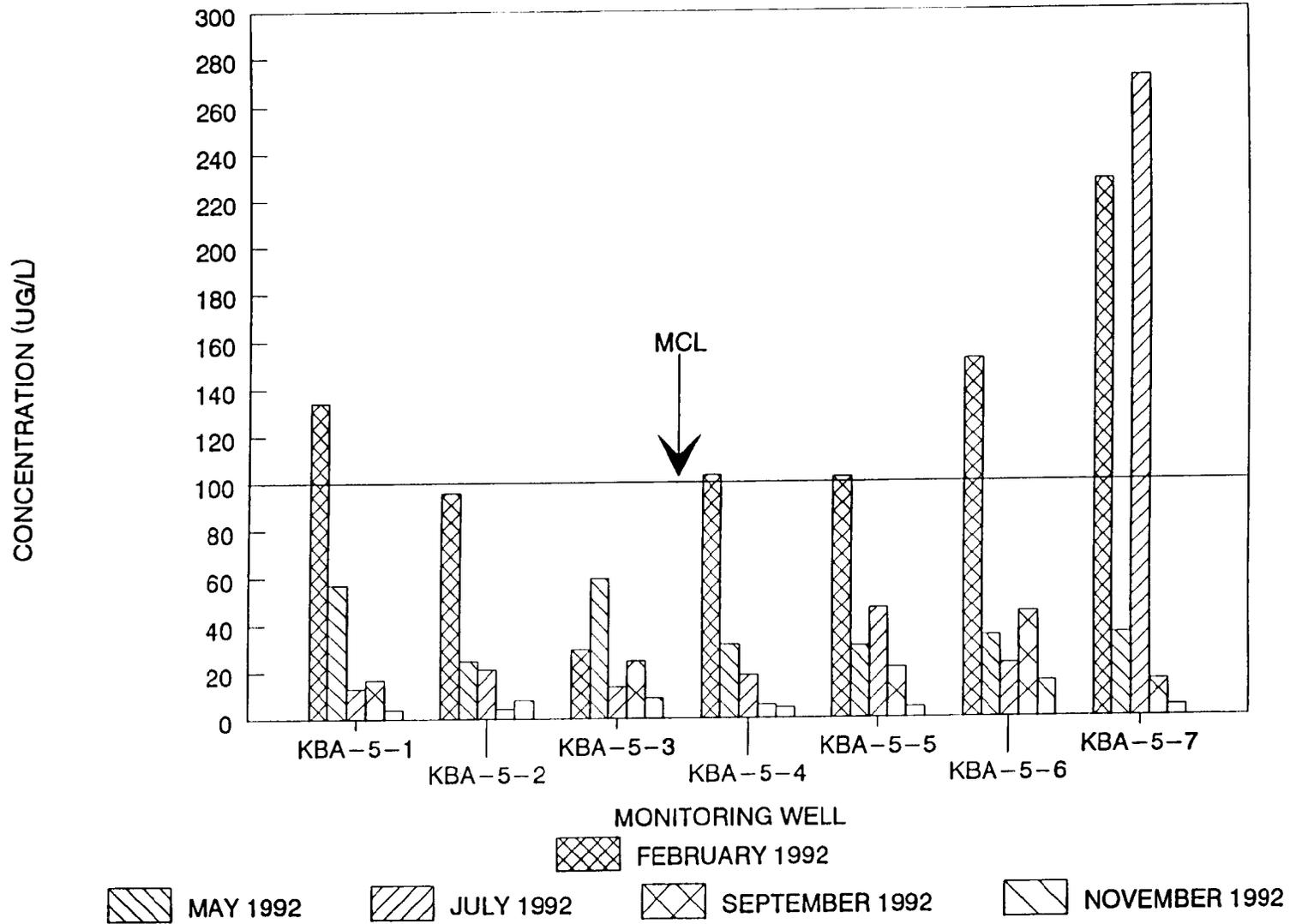


# NSB KINGS BAY, GEORGIA

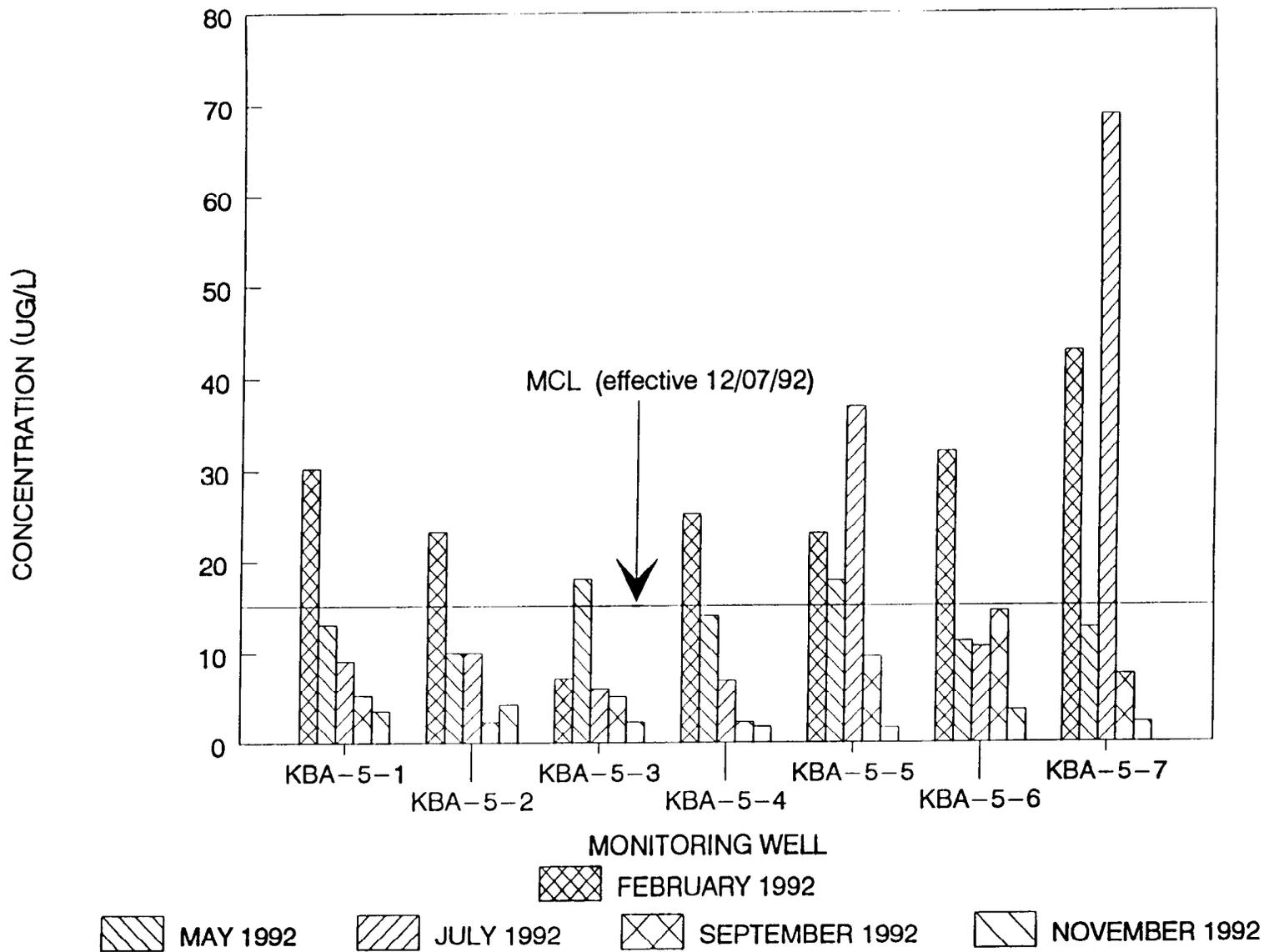
## SITE 5 - CADMIUM IN GROUNDWATER



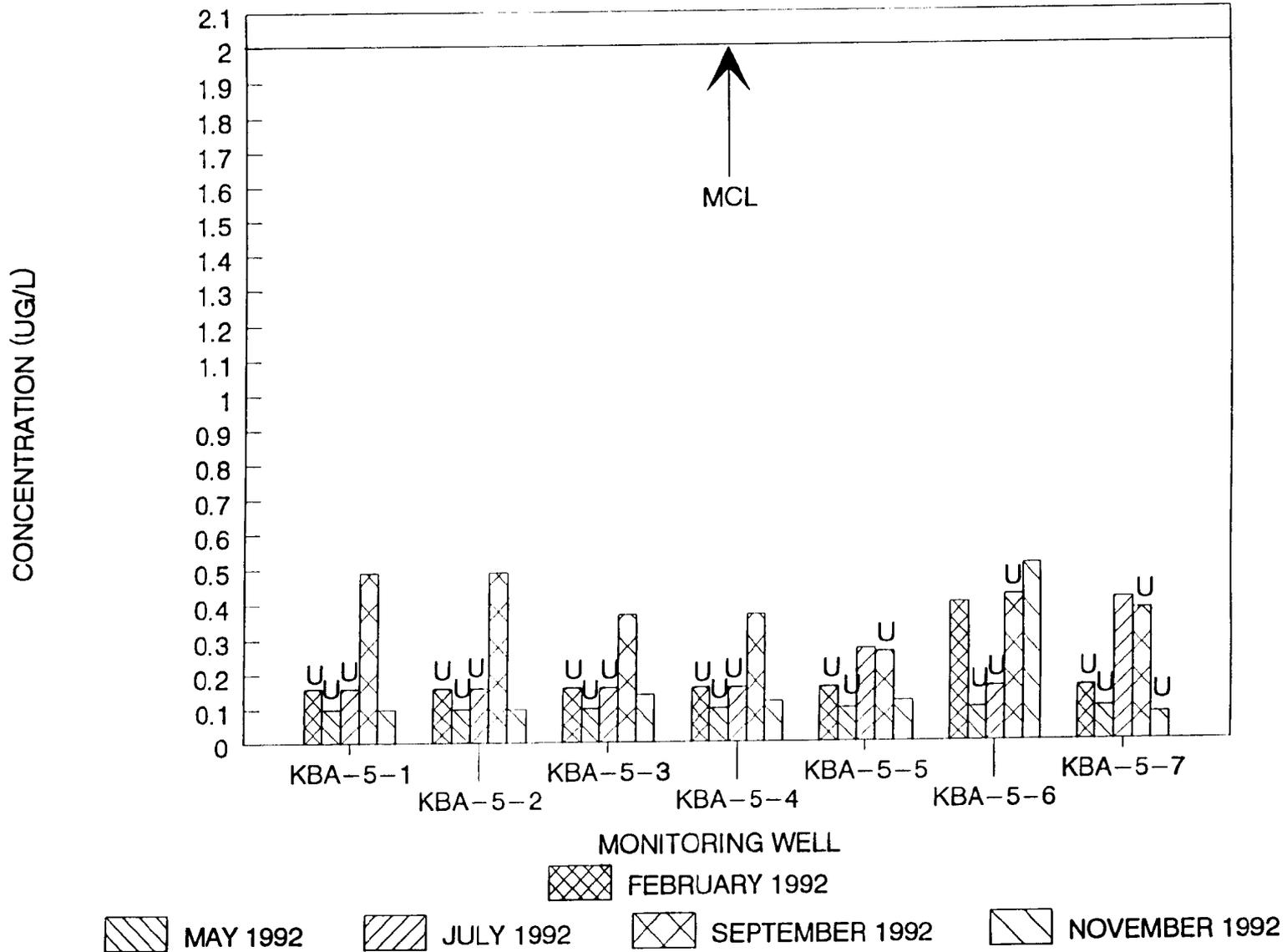
### NSB KINGS BAY, GEORGIA SITE 5 - CHROMIUM IN GROUNDWATER



### NSB KINGS BAY, GEORGIA SITE 5 – LEAD IN GROUNDWATER

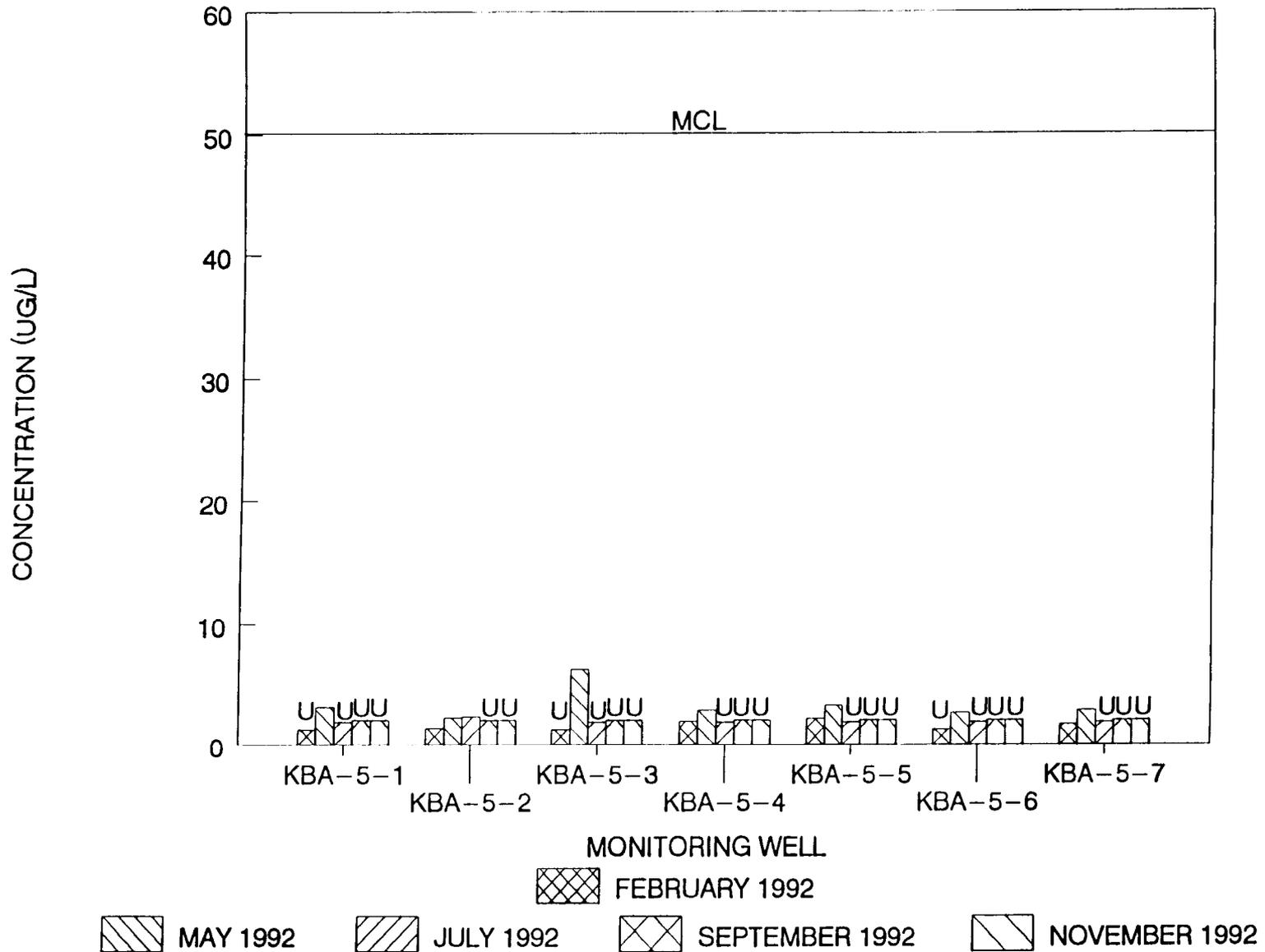


### NSB KINGS BAY, GEORGIA SITE 5 – MERCURY IN GROUNDWATER



# NSB KINGS BAY, GEORGIA

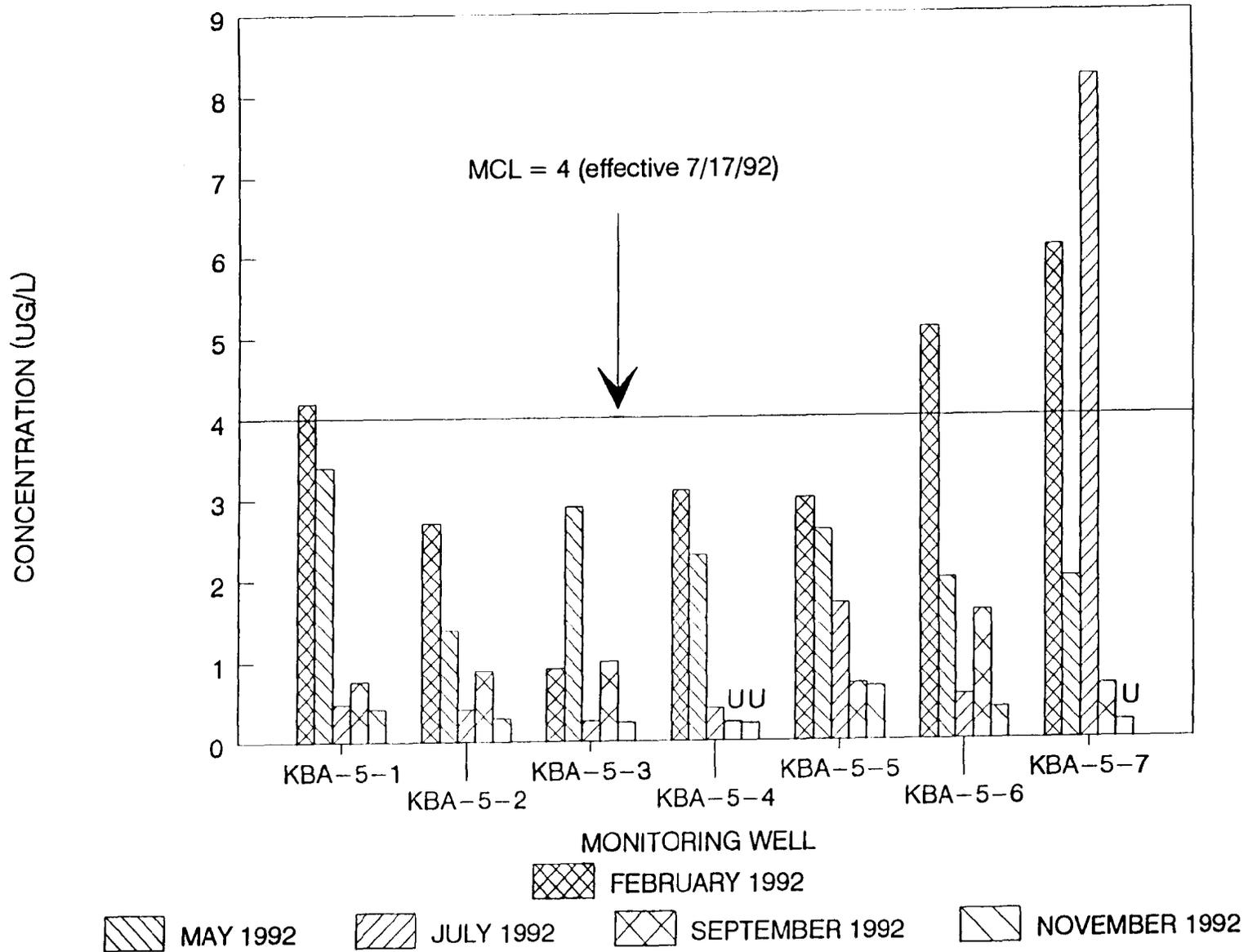
## SITE 5 - SELENIUM IN GROUNDWATER



# NSB KINGS BAY, GEORGIA

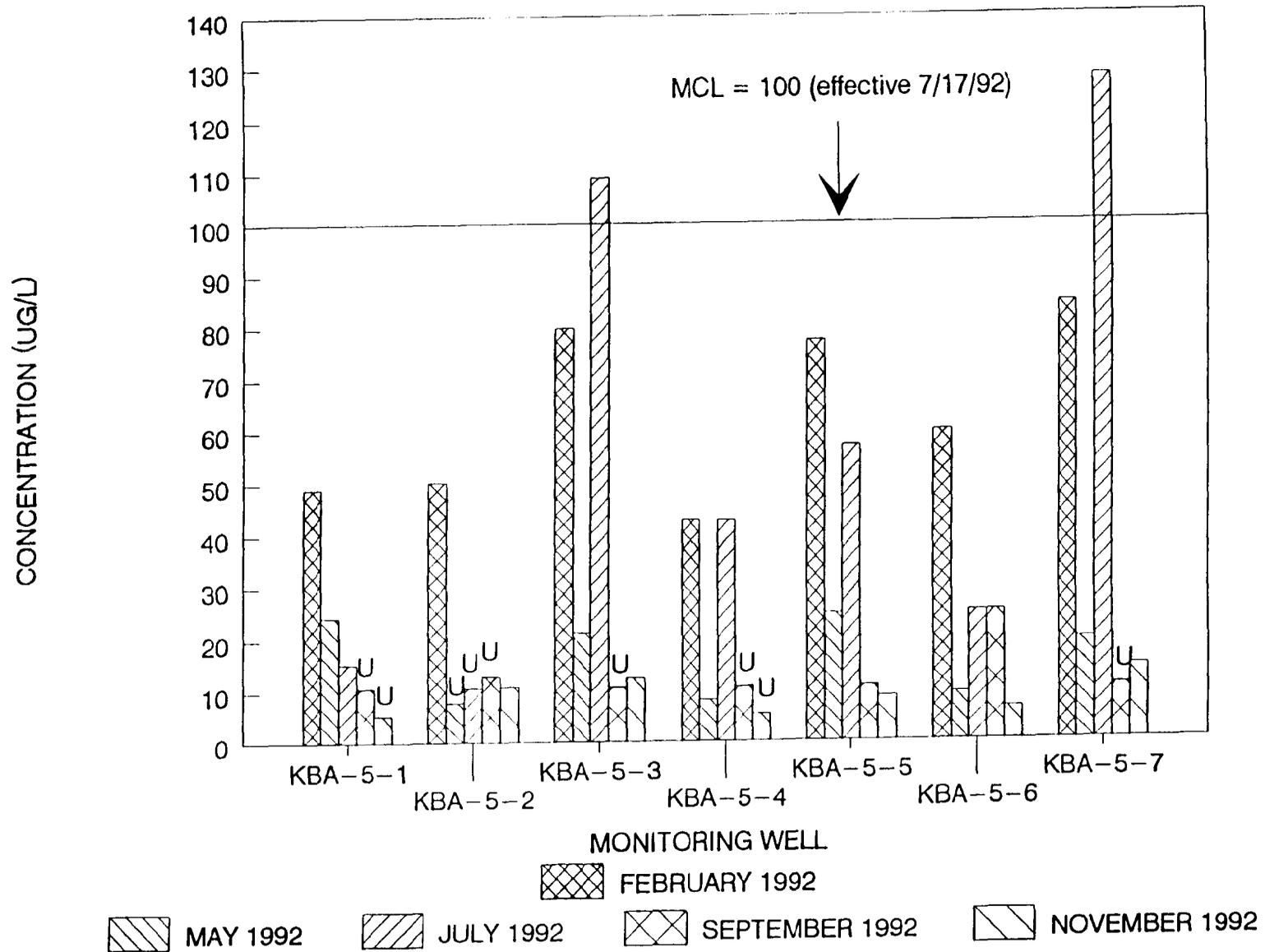
## SITE 5 – BERYLLIUM IN GROUNDWATER

8-C



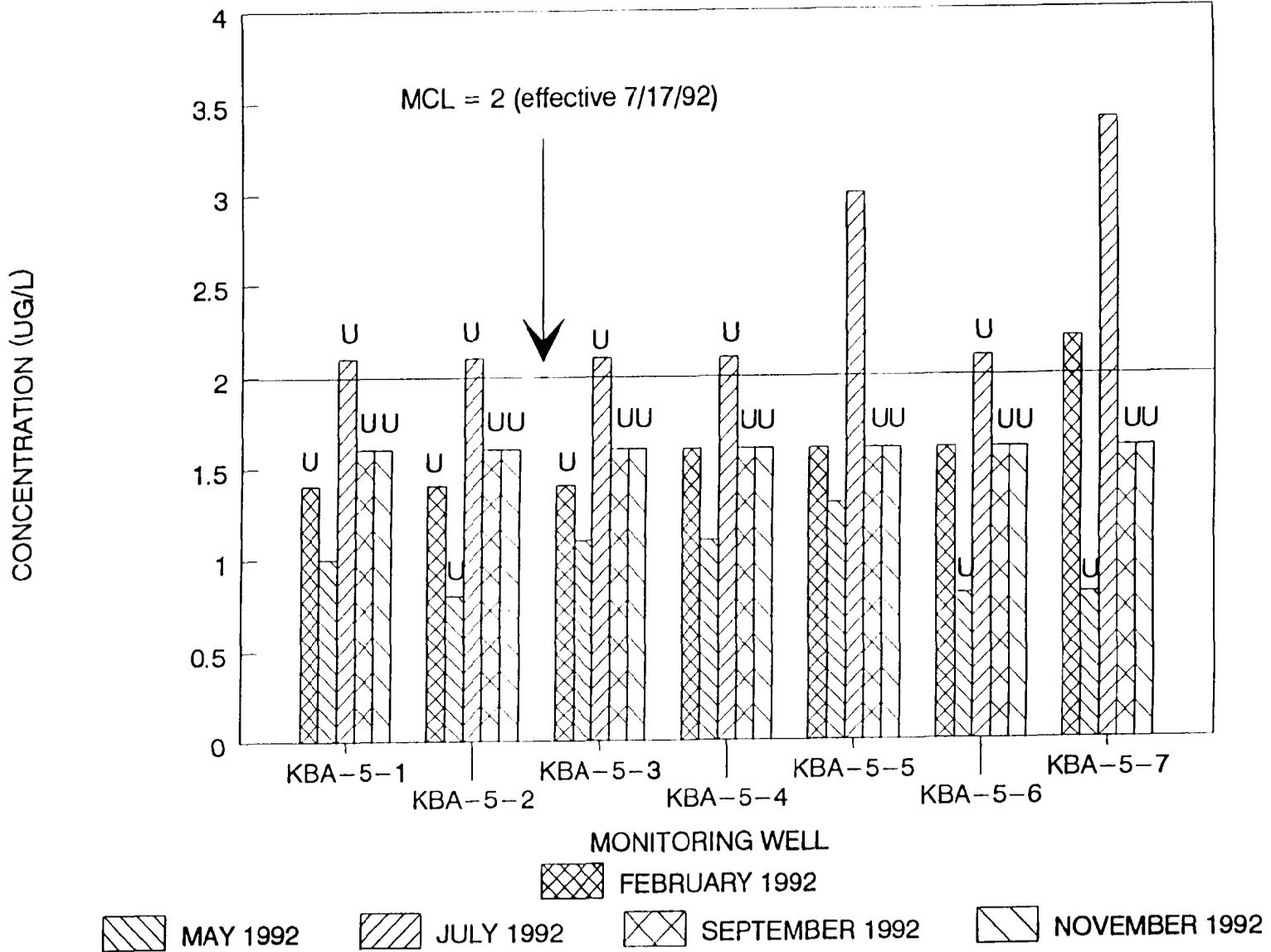
# NSB KINGS BAY, GEORGIA

## SITE 5 - NICKEL IN GROUNDWATER



# NSB KINGS BAY, GEORGIA

## SITE 5 – THALLIUM IN GROUNDWATER

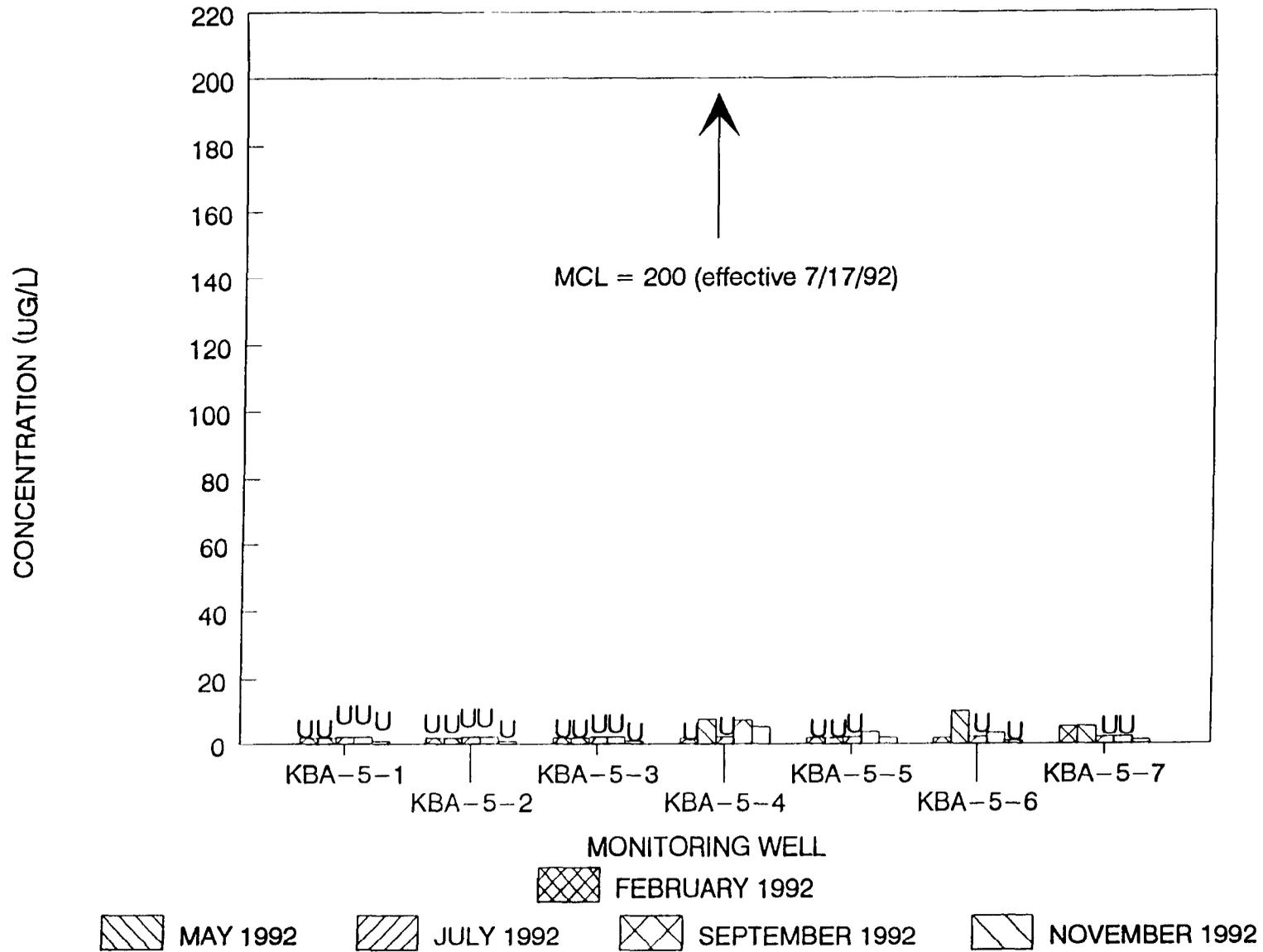


C-10

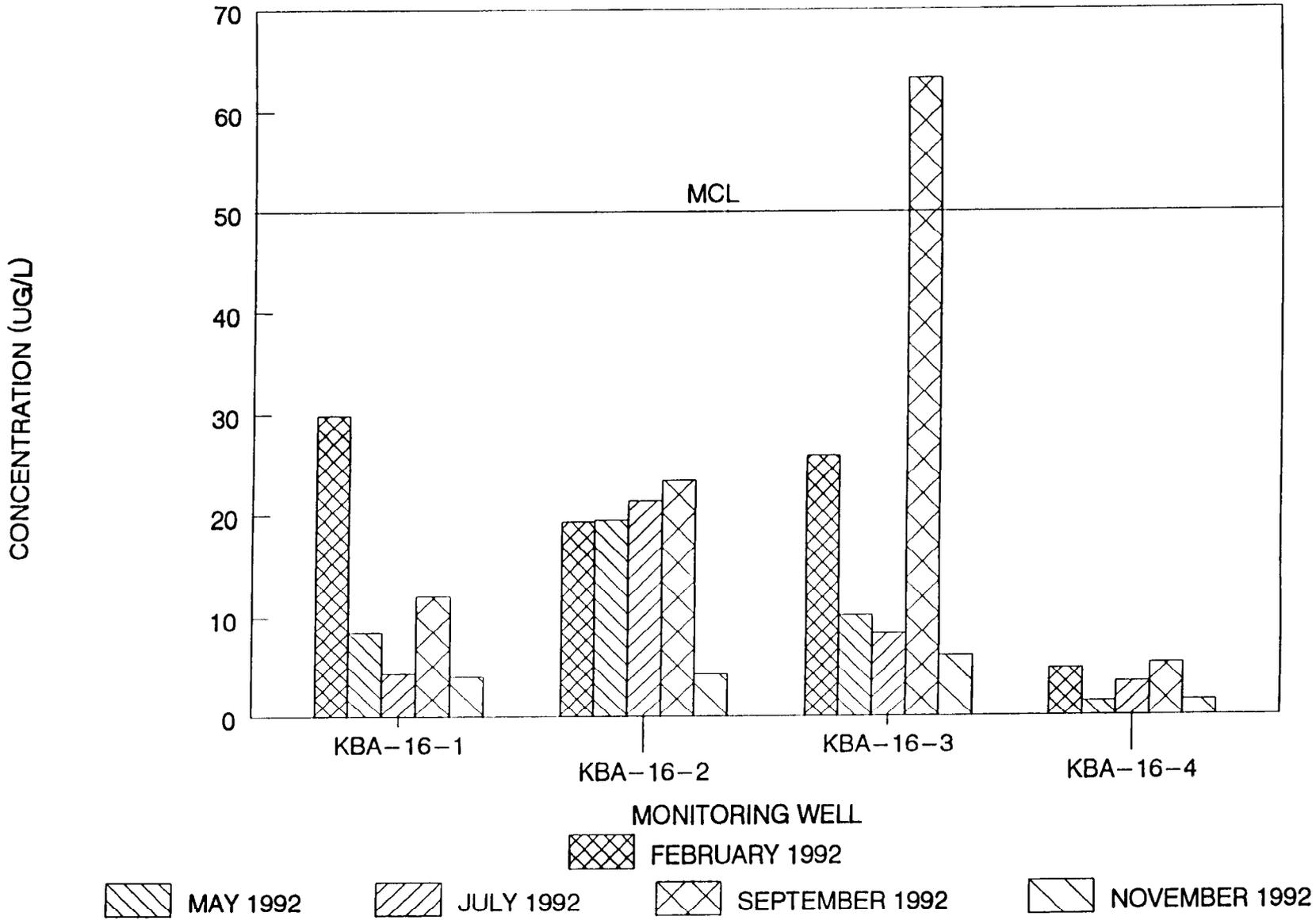
# NSB KINGS BAY, GEORGIA

## SITE 5 - CYANIDE IN GROUNDWATER

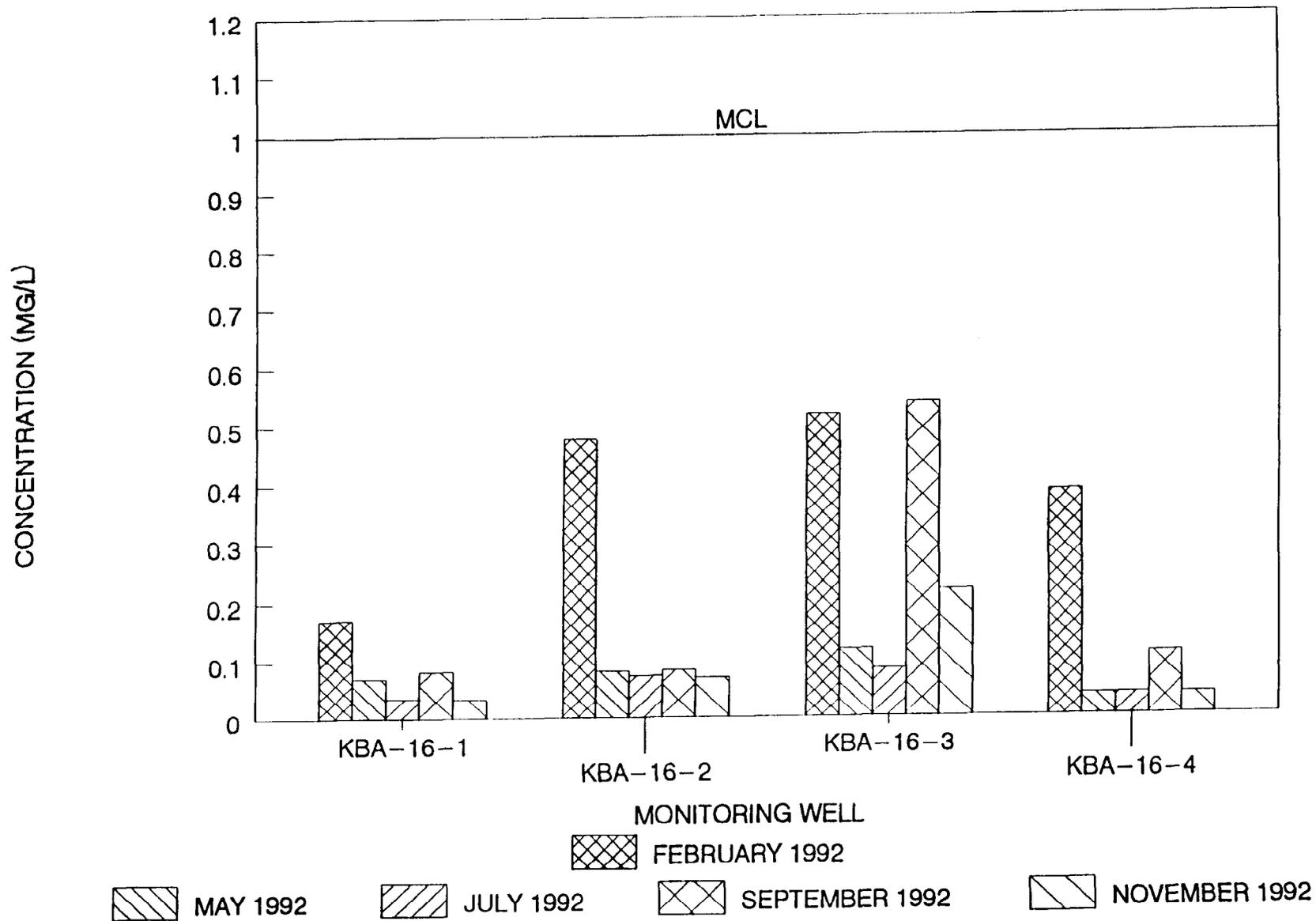
C-11



### NSB KINGS BAY, GEORGIA SITE 16 - ARSENIC IN GROUNDWATER

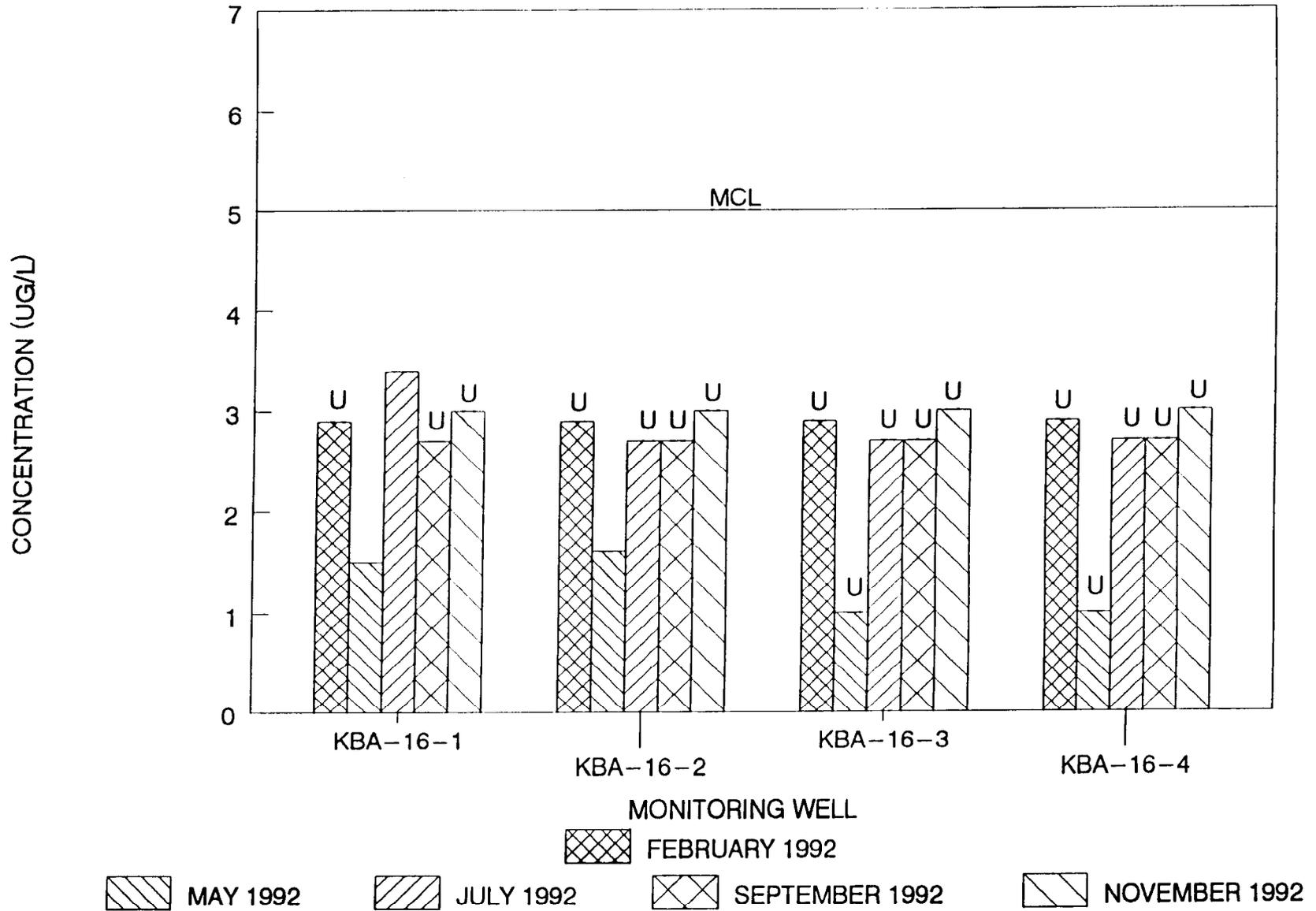


### NSB KINGS BAY, GEORGIA SITE 16 - BARIUM IN GROUNDWATER



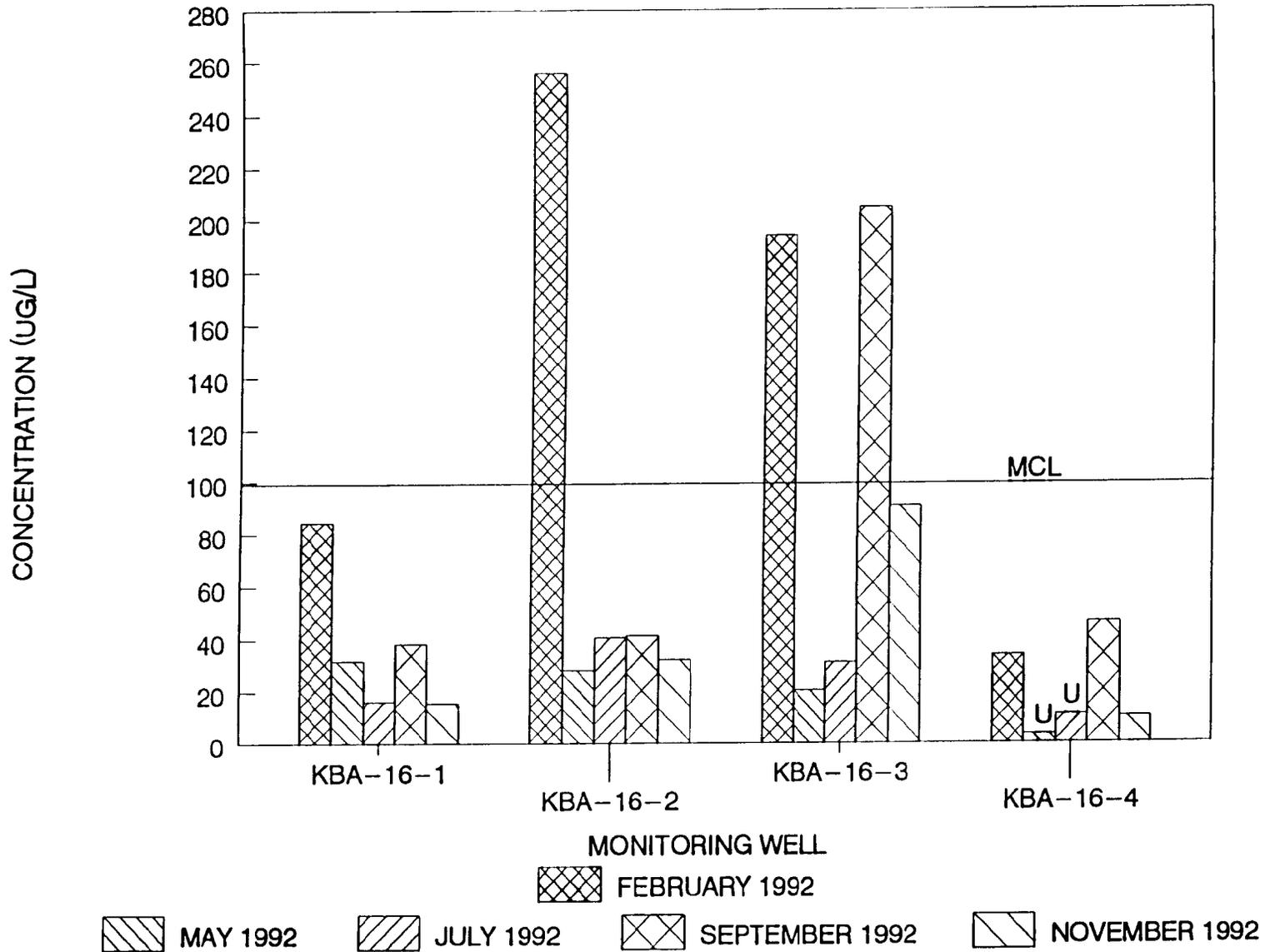
# NSB KINGS BAY, GEORGIA

## SITE 16 – CADMIUM IN GROUNDWATER

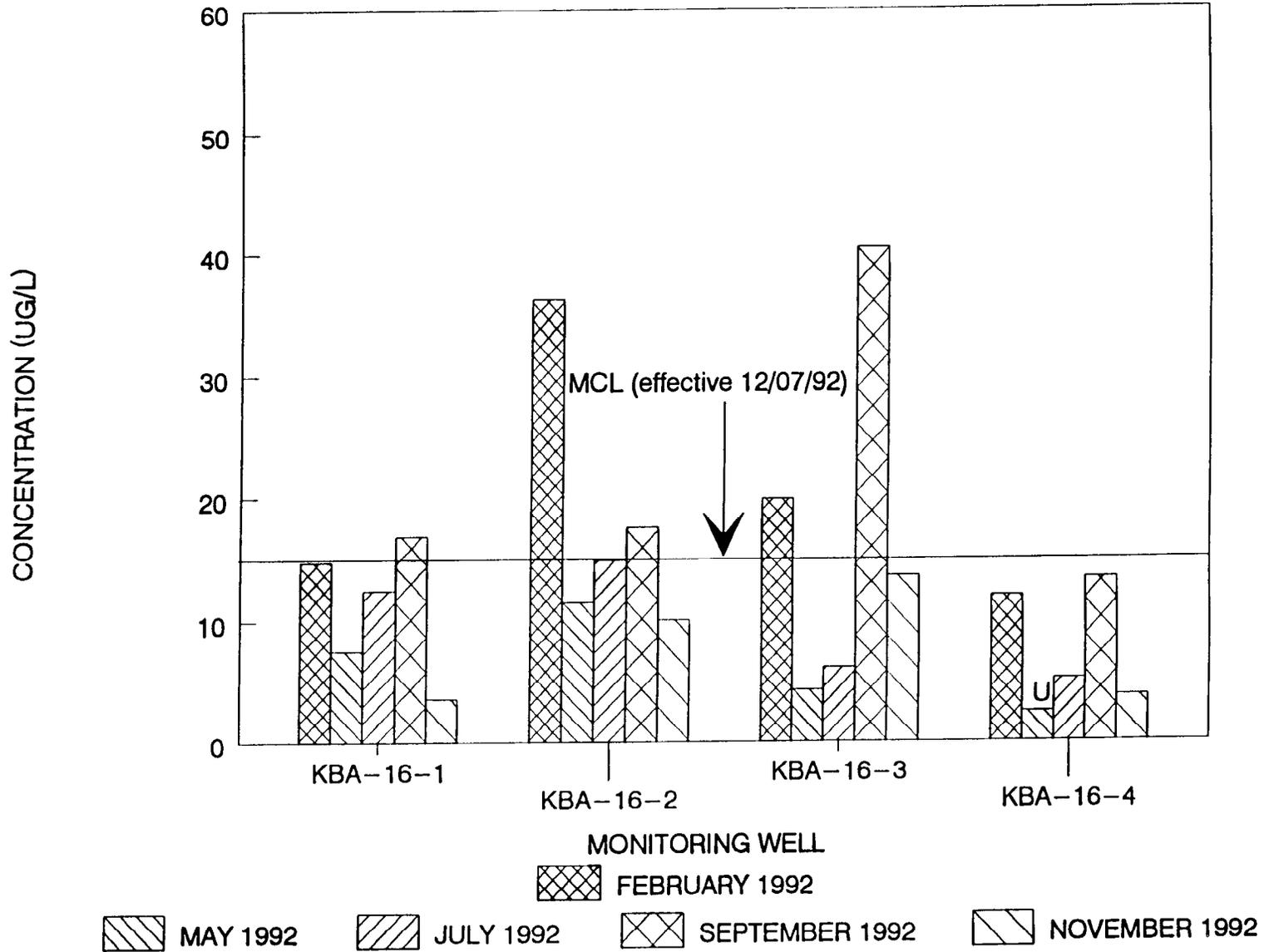


# NSB KINGS BAY, GEORGIA

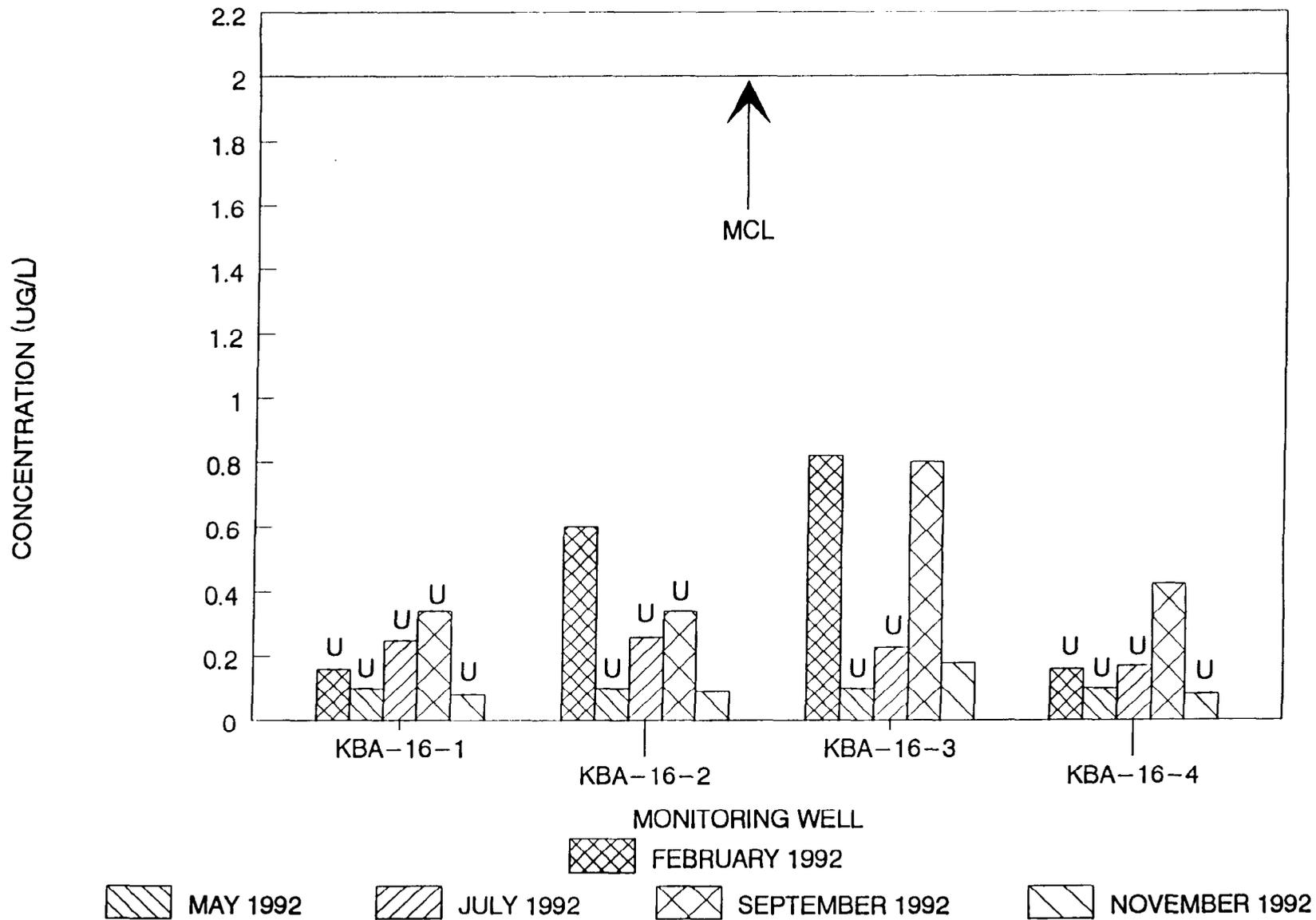
## SITE 16 - CHROMIUM IN GROUNDWATER



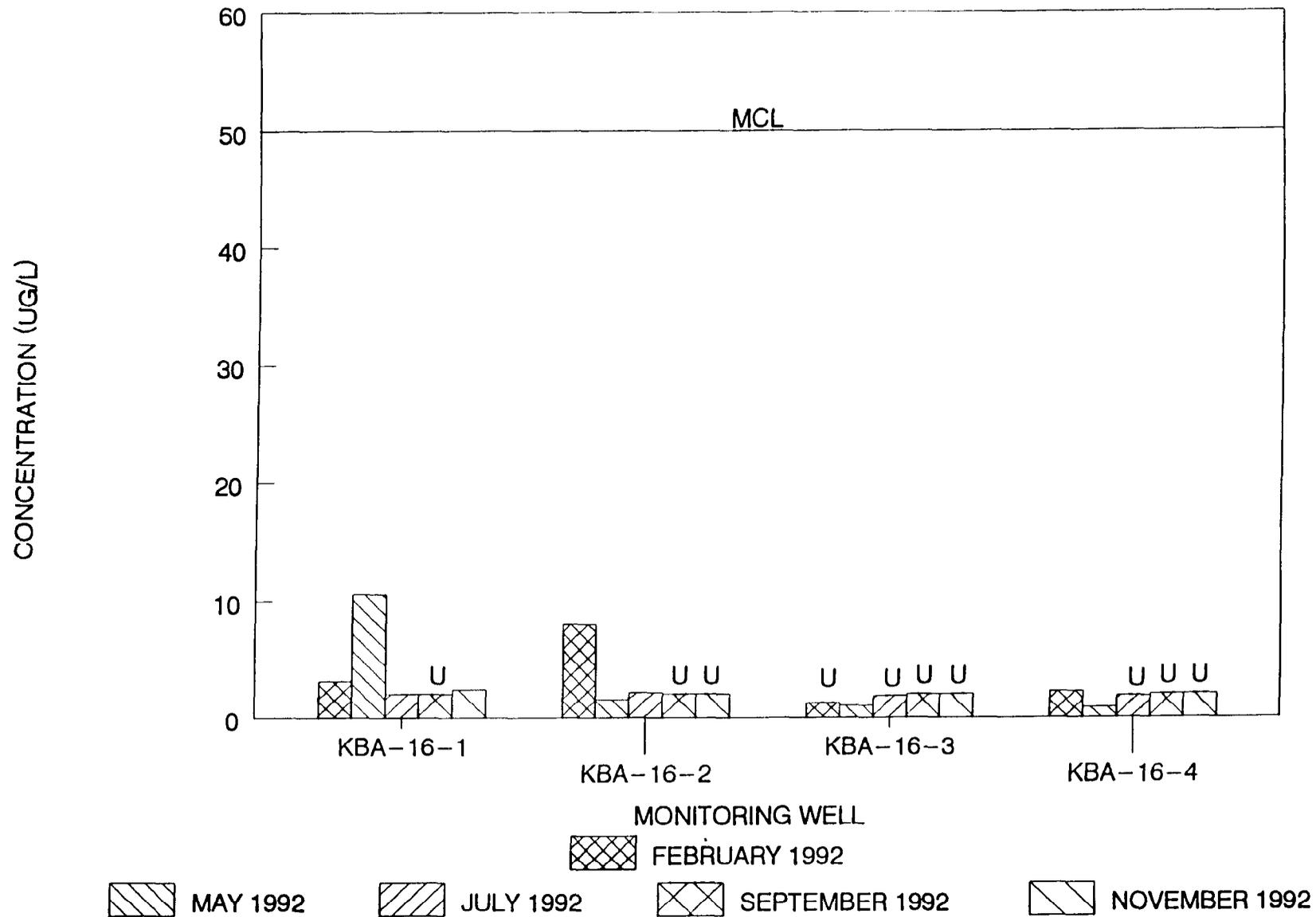
### NSB KINGS BAY, GEORGIA SITE 16 - LEAD IN GROUNDWATER



### NSB KINGS BAY, GEORGIA SITE 16 – MERCURY IN GROUNDWATER



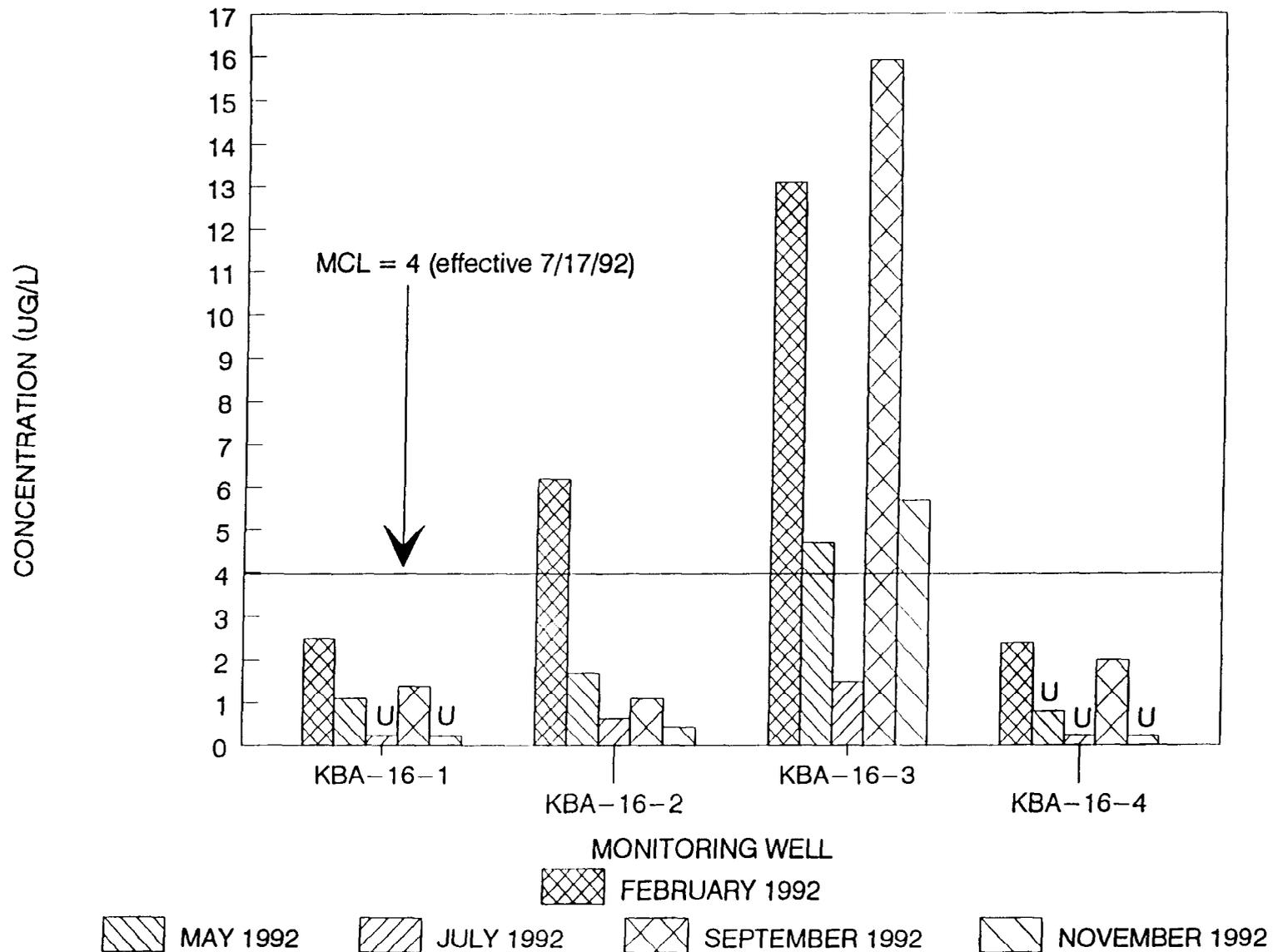
### NSB KINGS BAY, GEORGIA SITE 16 - SELENIUM IN GROUNDWATER



# NSB KINGS BAY, GEORGIA

## SITE 16 – BERYLLIUM IN GROUNDWATER

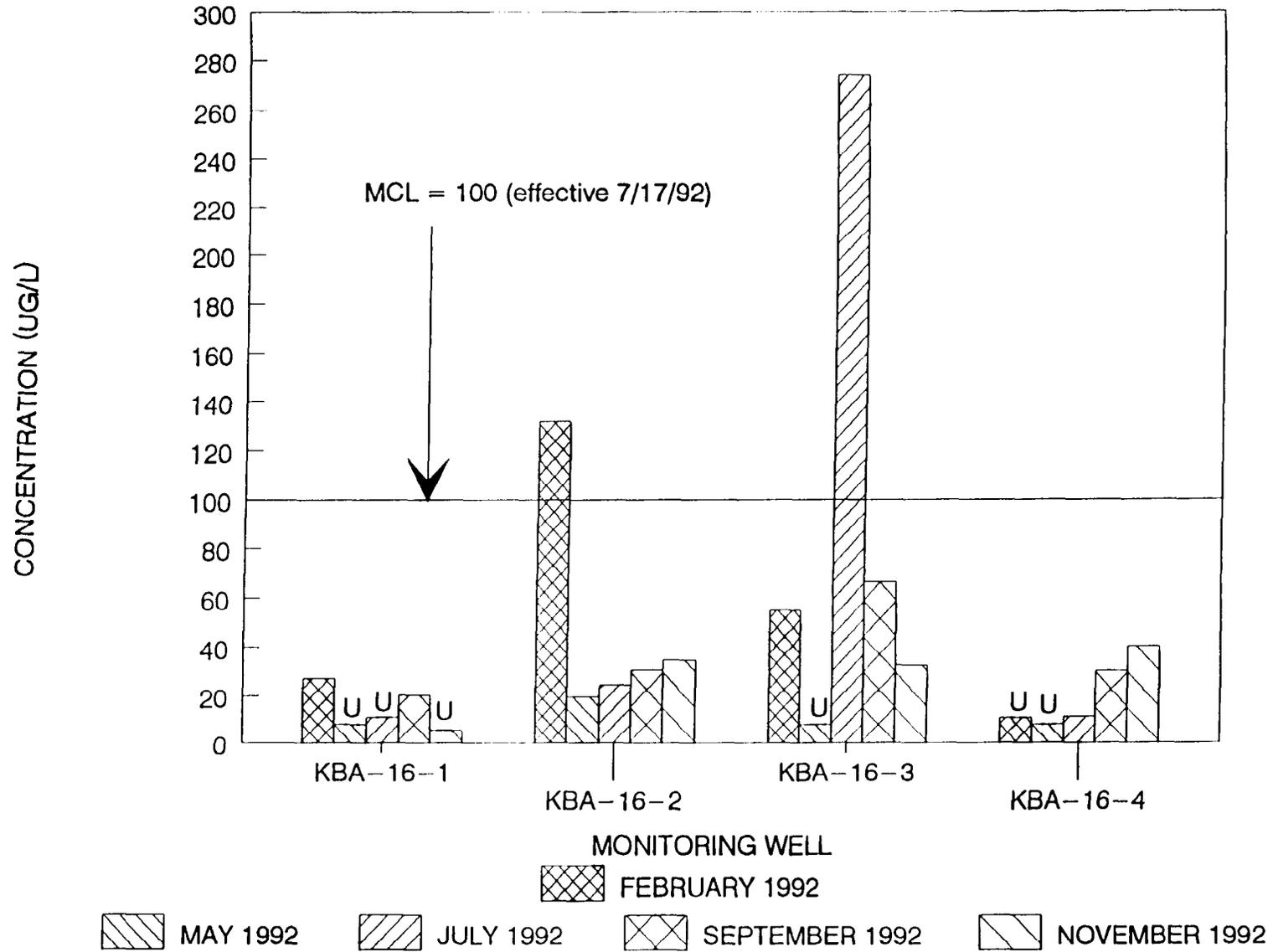
C-19



# NSB KINGS BAY, GEORGIA

## SITE 16 – NICKEL IN GROUNDWATER

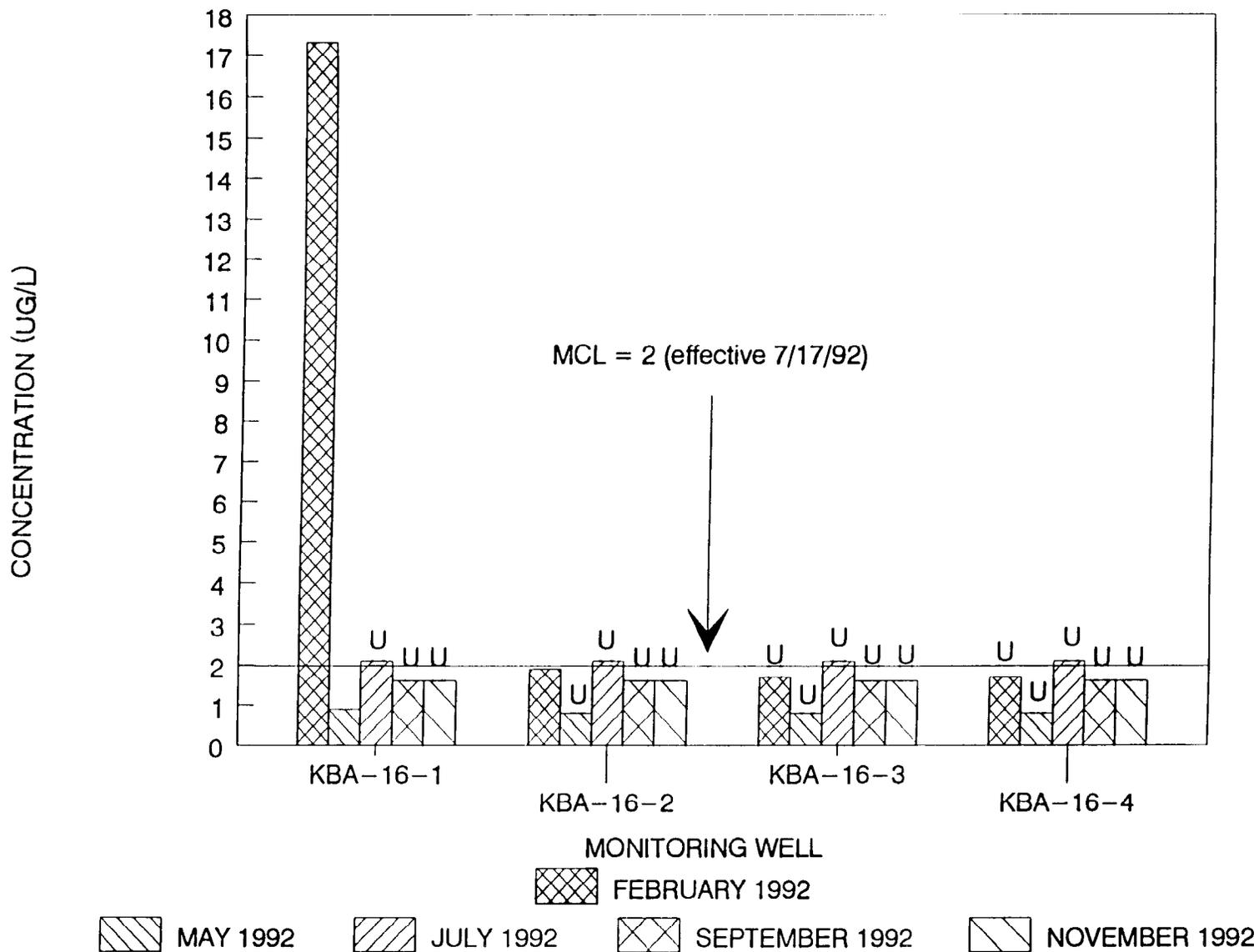
C-20



# NSB KINGS BAY, GEORGIA

## SITE 16 – THALLIUM IN GROUNDWATER

C-21



# NSB KINGS BAY, GEORGIA

## SITE 16 – CYANIDE IN GROUNDWATER

C-22

