CORRECTIVE MEASURES STUDY WORK PLAN
SWMU 39 SOIL AND GROUNDWATER

NAVAL SUPPORT ACTIVITY MID-SOUTH
MILLINGTON, TENNESSEE

Revision: 2

Comprehensive Long-Term Environmental Action Navy
Contract Number: N62467-89-D-0318
CTO-0146

Prepared for:

Department of the Navy
Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina

Prepared by:

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The Contractor, EnSafe Inc., certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0318 are complete, accurate, and comply with all requirements of the contract.

Date: December 7, 2001
Signature: _____
Name: John Stedman, Jr.
Title: Task Order Manager

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December 7, 2001

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Subject: CTO-0146; Naval Support Activity Mid-South, Millington, Tennessee
Document Transmittal — *NSA Mid-South — SWMU 39 Corrective Measures Study Work Plan*, Revision 2, December 7, 2001

Reference: Contract N62467-89-D-0318

Dear Sir:

Please find enclosed one copy of the *SWMU 39 Corrective Measures Study Work Plan*, Revision 2. Additionally, copies have also been distributed as shown on the attached distribution list.

If you have any questions or comments of a technical nature, please contact me at (901) 372-7962. Comments or questions of a contractual nature should be directed to Scott Nye at the same number.

Sincerely,

EnSafe Inc.

Ben Bentley for
John Stedman, Jr.

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ABBREVIATIONS AND ACRONYMS

AOC	Area of Concern
BCT	BRAC Cleanup Team
BRAC	Base Closure and Realignment Act
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CAP	Corrective Action Program
CAMP	Corrective Action Management Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
COC	Chemical of Concern
COPC	Chemicals of Potential Concern
CRP	Community Relations Plan
CSI	Confirmatory Sampling Investigation
1,2-DCA	1,2-Dichloroethane
DCE	Dichloroethene
DO	Dissolved Oxygen
DPT	Direct Push Technology
DQO	Data Quality Objectives
E/A&H	EnSafe/Allen & Hoshall
EDGe	Engineering, Design, and Geosciences Group, Inc.
EIC	Engineer-In-Charge
ERA	Ecological Risk Assessment
GW	Groundwater
HSWA	Hazardous and Solid Waste Amendments
IRP	Installation Restoration Program
MCLs	Maximum Contaminant Levels
MNA	Monitored Natural Attenuation
NPDES	National Pollutant Discharge Elimination System
NSA	Naval Support Activity
O&M	Operations and Maintenance

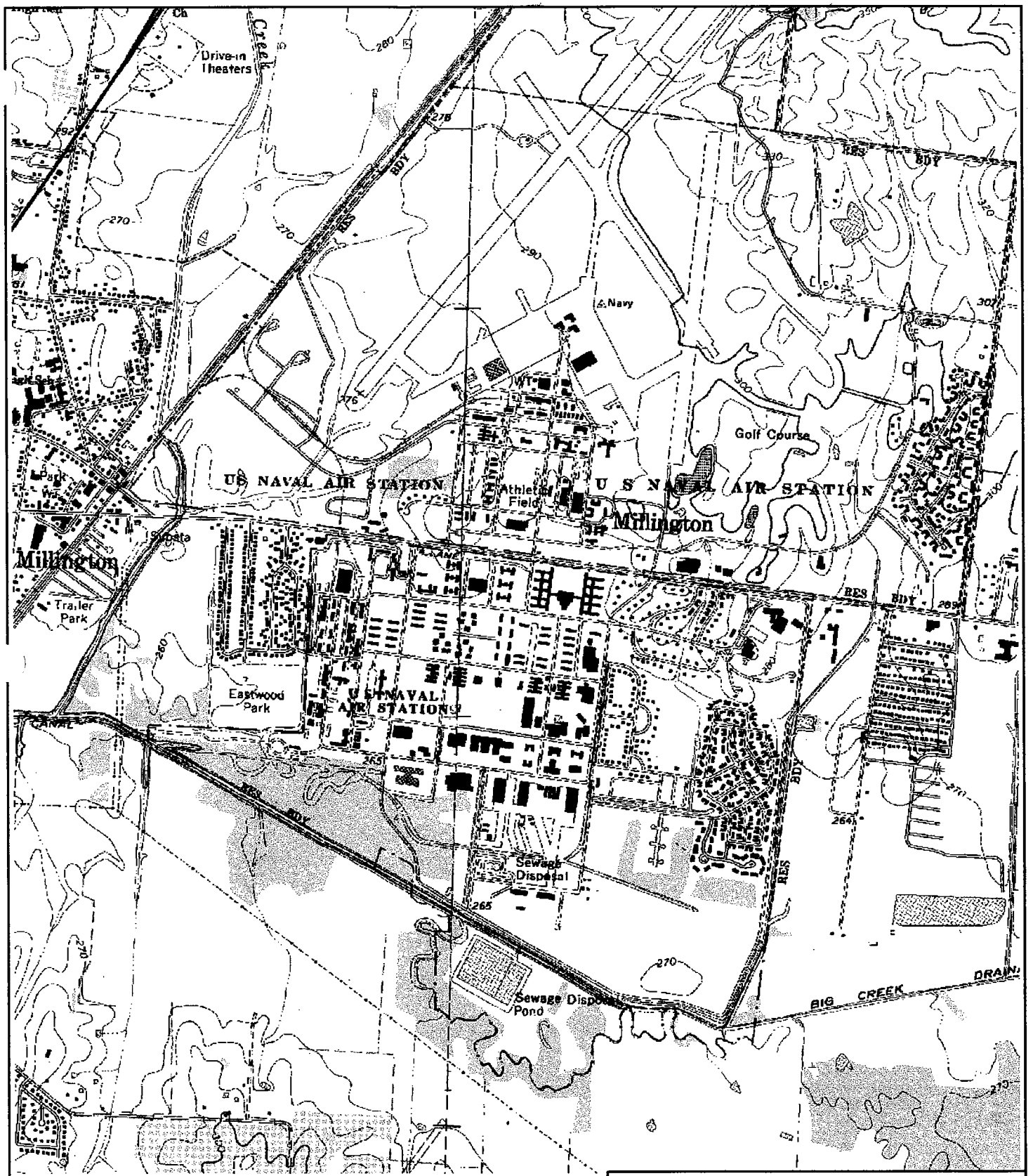
PCE	Tetrachloroethene
POC	Point of Compliance
POTW	Publicly Owned Treatment Works
PRGs	Preliminary Remedial Goals
RAB	Restoration Advisory Board
RBCs	Risk-Based Concentrations
RCRA	Resource Conservation and Recovery Act
RFA/RFI	RCRA Facility Assessment/RCRA Facility Investigation
RGO	Remedial Goal Option
SOUTHNAVFACENGCOM	Southern Naval Facility Engineering Command
SSL	Soil Screening Level
SWMU	Solid Waste Management Unit
TCE	Trichloroethene
TDEC	Tennessee Department of Environment and Conservation
TNHW	Tennessee Hazardous Waste (re: permit number)
TN-EPH	Tennessee Extractable Petroleum Hydrocarbons
TPH	Total petroleum hydrocarbons
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VC	Vinyl Chloride
VOCs	Volatile Organic Compounds
μg/L	Micrograms Per Liter
μg/kg	Micrograms Per Kilogram

1.0 INTRODUCTION

As part of the U.S. Navy Installation Restoration Program (IRP), this Corrective Measures Study (CMS) work plan has been prepared for solid waste management unit (SWMU) 39 on the Southside of Naval Support Activity (NSA) Mid-South (formerly Naval Air Station [NAS] Memphis), Millington, Tennessee. SWMU 39 was addressed in the *Assembly F RFI Report, Revision 1* (EnSafe, September 2000), which recommended a CMS.

Because contaminants in SWMU 39 soil and groundwater were not clearly delineated, the NSA Mid-South Base Closure and Realignment Act (BRAC) Cleanup Team (BCT) determined that further evaluation of contaminant migration was warranted before a CMS could be completed. Therefore, in October 2000, a supplemental direct push technology (DPT) investigation was conducted in soil beneath the Building S-74 foundation and around Building S-203. Fifteen DPT borings were advanced from which 28 soil samples were obtained. Groundwater samples were obtained from nine existing and four temporary monitoring wells. The findings of this investigation are presented in Section 3. Figure 1-1 is a topographic map of NSA Mid-South and the surrounding area. Figure 1-2 shows a site map of SWMU 39.

The CMS is part of the RCRA Corrective Action Program (CAP), which follows the Resource Conservation and Recovery Act (RCRA) Facility Assessment/RCRA Facility Investigation (RFA/RFI) process. Corrective Measures Implementation (CMI) follows the CMS. The ultimate goal of a CMS is to select a corrective measures alternative(s) that mitigates threats to public health, welfare, and the environment and provides continuing protection. A CMS entails development, screening, and evaluation of alternative remedial options. Specific objectives are to develop and evaluate alternatives that protect public health and the environment, comply with applicable requirements (e.g., Maximum Contaminant Levels [MCLs]), and reduce contaminant mobility and/or toxicity.



USGS Bruswick , TN and Millington, TN Quadrangles

Figure 1-1
Corrective Measures Study
NSA Mid-South
Millington, Tennessee

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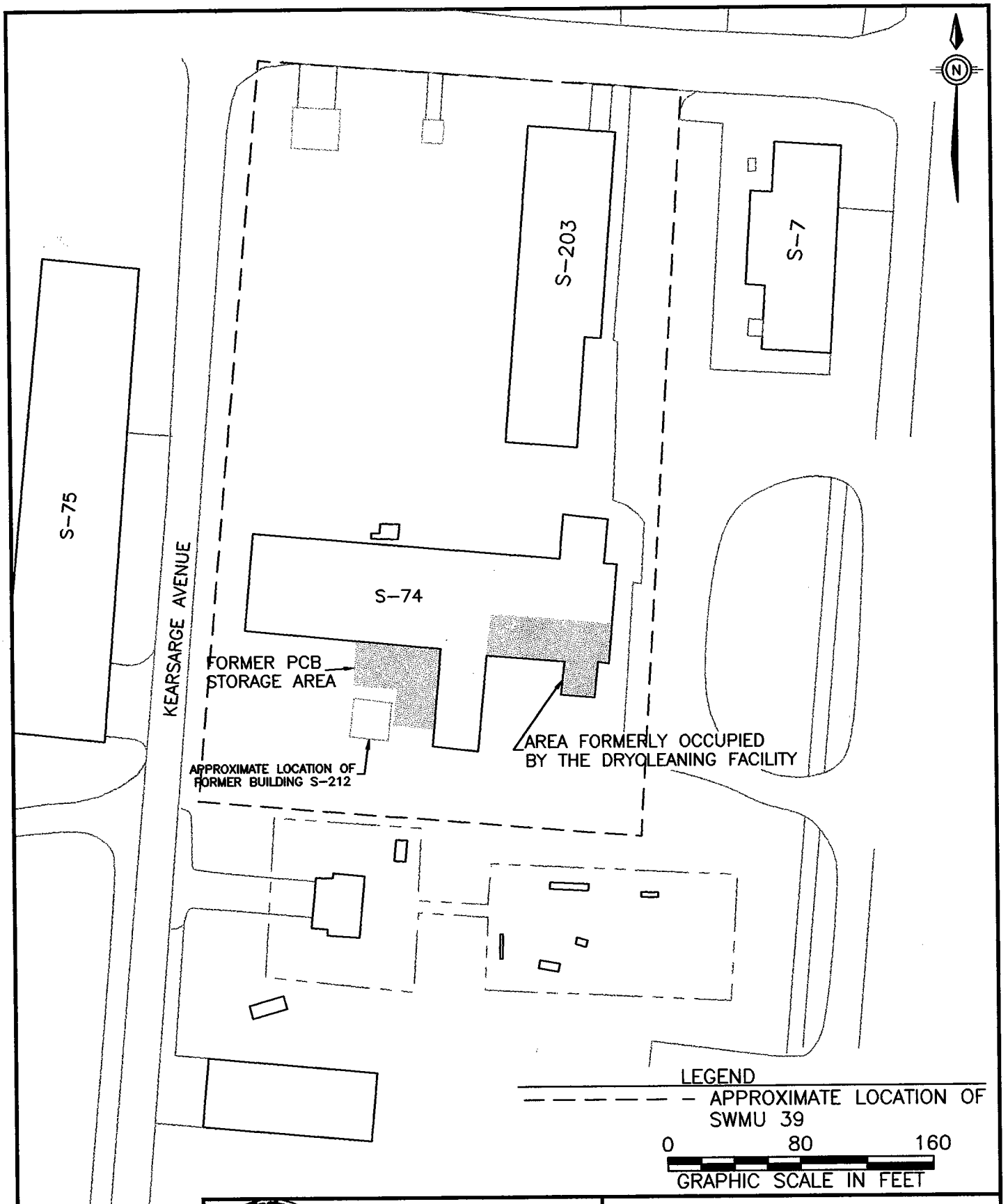

SWMU 39
CMS WORK PLAN
NSA MID-SOUTH
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FIGURE 1-2
SWMU 39
SITE MAP

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The U.S. Environmental Protection Agency (USEPA) *RCRA Corrective Action Plan (Final),* (OSWER Directive 9902.3-2A, May 1994) emphasizes the importance of a concise corrective action process based on site-specific detail, with an overall goal of streamlining the process to expedite cleanup. Therefore, all or some of the components of the corrective action process (i.e., RFI→CMS→CMI) may be streamlined and an alternative to this sequential process may be appropriate. The traditional CMS can be scaled down to a streamlined version in which only one alternative is evaluated.

In keeping with this goal, this plan addresses general procedures to be followed during a streamlined CMS for SWMU 39. A streamlined approach is being taken at SWMU 39 because the contamination is in a small area and represents minimal exposure concerns. This work plan discusses one corrective measures technology (monitored natural attenuation [MNA]) that has been identified for evaluation in a streamlined CMS.

1.1 Purpose of CMS

The purpose of a CMS is to identify and evaluate potential remedial alternatives for a given site or group of sites identified through the RFI or other investigations as needing further evaluation. Although not required, the Permittee may choose to evaluate several corrective measures technologies. The scope and requirements of the CMS need to be balanced with quickly initiating remedies and rapidly restoring contaminated media. In keeping with these goals, a streamlined approach to remedy selection can enable a facility to move from facility investigation to CMI more rapidly.

According to the *RCRA Corrective Action Plan (Final),* a streamlined or highly focused CMS may be appropriate in the following types of situations:

- "Low risk" facilities where environmental problems are relatively small, and releases present minimal exposure concerns.

- High quality remedies have been proposed by the Permittee/Respondent, who may propose a remedy which is highly protective and consistent with all other remedial objectives.

- Facilities with straightforward remedial solutions. For some contamination problems, standard engineering solutions can be applied that have been proven to be effective in similar situations.

- Phased remedies. At some facilities, the nature of the environmental problem will dictate development of the remedy in phases, which would focus on one aspect of the remedy or one area of the facility that requires immediate measures to control further environmental and human exposure. In these situations, the CMS could focus on that specific element of the overall remedy, with follow-up studies as appropriate to deal with the remaining remedial needs at the facility.

Typically, evaluation of several viable remedial options is based primarily upon their ability to protect human health and the environment adequately while complying with all applicable regulatory concerns and standards. However, only one alternative needs to be evaluated for a smaller site with a simple and straightforward environmental problem.

1.2 RCRA Permit Issues

This plan has been prepared for NSA Mid-South as part of the Department of Defense IRP and is intended to satisfy Condition IV G-1(a)(b) of the Hazardous Waste Management permit (TNHW-094) and the Hazardous and Solid Waste Amendments (HSWA) permit (HSWA-TN 002),

issued to NSA Mid-South by the Tennessee Department of Environment and Conservation (TDEC) and the USEPA Region IV, respectively. These permits make up the complete RCRA permit for NSA Mid-South, which regulates current RFI activities. The Hazardous Waste Management permit was reissued by TDEC on September 24, 1996, and will expire September 24, 2006. The original HSWA permit of September 15, 1986, was reissued by USEPA Region IV on April 1, 1998.

The HSWA portion of the permit required NSA Mid-South to conduct an RFA to identify and characterize all active and inactive SWMUs. The Navy retained Engineering, Design, and Geosciences Group, Inc. (EDGe) in December 1986 to conduct the RFA and to perform an RFI to evaluate SWMUs known, suspected, or presumed to have released hazardous constituents. EDGe prepared the draft RFA and RFI reports concurrently and submitted them in April 1987. The reports identified 58 potential SWMUs and recommended 34 for additional study. Since 1987, eight more sites have been added and a previously identified site has been divided into two sites, bringing the total number of SWMUs to 67. On September 24, 1996, TDEC reissued the Hazardous Waste Management permit with modifications to add the new SWMUs and one area of concern (AOC), the Northside fluvial deposits groundwater. Thus, 67 SWMUs and one AOC are currently listed in the permit modification.

The RCRA Part B Permit for NSA Mid-South specifies that TDEC and USEPA will review RFI documents and notify NSA Mid-South if further investigations, CMSs, or corrective actions are needed. It is anticipated that a permit modification will be required at the end of the CMS when the program progresses to the CMI stage. The CMS is expected to present the general methodology for transition to CMI and will also focus on the remedial time frame, permitting, and regulatory concerns for the proposed remedy.

2.0 GENERAL APPROACH TO CMS

This section discusses the fundamental CMS approach to collecting data, identifying target media cleanup goals, statistical application to corrective measures evaluation, modeling, and cost estimating.

2.1 Data Evaluation

Defining the nature of potential contaminants, or chemicals of potential concern (COPC), was the initial step in the RFI data-collection process, which depends largely on data quality (as defined by data quality objectives [DQOs]). A minimal number of biased samples was collected following DQO definitive data (formerly Levels III and IV) protocols and procedures. Quality criteria are outlined in the *Comprehensive RFI Work Plan — Naval Air Station Memphis* (E/A&H, 1994). In addition to establishing initial concentration measures for COPCs, the data will be used in the CMS process to define preliminary remedial goals (PRGs) and to evaluate corrective measures technologies.

DQO Process

Data quantity and quality can have a direct effect on selection of the correct remedial option. However, a point is reached at which more and/or better data do not significantly increase the probability of making the right choice. The DQO process is a systematic way of evaluating the data's impact on decision-making, and determining the degree of uncertainty associated with such decisions. DQOs will be established during the CMS to properly evaluate the selected remedial technology and will be described in the CMS report. The overall objective of the CMS — *to select a corrective measures alternative(s) which mitigates threats and protects public health, welfare, and the environment* — will be maintained while establishing DQOs for individual processes or problems within the proposed remedy.

Typically, nine broad steps will be adopted in establishing and describing the DQO process:

1. State the nature of the problem.
2. Identify the decision.
3. Identify decision-making input.
4. Define the study boundaries.
5. Develop a decision rule.
6. List the limitations on decisions and associated errors.
7. Optimize the decision for obtaining the data.
8. Apply the data to the problem's quantification and qualification process.
9. Assess the quality of the data, i.e., evaluate the data set to determine whether data are sufficient for decision-making.

The DQO process will be applied to five tasks:

- Statistical analyses and tests of the contaminant concentration data.

- Geochemical parameter analysis and preliminary screening for evidence of site biodegradation as part of the natural attenuation remedy evaluation.

- Input parameters to be used in the fate-and-transport model for natural attenuation; the assumptions and limitations of the model; the quantitative effect of numerical values attached to each input parameter such as groundwater velocity, dispersion, and adsorption; and how the sensitivity analysis for the fate-and-transport model fits into the DQO process.

- Computation of the costs and time required for remediation of the selected alternative; the assumptions, limitations, and uncertainties associated with these determinations.

- Planning for long-term groundwater monitoring and analysis of long-term monitoring data; developing an effectiveness evaluation of the chosen remedy.

2.2 Development of Target Media Cleanup Goals

PRGs or site-specific goals for corrective measures are based on human health and environment criteria, information gathered during the RFI, USEPA guidance, and applicable federal and state statutes. PRGs are typically based on promulgated standards such as MCLs and surface-water quality criteria, and relevant nonpromulgated requirements such as USEPA risk-based concentrations (RBCs) and soil-screening levels (SSLs). Human health and ecological risk-based concentrations, estimated in accordance with USEPA risk-assessment guidance, may also be considered when establishing PRGs. The USEPA guidance document *RCRA Corrective Action Plan (Final)* outlines issues to be considered in developing corrective action objectives for groundwater, soil, surface water, sediment, and air.

2.3 Points of Compliance

Points of compliance (POCs) will be evaluated as part of the CMS. For groundwater compliance, the USEPA Region IV *Memorandum on Media Cleanup Standards and Conditional Remedies in the HSWA Program* (USEPA, 1996) details several alternatives for location of POC wells. The following locations were outlined in proposed Subpart S: the physical edge of the SWMU, throughout the plume, the leading edge of the plume (if contained within the property), or the facility boundary. USEPA Region IV recommends that the POC be set at the physical edge of the SWMU for final remedies.

2.4 Cost Estimating

This section presents the approach to be used when evaluating the cost of the proposed remedy. Cost estimates will include both capital and operation and maintenance (O&M) costs. Capital costs will include estimates for engineering, site preparation, construction, materials, labor, sampling/analysis, waste management and disposal, permitting, and health and safety measures. O&M costs will include labor, training, sampling/analysis, maintenance materials, utilities, and waste disposal and/or treatment. Costing sources include the R.S. Means Company's 1998 *Environmental Remediation Cost Data-Assemblies* and their *Environmental Remediation Cost Data-Unit Price* along with industry quotes.

Costs will be evaluated to a present-worth value by using a combination of the USEPA *Remedial Action Costing Procedures* (EPA/600/8-87/049, October 1987), USEPA *Superfund Cashout User's Manual* (PB94-141678, September 1992), and *Engineering Economic Analysis* (1988) by Donald G. Newman. A present-worth analysis makes it possible to evaluate the proposed remedy on the basis of a single cost representing an amount that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the remedial action over its planned life. For base calculations, two rates are assumed: an inflation rate of 1.22%, based on the Chemical Engineering Plant cost index for 1989 to 1995, and a prime interest rate of 8.25%. The present-worth cost will be estimated from midyear, and an increase in the discount rate would decrease the present worth of the proposed remedy.

The cost elements for the proposed remedy will be summarized in the cost analysis section of the CMS report. In accordance with USEPA guidelines, the cost estimate will reflect actual costs with an accuracy of -30 to +50%. Most costs will be discounted over 30 years. Indirect costs will include an overhead labor rate of 45% with an additional 15% administrative fee on all direct costs. A 10% profit will be added to all labor and materials, with an assumed 5% to 15% contingency. A 6% design fee also will be used.

3.0 BACKGROUND INFORMATION

3.1 SWMU 39 Site Description

SWMU 39 is approximately 150 feet east of Kearsarge Avenue across from the boiler plant on the NSA Mid-South Southside (Figure 1-2). SWMU 39 consists of the area around Building S-203, the concrete slab remaining from Building S-74, and the area of former Building S-212. Transformers and drums of oil were stored in the polychlorinated biphenyls (PCBs) storage area (an outdoor concrete slab) until Building S-74 was demolished in 1995. Building S-74 was built in 1943 and operated as a laundry and dry cleaning facility until 1981. The remaining Building S-74 foundation is concrete while surrounding areas are covered with grass. Former Building S-212 was used to store dry cleaning solvent but the area is now covered with grass. Surface drainage flows south and west toward SWMU 38.

The SWMU 39 RFI included SWMUs 22 and 63. SWMU 22 was included because it is hydraulically downgradient of and adjacent to SWMU 39, and similar compounds were detected during the Confirmatory Sampling Investigation (CSI). SWMU 63 was included because of its proximity to SWMU 39; however, no further investigation was conducted after the CSI at this SWMU because no evidence of contamination was found.

3.2 Site Geology and Hydrogeology

Geology

As discussed in the RFI, three geologic units were investigated at SWMU 39 — the loess, fluvial deposits, and Cockfield Formation. The loess consists of a clayey silt or silty clay, with varying amounts of silt, clay and occasional sand, and serves as an overlying semiconfining unit to the fluvial deposits. Thickness of the loess ranges from approximately 32 to 46 feet at SWMU 39. Color ranges from varying shades of brown, orange-brown and gray-brown to gray. Some gray mottling and iron staining were observed. While use of water during rotasonic drilling

made it difficult to identify groundwater zones, saturated horizons in the loess typically are encountered around 10 to 15 feet below land surface (bls). The vertical permeability coefficient of the loess is $4.5x10^{-6}$ cm/sec.

The fluvial deposits were encountered beneath the loess at depths between 32 and 41.5 feet, with an overall thickness ranging from 11.5 to 42 feet at SWMU 39. The entire thickness is saturated. The fluvial deposits comprise a fine to coarse-grained, poorly sorted sand and gravel unit ranging from 11 to 35 feet thick. The rounded to sub-angular gravel coarsens downward, with individual cobbles typically ranging from less than 0.25 to 1 inch in longest dimension. Cobbles were occasionally encountered as large as 2 to 2.5 inches in longest dimension. Color ranges from varying shades of orange-brown and gray to olive gray.

At SWMU 39, the contact between the fluvial deposits and the Cockfield Formation ranges from 50.5 to 75.5 bls. The upper part of the Cockfield Formation consists of a discontinuous sand zone overlying a clay zone. This upper part consists of a very fine to fine grained sand, ranging in color from very light gray to light yellow-gray. Where present, the sand thickness ranges from 16.5 to 28 feet. The sand zone is not present at the 039G01LF and 039G06LF well locations.

Clay horizons in the Cockfield Formation behave as a lower semiconfining unit for the fluvial deposits and, where present, sandy zones underlying the fluvial deposits in the upper part of the Cockfield Formation. The contact between sands in the upper part of the Cockfield Formation and clays in the upper to middle part of the formation was noted by a distinct change from fine sand to clay. The clay zones in the upper to middle part of the Cockfield Formation consist of dark charcoal gray or dark olive gray clay which is dense and very stiff. Fine sand was noted within the clay at some locations.

Hydrogeology

As discussed in the *Assembly F RFI Report* (EnSafe, 2000), the water-bearing units sampled during the RFI were the loess, the fluvial deposits, and the upper part of the Cockfield Formation. Groundwater in the loess flows primarily downward, although locally some loess groundwater may discharge to nearby streams, drainage ditches, and other surface-water bodies.

During the RFI, groundwater elevations were measured to determine flow directions and horizontal gradients in the fluvial deposits/upper Cockfield Formation at SWMU 39. Potentiometric maps indicate a southwest groundwater flow direction. The average hydraulic conductivity was 6.8 ft/day. With an effective porosity of 0.25 and a horizontal hydraulic gradient of 0.0024 ft/ft in the fluvial deposits/upper Cockfield Formation, the average horizontal groundwater velocity is approximately 0.07 ft/day (25.6 ft/yr).

3.3 Nature and Extent of Contamination

The SWMU 39 investigation is documented in the *Assembly F RFI Report* (EnSafe, 2000). Samples collected during the RFI indicated an impact to soil and loess and fluvial deposits groundwater. Previous investigations showed chlorinated solvents and petroleum hydrocarbons at concentrations greater than screening levels in soil beneath the Building S-74 foundation, and chlorinated solvents were detected in loess and fluvial deposits groundwater. The RFI report recommended that further delineation of chlorinated solvents in soil beneath the Building S-74 foundation and in loess and fluvial deposits groundwater was needed to complete a CMS evaluation. The following sections summarize SWMU 39 soil and groundwater sampling results, including results from the DPT investigation completed in October 2000 that were not included in the RFI report.

3.3.1 Soil Contamination

During the RFI, soil samples were collected from six locations at SWMU 39. Surface-soil samples (0 to 1 foot bls) were collected from five locations beneath the foundation of former Building S-74. Subsurface-soil samples were collected at location 039S0023 from depths of 9 to 11 feet and 11 to 13 feet bls. Analytical results indicated a release of chlorinated solvents and petroleum-related compounds. Table 3-1 shows the volatile organic compounds (VOCs) that exceeded their SSLs. None of the compounds exceeded their RBCs.

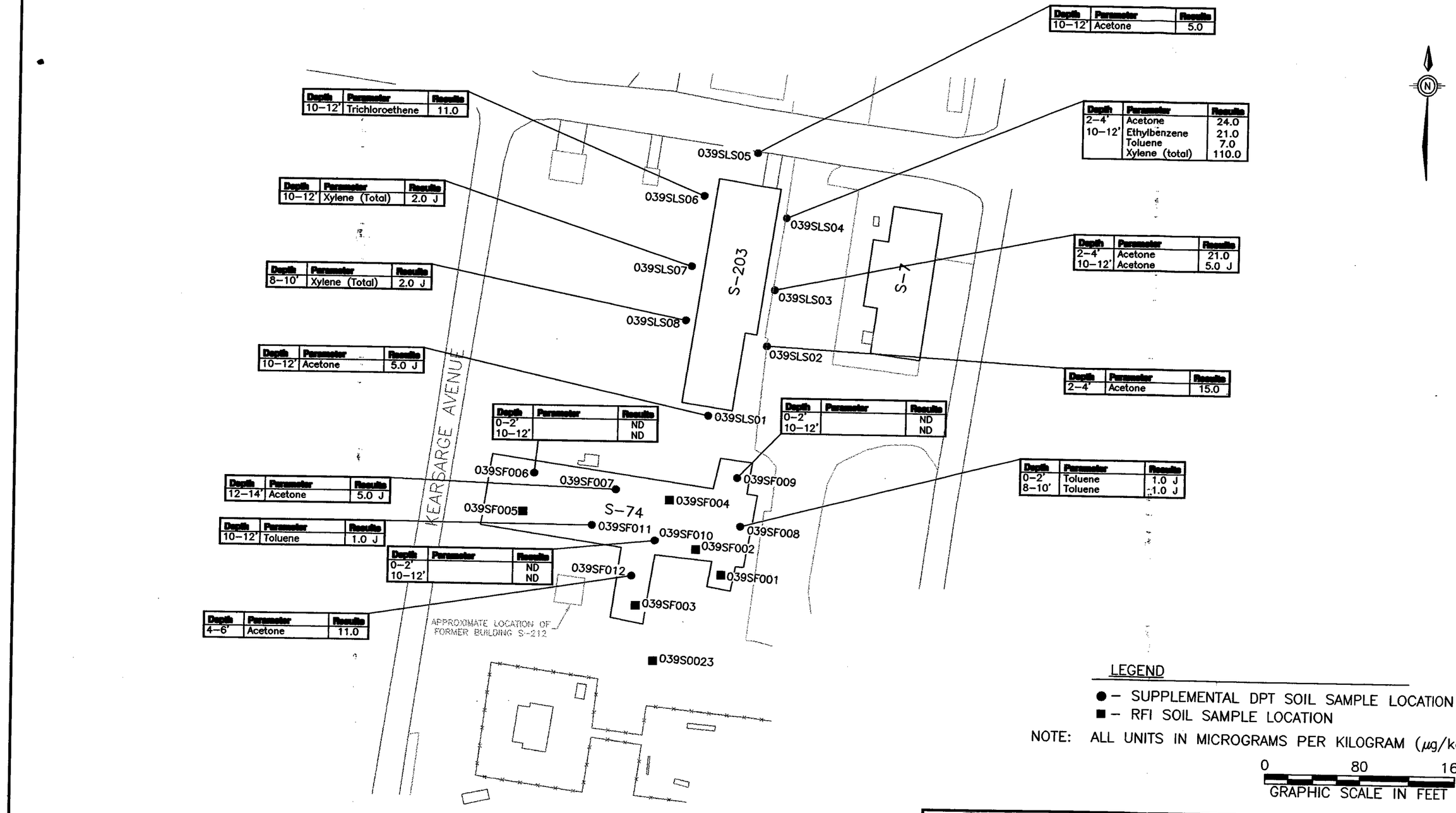
Table 3-1
RFI Soil Sample Exceedances (µg/kg)

Location	Sample Interval[a]	Parameter	Detection	Residential RBC[b]	Industrial RBC[b]	SSL[b]
039SF003	0 to 1	cis-1,2-dichloroethene (DCE)	20	7.8 E+5	2.0 E+7	**17**
	0 to 1	tetrachloroethene (PCE)	41	1.2 E+4	1.1 E+5	**2.4**
	0 to 1	trichloroethene (TCE)	23	5.8 E+4	5.2 E+5	**0.77**
	0 to 1	acetone	130	7.8 E+6	2.0 E+8	**120**
039S0023	9 to 11	acetone	480	7.8 E+6	2.0 E+8	**120**

Notes:
µg/kg = micrograms per kilogram
a = feet below land surface
b = SSL and RBC values are from the USEPA Region III September 2001 Risk-Based Concentration Tables
Bold = Detection exceeds the respective screening value

Supplemental Soil Sampling

The SWMU 39 DPT soil investigation, conducted in October 2000 as part of a supplement to the RFI, yielded 15 subsurface-soil samples from beneath and around the concrete slab of former Building S-74 and also from the area of former Building S-212. The supplemental samples were analyzed for VOCs. Table 3-2 shows the detections. Only TCE was detected in concentrations exceeding its SSL of 0.77 µg/kg in one soil sample (11 µg/kg in 039SLS0612). None of the samples exceeded their respective RBCs. Figure 3-1 shows the RFI and supplemental DPT soil-sample locations with detections.



LEGEND

● – SUPPLEMENTAL DPT SOIL SAMPLE LOCATION
■ – RFI SOIL SAMPLE LOCATION

NOTE: ALL UNITS IN MICROGRAMS PER KILOGRAM (μg/kg)

0 80 160
GRAPHIC SCALE IN FEET

SWMU 39
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FIGURE 3-1
SWMU 39 DPT SOIL SAMPLING DETECTIONS
(OCTOBER 2000)

DWG DATE: 08/16/01 | NAME: 0146001W013

Table 3-2
DPT Soil Investigation Detections (µg/kg)
October 2000

Location	Sample Depth[a]	Parameter	Detection	Residential RBC[b]	Industrial RBC[b]	SSL[b]
039SF007	14	acetone	5 J	7.8 E+6	2.0 E+8	120
039SF008	2	toluene	1 J	1.6 E+7	4.1 E+8	440
	10	toluene	1 J	1.6 E+7	4.1 E+8	440
039SF011	12	toluene	1 J	1.6 E+7	4.1 E+8	440
039SF012	6	acetone	11	7.8 E+6	2.0 E+8	120
039SLS01	12	acetone	5 J	7.8 E+6	2.0 E+8	120
039SLS02	4	acetone	15	7.8 E+6	2.0 E+8	120
039SLS03	4	acetone	21	7.8 E+6	2.0 E+8	120
	12	acetone	5 J	7.8 E+6	2.0 E+8	120
039SLS04	4	acetone	24	7.8 E+6	2.0 E+8	120
	12	toluene	7	1.6 E+7	4.1 E+8	440
	12	ethylbenzene	21	7.8 E+6	2.0 E+8	750
	12	xylene (total)	110	1.6 E+8	4.1 E+9	8,500
039SLS05	12	acetone	5 J	7.8 E+6	2.0 E+8	120
039SLS06	12	TCE	11	5.8 E+4	5.2 E+5	**0.77**
039SLS07	12	xylene (total)	2 J	1.6 E+8	4.1 E+9	8,500
039SLS08	10	xylene (total)	2 J	1.6 E+8	4.1 E+9	8,500

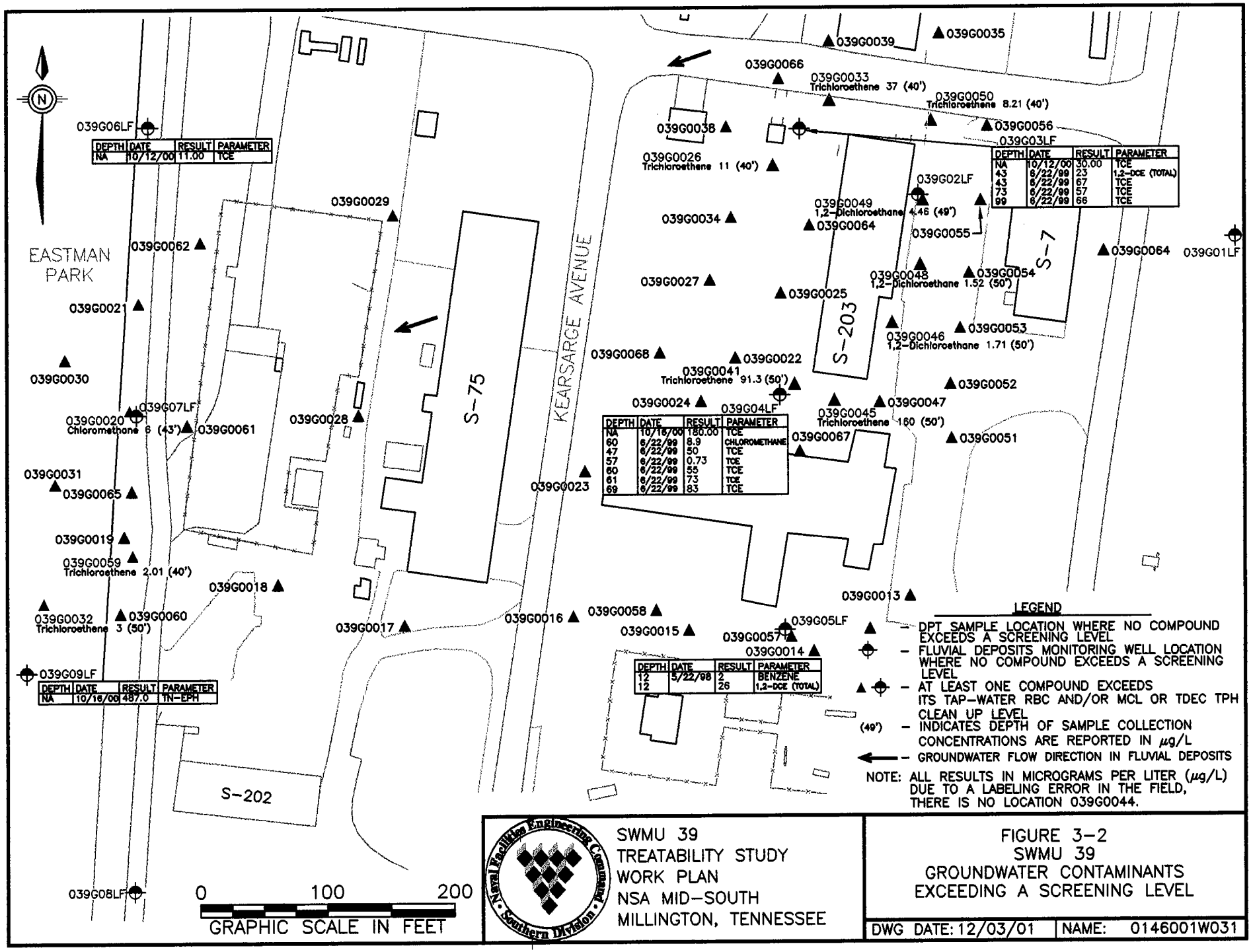
Notes:
a = feet below land surface
b = SSL and RBC values are from the USEPA Region III September 2001 Risk-Based Concentration Tables
J = estimated
Bold = Detection exceeds the respective screening level

3.3.2 Groundwater Contamination

Table 3-3 shows the groundwater samples from the RFI that exceeded either their tap-water RBC or MCL for the loess, fluvial deposits, and Cockfield Formation groundwater. Of the loess groundwater samples collected during the RFI, VOCs were detected only in the DPT loess groundwater sample from location 039G0014. Benzene and 1,2-DCE (total) exceeded either their RBC in this sample. It appears that the lateral extent of contamination in the loess is limited to the immediate area of location 039G0014. TCE and 1,2-dichloroethane (DCA) were the most common compounds exceeding their RBC and/or MCL in groundwater samples collected from the fluvial deposits. In the fluvial deposits/Cockfield Formation, TCE and 1,2-DCE (total) were the most common compounds exceeding their RBC and/or MCL. Sample locations and groundwater contaminants detected during the RFI above a screening level in the loess and fluvial deposits are shown on Figure 3-2.

Supplemental Groundwater Sampling

Supplemental sampling was conducted in October and December 2000 of all SWMU 39 loess and fluvial deposits/Cockfield Formation groundwater monitoring wells. All samples were collected from the bottom five feet of each well screen. Table 3-4 shows which wells exceeded a screening level from this sampling event. TCE exceeded its MCL in samples from three fluvial deposits wells (039G03LF, 039G04LF, 039G06LF). Figures 3-3 and 3-4 show the fluvial deposits and loess groundwater well locations and detections, respectively. None of the compounds detected in the loess exceeded their RBC and/or MCL. The USEPA does not have an RBC or MCL for TPH (TN-EPH). Because loess groundwater will likely never be used as a potable water source at NSA Mid-South due to its low yield and poor aesthetic water quality, detected concentrations of TPH in samples collected from loess wells are compared to the TDEC groundwater cleanup level of 1,000 μg/L for non-drinking water aquifers. TPH concentrations found in fluvial monitoring wells are compared to TDEC's most stringent groundwater cleanup level of 100 μg/L for drinking water aquifers. None of the samples from the loess monitoring wells exceeded the cleanup level while one sample from the fluvial deposits wells exceeded its TPH goal. Copies of laboratory reports for this event are in Appendix A of this document.



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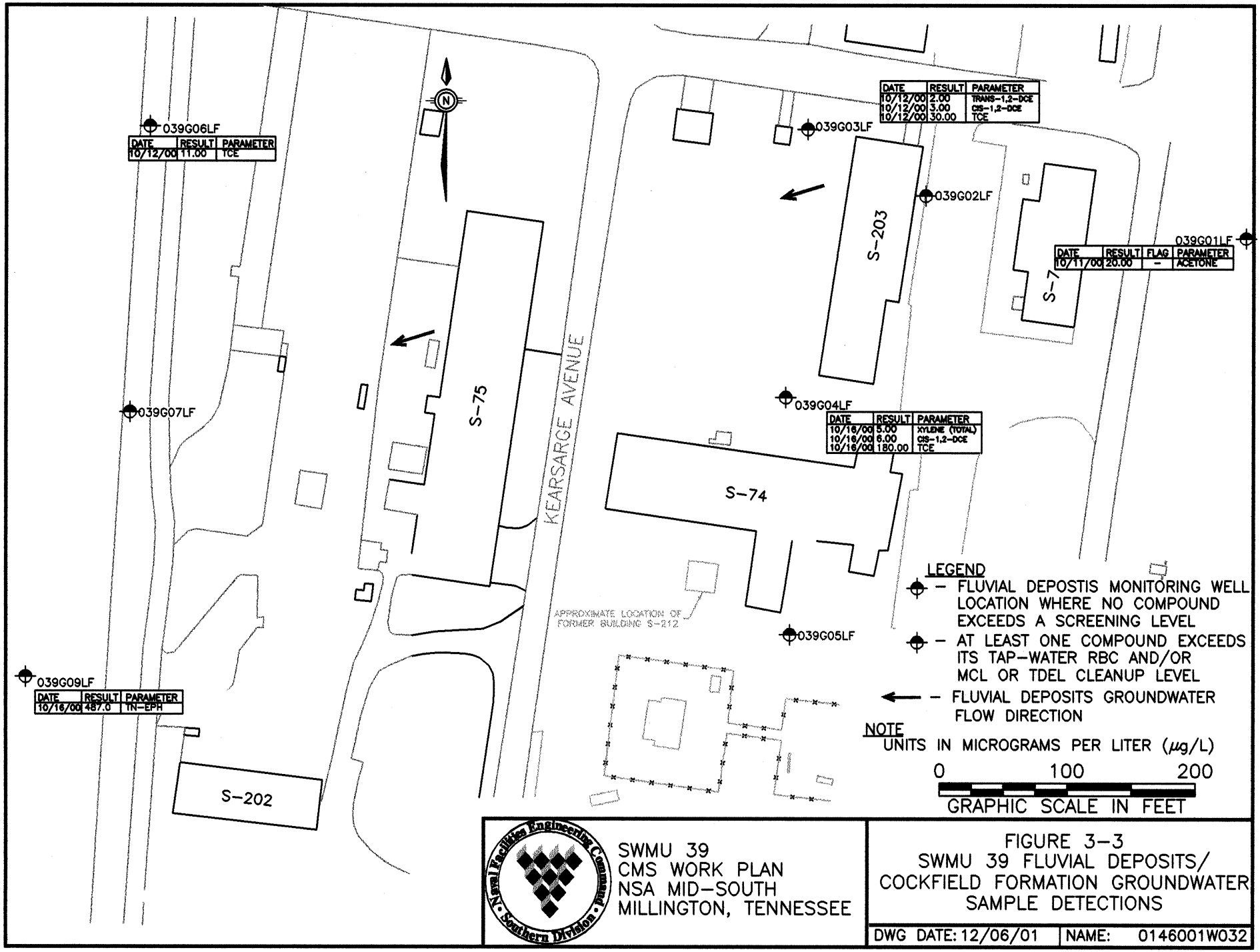
SWMU 39
TREATABILITY STUDY
WORK PLAN
NSA MID-SOUTH
MILLINGTON, TENNESSEE

FIGURE 3-2
SWMU 39
GROUNDWATER CONTAMINANTS
EXCEEDING A SCREENING LEVEL

DWG DATE: 12/03/01 | NAME: 0146001W031



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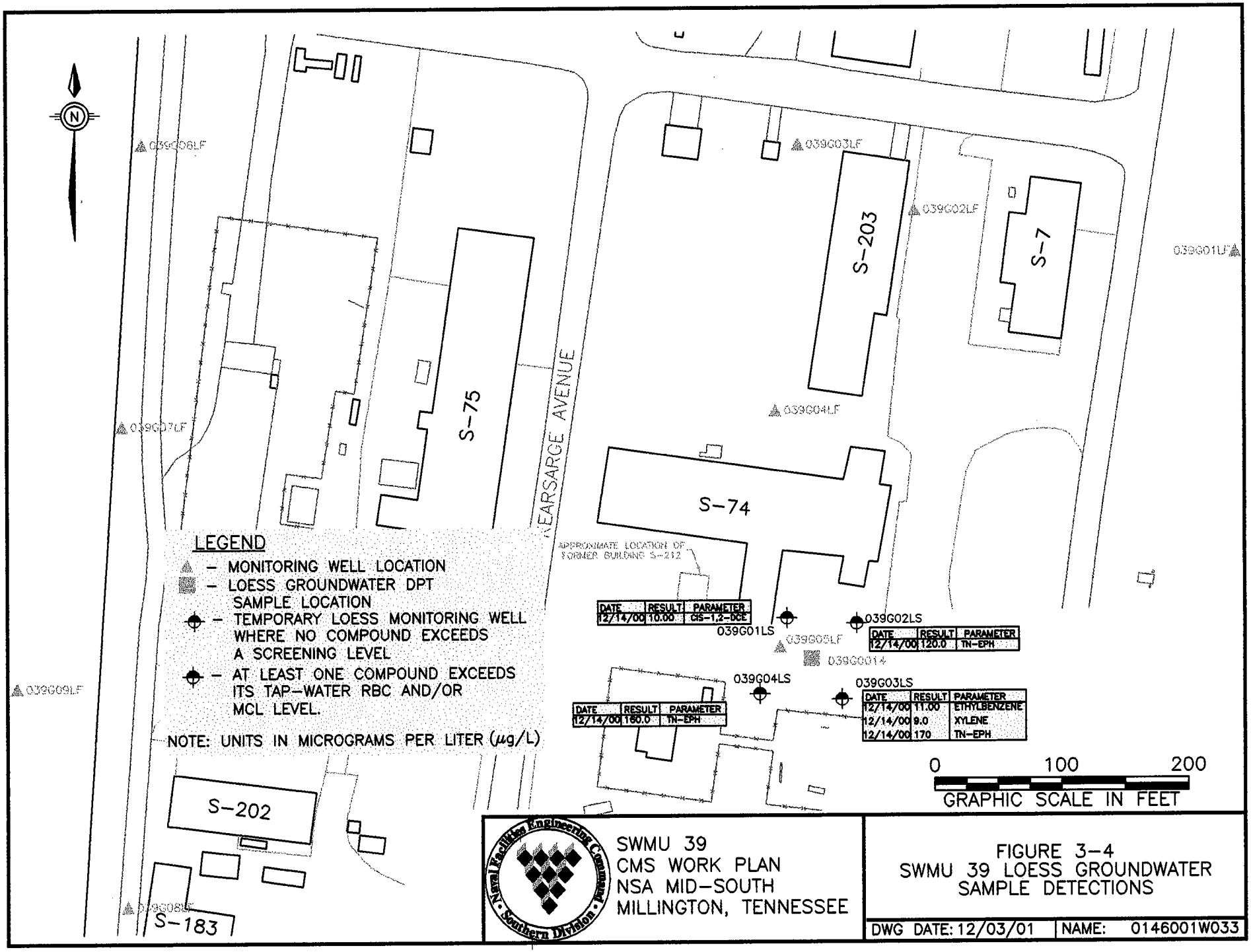
SWMU 39
CMS WORK PLAN
NSA MID-SOUTH
MILLINGTON, TENNESSEE

FIGURE 3-3
SWMU 39 FLUVIAL DEPOSITS/
COCKFIELD FORMATION GROUNDWATER
SAMPLE DETECTIONS

DWG DATE: 12/06/01 | NAME: 0146001W032



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SWMU 39
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FIGURE 3-4
SWMU 39 LOESS GROUNDWATER
SAMPLE DETECTIONS

DWG DATE: 12/03/01 | NAME: 0146001W033

Table 3-3
RFI Groundwater Sample Exceedances (µg/L)

Location	Sample Depth[a]	Parameter	Detection	Tap-Water RBC[b]	MCL[c]
Loess DPT Samples					
039G0014	12	benzene	2	**0.32**	5
	12	1,2-DCE (total)	26	55	**5**
Fluvial Deposits DPT Samples					
039G0020	40	chloromethane	6	**2.1**	NL
039G0026	40	TCE	11	**1.6**	**5**
039G0032	50	TCE	3	**1.6**	5
039G0033	40	TCE	37	**1.6**	**5**
039G0041	50	TCE	91.30	**1.6**	**5**
039G0045	50	TCE	160	**1.6**	**5**
039G0046	50	1,2-DCA	1.71	**0.12**	5
039G0048	50	1,2-DCA	1.52	**0.12**	5
039G0049	40	1,2-DCA	4.46	**0.12**	5
039G0050	40	TCE	8.21	**1.6**	**5**
039G0059	40	TCE	2.01	**1.6**	**5**
Fluvial Deposits/Cockfield Formation Monitoring Well Samples					
039G03LF	43	1,2-DCE (total)	23	55	**5**
	43	TCE	67	**1.6**	**5**
	73	TCE	57	**1.6**	**5**
	99	TCE	66	**1.6**	**5**
039G04LF	47	TCE	50	**1.6**	**5**
	57	1,2-DCE (total)	10	55	**5**
	57	TCE	73	**1.6**	**5**
	60	chloromethane	8.9	**2.1**	NL
	60	TCE	55	**1.6**	**5**
	61	TCE	73	**1.6**	**5**
	69	TCE	83	**1.6**	**5**

Notes:
a = feet below land surface
b = Tap-water RBC screening values are from the USEPA Region III September 2001 Risk-Based Concentration Tables
c = MCL values are from the USEPA Summer 2000 Drinking Water Standards and Health Advisories
NL = Not listed
Bold = Detection exceeds the respective screening value

Table 3-4
Supplemental Groundwater Data (October 2000)
Exceedances Only (µg/L)

Location	Sample Date	Depth[a]	Parameter	Detection	Tap-Water RBC[b]	MCL[c]
Fluvial Deposits						
039G03LF	10/00	98'	TCE	30	**1.6**	**5**
039G04LF	10/00	98'	TCE	180	**1.6**	**5**
039G06LF	10/00	65'	TCE	11	**1.6**	**5**
039G09LF	10/00	88'	TN-EPH	487 J	**100[d]**	

Notes:
a = feet below land surface
b = Tap-water RBC screening values are from the USEPA Region III September 2001 *Risk-Based Concentration Tables*
c = MCL values are from the USEPA Summer 2000 *Drinking Water Standards and Health Advisories*
d = TDEC TPH remediation goal
J = estimated
Bold = Detection exceeds respective screening level
Samples from wells 039G01LF, 039G02LF, 039G05LF, 039G07LF, and 039G08LF were either non-detect or detections were below the RBCs and/or MCLs. All wells sampled from the bottom five feet of the well screen.

3.4 Conclusions and Recommendations

- Fifteen additional DPT soil samples were obtained and analyzed for volatiles and TPH, as part of the supplemental sampling event conducted in October 2000. Because minimal contamination was found in surface soils and subsurface soils beneath the Building S-74 concrete slab, the potential impact of removing the slab is considered negligible. No further action is recommended for surface and subsurface soils at SWMU 39.

- Because VOCs detected in groundwater samples collected from loess monitoring wells did not exceed RBCs or MCLs, no further action is recommended for loess groundwater, except for abandonment of the four temporary loess monitoring wells.

- Based on supplemental sampling results for the fluvial deposits/upper Cockfield Formation, TCE exceeded its MCL at three monitoring well locations. TPH also exceeded its TDEC cleanup level at one monitoring well location. Because this contamination is small and presents a minimal exposure concern, fluvial deposits/upper Cockfield Formation groundwater should be addressed in a streamlined CMS for TCE and petroleum-related contaminants.

4.0 INVESTIGATING AND EVALUATING POTENTIAL REMEDIES

As previously stated, the CMS portion of the RCRA corrective action process is designed to identify and evaluate remedial alternatives for contaminant releases. Evaluation of environmentally protective remedies may be relatively straightforward at some SWMUs or AOCs, and may not require extensive study of numerous remedial alternatives. This streamlined CMS approach may be appropriate at facilities where environmental problems are relatively small and releases present minimal exposure concerns (USEPA, 1994).

For sites where the contamination problem is small and/or simple, only one alternative may be evaluated. The small area associated with the SWMU 39 lower fluvial deposits/upper Cockfield Formation groundwater is consistent with a streamlined approach to remedy selection. A streamlined approach will enable SWMU 39 to move from facility investigation to CMI more rapidly.

4.1 Identification, Screening, and Development of Corrective Measures Technologies

Generally, engineering practice and experience are used to identify which one of the corrective action technologies appears most suited to each SWMU or AOC. The initial step in assembling corrective measures technology alternatives is a review of the RFI results and corrective action objectives, followed by identification of technologies applicable to corrective measures for each SWMU/AOC or group of SWMUs/AOCs. Selection of corrective measures technologies is based on site-, waste-, and technology-specific characteristics using current literature, vendor information, USEPA treatability databases, technology databases, guidance documents and handbooks, and experience in developing alternatives for similar sites, and releases.

4.2 General Approach

The proposed remedy will be evaluated according to five standards reflecting the major technical components of the remedy, including cleanup of releases, source control, and management of wastes generated by remedial activities.

General Approach Standards

- Protection of human health and the environment.
- Attainment of media cleanup standards set by the implementing agency.
- Control of the source(s) of releases to reduce or eliminate, to the extent practicable, further releases that may pose a threat to human health and the environment.
- Compliance with any applicable standards for management of wastes.
- Other factors.

4.2.1 Protection of Human Health and the Environment

The selected remedy may include measures to protect human health and the environment, even though they are not directly related to media cleanup, source control, or management of wastes. For example, access controls, and deed restrictions may be used to prevent contact with contaminated media while intrinsic or engineered remedial processes are monitored or augmented.

4.2.2 Attainment of Media Cleanup Standards Set by the Implementing Agency

The proposed remedy will be evaluated on its ability to achieve the PRGs. This evaluation will include an estimate of the time necessary for the selected remedy to meet these standards. Remedial goal options (RGOs) may be established where PRGs cannot be attained.

4.2.3 Control of Release Sources

Although not anticipated for SWMU 39, source-control measures will be evaluated as part of the CMS to determine if they are necessary to control or eliminate further releases that may threaten human health or the environment. If a source-control measure is proposed, the CMS report will discuss the selected technology and its reliability under given site conditions.

Source-control measures will be considered when it is necessary to stop further environmental degradation by controlling or eliminating further releases. Without source-control measures, some cleanup efforts may be ineffective, or at best will essentially involve a perpetual cleanup. In these cases, an effective source-control program may be essential to ensure the long-term effectiveness and protectiveness of the corrective action program. Source-control measures may include all protective remedies such as partial waste removal, capping, slurry walls, in situ treatments and/or stabilization, and consolidation.

4.2.4 Compliance with Any Applicable Standards for Management of Wastes

The report will discuss how specific waste-management activities will maintain compliance with applicable state or federal regulations such as closure requirements and land-disposal restrictions.

4.2.5 Other Factors

Five general factors will be considered, as appropriate, in approving a remedy that meets the standards listed above. These factors combine technical measures and management controls to address the environmental problems at a facility:

- Long-term reliability and effectiveness.
- Reduction in the toxicity, mobility, or volume of wastes.
- Short-term effectiveness.
- Implementability.
- Cost.

Long-Term Reliability and Effectiveness

The CMS will evaluate whether the technology or a combination of technologies has been used effectively under similar site conditions, whether failure of any one technology in the alternative would have an immediate impact on receptors, and whether the alternative would have the flexibility to accommodate uncontrollable site changes.

This criterion will assess the proposed useful life of the alternative and its component technologies. Useful life is defined as the length of time that the level of effectiveness can be maintained. Typically, most corrective measures technologies deteriorate over time. Deterioration can often be slowed through proper system operation and maintenance, but the technology may eventually require replacement to maintain effectiveness.

Reduction in the Toxicity, Mobility, or Volume of Wastes

In general, preferred remedies use treatment technologies which can eliminate (or substantially reduce) the potential for contaminated media to cause future environmental releases

or other risks to human health and the environment. Estimates of how much the corrective measures alternatives will reduce the waste toxicity, mobility, or volume may help in assessing this criterion.

In some situations, reduction in toxicity, mobility, or volume may not be practical or even desirable. For example, unexploded munitions may be extremely dangerous to handle, and in such situations the short-term risks of treatment outweigh potential long-term benefits.

Short-Term Effectiveness

The short-term effectiveness of the selected remedy will be assessed, including the potential for fire, explosion, and exposure to hazardous substances. Threats associated with treatment, excavation, transportation, and disposal or containment of waste material will also be assessed. This criterion is important in densely populated areas, and when waste characteristics pose high risks to workers or the environment and special protective measures are needed.

Implementability

The implementability of the selected remedy will be evaluated to assess any potential impacts to the time required to implement a given remedy. Information to consider for implementability includes:

- Administrative activities needed to implement the corrective measures alternative (e.g., permits, rights-of-way, offsite approvals) and how long they will take.

- Criteria for construction, time for implementation, and time for beneficial results.

- Availability of adequate offsite treatment, storage capacity, disposal services, needed technical services, and materials.

- Availability of prospective technologies needed for the selected remedy.

Cost

The CMS will consider the relative cost of the proposed remedy. This criterion is especially useful when several technologies offer the same degree of protection to human health and the environment but vary widely in cost. The accuracy of cost estimating increases as the project moves from the conceptual/feasibility phase to an actual design, fabrication, and start-up. Therefore, cost estimates calculated in the CMS should be viewed in the ensuing decision-making process as guidance and not as definitive fact.

Cost estimates are generally subdivided into:

- *Direct Capital Costs:* Remedial action construction, equipment, land/site development, building and services, relocation of population, and disposal costs.

- *Indirect Capital Costs:* Engineering expenses, supervision/inspection/overhead, and monitoring and testing.

- *Contingency Allowances:* Varies.

- *Other Indirect Expenses:* Legal fees, license/permit costs, and start-up/shake-down.

- *Operation and Maintenance Costs:* Operating labor, maintenance material, and labor, auxiliary materials and labor, purchased services, administration, insurance/taxes/licenses, maintenance reserve, contingency, and other costs.

4.3 Corrective Measures Alternative

Based on the specific characteristics of SWMU 39, and using available resources, MNA was identified as the corrective measures alternative that has the best potential to achieve the remedial goals for this site. Factors considered were:

- Contamination is well defined.
- Lack of source (no significant soil contamination).
- Lack of receptors.
- Strong geochemical evidence of contaminant degradation from preliminary MNA evaluation results.

Well-Defined Contamination

The supplemental sampling confirmed that the contamination is limited to the lower fluvial deposits/upper Cockfield Formation groundwater.

Lack of Source

During the supplemental sampling, only one soil sample had a compound exceed its MCL and RBC. Because no significant soil contamination exists at this site, a potential source could not be determined.

Lack of Receptors

No fluvial deposits drinking-water wells are present at NSA Mid-South and a public water supply is readily available, thereby eliminating any potential receptors for SWMU 39 groundwater. Periodic sampling at SWMU 39 has shown limited horizontal migration of contaminants, which precludes any threat to cross-gradient discharge points, including discharges to surface waters, and other ecosystems.

Preliminary MNA Evaluation Results

Analytical results from historical and supplemental groundwater sampling were used to perform a preliminary MNA evaluation (see Appendix B). Results of this evaluation indicate that MNA may be a viable remedial alternative for SWMU 39. Key indicators include:

- Absence of contamination in downgradient monitoring wells suggests that the rate of natural attenuation of TCE and its daughter products is greater than the rate of migration in the aquifer.

- Low dissolved oxygen concentrations (generally <0.5 mg/L) were found in the groundwater samples, indicating anaerobic conditions conducive to TCE degradation by reductive dechlorination. Low redox values further support this finding.

- Ferrous iron was detected at high concentrations (>5.0 mg/L) in several area wells, indicating that iron could be mediating the direct anaerobic oxidation of daughter products *cis*-1,2-DCE and vinyl chloride.

- The presence of petroleum hydrocarbons, a valuable source of organic carbon for microorganisms, serves to induce anaerobic conditions and facilitate the degradation process.

- TCE daughter products such as vinyl chloride are not accumulating in the aquifer.

Considering the above factors with the nature and extent of contamination, MNA was identified as the corrective measure alternative that is most likely to satisfy the criteria described in Section 4.2. The following section provides a general approach for evaluating MNA in a streamlined CMS. Following approval of this document, a detailed work plan describing specific methods and procedures for evaluating MNA at SWMU 39 will be submitted to the BCT. This work plan will include recommendations for additional fluvial deposits monitoring wells to further define the contaminant plume and provide geochemical data for the MNA evaluation.

4.4 Monitored Natural Attenuation

Natural attenuation is the combined effect of various physical, chemical, and biological processes that act to reduce the toxicity, mobility, and mass of a contaminant(s) in the subsurface. Physical processes include advection, dispersion, adsorption, and volatilization. Chemical processes include chemical oxidation and hydrolysis, while biological processes include microbially mediated destruction of contaminants. Physical processes are commonly referred to as nondestructive because they reduce contaminant concentrations and/or mobility without reducing contaminant mass in an aquifer. Chemical and biological processes are commonly referred to as destructive processes because they actually reduce the contaminant mass in an aquifer.

4.4.1 General Evaluation Approach

Evaluating natural attenuation as a remedial alternative involves understanding how natural, physical, chemical, and biological processes work to reduce contaminants to concentrations that protect human health and the environment. An evaluation of natural attenuation requires adequate site hydrogeological, chemical, and microbial characterization and use of these data to assess and demonstrate the potential of natural attenuation at a site.

The following steps constitute a general approach to evaluating natural attenuation. Depending on the nature of contamination, its extent, and hydrogeological, geological, and regulatory requirements, all these steps may not be required in a MNA evaluation. Furthermore, the steps are not listed sequentially and can be interchanged as necessary to evaluate the feasibility of MNA as a potential remedial alternative.

1. Review available site hydrogeological, geochemical, and contaminant data.

2. Perform preliminary screening of the site using geochemical data to assess the potential for natural attenuation.

3. Assess the economics of natural attenuation.

4. Evaluate whether natural attenuation can reach cleanup goals (solely or in combination with another remedy), and if so, in what time frame.

5. Develop a groundwater monitoring program to demonstrate natural attenuation.

6. Establish a remedial contingency in the event that monitoring indicates natural attenuation is insufficient to remediate groundwater.

4.4.2 Review of Site Data

The following site characterization data, collected during the RFI, will be used to evaluate the feasibility of using natural attenuation for remediation of SWMU 39 contaminants.

- Location and type of chlorinated solvents in SWMU 39 fluvial deposits/upper Cockfield Formation groundwater.

- Location, extent, and concentrations of dissolved contaminants in the groundwater collected interactively over the period of the investigation.

- Geochemical data collected during the RFI.

- Hydrogeological parameters such as soil type, thickness of the geological deposits, thickness of the aquifer(s), hydraulic conductivity, hydraulic gradient, porosity, and groundwater velocity.

4.4.3 Criteria for Preliminary Screening of Geochemical Data

Geochemical data are to be used in the preliminary screening process that evaluates the potential of the biodegradation component of natural attenuation at the site. The screening process is based on the concept that natural geochemical conditions influence natural microbial activity, and the resulting natural biodegradation causes changes in groundwater chemistry. Following is a list of some of the significant geochemical parameters for MNA evaluation:

- Dissolved Oxygen (DO)
- pH
- Temperature
- Redox Potential
- Sulfide
- Ferrous Iron
- Total Iron
- Nitrate
- Sulfate
- Specific Conductivity
- Methane
- Alkalinity
- Chloride
- Total Organic Carbon

The screening process uses a scoring system that allocates points to each geochemical parameter. An established scoring table is detailed in the USEPA *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater* (USEPA, 1998). The scoring table also lists chemical data and the significance of the presence of TCE and PCE daughter breakdown products in the aquifer. The scoring table and the total points scored for a particular site can be used to interpret the extent of evidence of natural biodegradation. Data will be evaluated as outlined in *Use of Monitored Natural Attenuation at Superfund RCRA Corrective Action, and Underground Storage Tank Sites* (USEPA, 1999).

Table B-1 in Appendix B summarizes the critical geochemical parameters at SWMU 39. Because of insufficient data at this site, geochemistry is discussed qualitatively in contrast to the general scoring format outlined above. Because this is the first step in evaluating MNA feasibility, understanding how geochemistry affects the degradation of VOCs is more critical. When more geochemical data are collected, the site may be formally scored. During the CMS, a monitoring program will be implemented to collect additional chemical and geochemical data. The program will consist of installing additional monitoring wells and quarterly monitoring. Results from analysis of groundwater geochemistry and the potential for natural biodegradation of chlorinated solvents at SWMU 39 will be detailed in the CMS report.

4.4.4 Economic Analysis of MNA

Cost considerations for MNA will be evaluated as described in Section 4.2.5.

4.4.5 Achieving RGOs

MNA and its ability to achieve RGOs will be evaluated as described in Section 4.2.2.

4.4.6 Development of Monitoring Program

A long-term monitoring program will be developed to monitor the area over time and to verify that natural attenuation is occurring at rates sufficient to attain site-specific RGOs within the predicted time frame. The monitoring plan will be designed to evaluate long-term behavior of the groundwater, to verify that exposure to contaminants does not occur, to verify that natural attenuation breakdown products do not pose additional risks, to determine actual attenuation rates for refining predictions of the remediation time frame, and to document when site-specific RGOs have been attained.

At minimum, the monitoring program will analyze groundwater samples for:

— VOCs

— Geochemical parameters: DO, pH, iron, methane, nitrate, and sulfate

4.4.7 Establishing Remedial Contingency

The results of the natural attenuation study will be presented in the CMS report, which will objectively evaluate whether MNA is the most appropriate remedial option for SWMU 39. All available data and information developed during the study will be presented in the CMS report. If the proposed remedy cannot achieve RGOs as described, other protective remedies will be considered.

4.5 Institutional Controls

Institutional controls often supplement engineering controls, as appropriate, for short- and long-term management to prevent or limit exposure to hazardous substances, pollutants, or contaminants. Institutional controls, which will be evaluated in the CMS, should not supplant active response measures as the sole remedy unless active measures are determined to be impractical.

Typical Institutional Controls

- Site access controls
- Public awareness, education
- Groundwater-use restrictions
- Long-term monitoring
- Warning against water use

In addition to these institutional controls, deed restrictions or incorporating land use controls into the Installation Master Plan (or equivalent) may be used.

4.6 Corrective Measures Alternative Recommendations

After corrective measures have been evaluated, the CMS report will recommend a remedial alternative based on its ability to meet the criteria in Section 4.2. The recommended alternative could be one remedy or a combination of remedies. Figure 4-1 is a flow chart that details the corrective measures selection process for SWMU 39.

REVIEW AVAILABLE SITE DATA AND DEVELOP CONCEPTUAL REMEDIATION MODEL

ASSESS POTENTIAL FOR NATURAL ATTENUATION BASED ON CONTAMINANT TYPE AND DISTRIBUTION; HYDROGEOLOGY; PLUME STABILITY LOCATION OF RECEPTORS; GEOCHEMICAL EVIDENCE FOR BIODEGRADATION (OR OTHER ATTENUATION MECHANISM)

EVALUATE SELECTED ENGINEERED REMEDIAL OPTION:
1) NONE PROPOSED AT THIS TIME
SUPPLEMENTAL OPTIONS:
1) NONE PROPOSED AT THIS TIME

COLLECT MORE SCREENING DATA

IS NATURAL ATTENUATION A VIABLE REMEDIAL OPTION

NO

YES

ARE SUFFICIENT DATA AVAILABLE?

NO

YES

LOCATE SOURCE(S) AND RECEPTOR(S)

DETERMINE GROUNDWATER FLOW AND SOLUTE TRANSPORT PARAMETERS USING SITE-SPECIFIC DATA AND DETERMINE IF THE PLUME IS STABLE (AT EQUILIBRIUM)

ESTIMATE BIODEGRADATION RATE CONSTANT USING SITE SPECIFIC DATA

DOES NATURAL ATTENTUATION APPEAR FEASIBLE?
1) IS THE PLUME GOING TO ATTENUATE TO CONCENTRATIONS LESS THAN MCLS?
2) IS THE RATE OF MASS ATTENUATION SUCH THAT PLUME SIZE AND CONCENTRATION ARE EITHER DECREASING OR REMAINING THE SAME?
3) IS CONTAMINANT MASS ATTENUATING AT RATES SUFFICIENT TO BE PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT?

NO

YES

DOES IT APPEAR THAT NATURAL ATTENUATION ALONE WILL MEET REGULATORY CRITERIA?

NO

EVALUATE USE OF SELECTED ENGINEERED REMEDIES ALONG WITH NATURAL ATTENUATION

YES

STREAMLINED CMS REPORT (ONE ALTERNATIVE)

IF NATURAL ATTENUATION IS SELECTED AS THE SOLE REMEDIAL ALTERNATIVE

IF NATURAL ATTENTION IS NOT SELECTED AS SOLE ALTERNATIVE

DEVELOP CORRECTIVE MEASURES IMPLEMENTATION (CMI) PROGRAM FOR NATURAL ATTENUATION

INITIATE VERIFICATION OF NATURAL ATTENUATION USING LONG-TERM MONITORING PROGRAM

VERIFY ATTAINMENT OF SITE CLEANUP GOALS THROUGH LONG-TERM MONITORING PROGRAM

IMPLEMENT CONTINGENCY ALTERNATIVE IF NATURAL ATTENUATION IS NOT EFFECTIVE

DEVELOP CORRECTIVE MEASURES IMPLEMENTATION (CMI) PROGRAM FOR SELECTED ENGINEERED ALTERNATIVE: PREPARE DESIGNS, PLANS, OPERATION AND MAINTENANCE PROCEDURES FOR ENGINEERED ALTERNATIVE, AND EFFECTIVENESS MONITORING PROGRAM

CONSTRUCT AND IMPLEMENT ENGINEERED REMEDY

VERIFY ATTAINMENT OF SITE CLEANUP GOALS THROUGH EFFECTIVENESS AND MONITORING PROGRAM

NSA MID-SOUTH
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FIGURE 4-1
CORRECTIVE MEASURES
ALTERNATIVE SELECTION FLOW CHART

DWG DATE: 03/26/01 | NAME: 0146001W001

5.0 PROJECT MANAGEMENT

This section outlines the proposed project management plan for the SWMU 39 CMS, including project work elements, schedule, and project-management responsibilities. The main goal of this effort is to achieve compliance with the HSWA portion of the Part B permit for operating a hazardous-waste storage and transfer facility.

5.1 Project Work Elements

The CMS will begin with a review of the site characteristics, nature and extent of contamination, identification of corrective action objectives, and corrective measures alternatives. Based on review of these data, an in-depth analysis of alternatives will be conducted to determine the most appropriate and cost-effective corrective measures for groundwater based on the five standards and five decision factors discussed in Section 4.

Results of the CMS will be presented in a CMS report, which will include the following elements:

- Introduction/Purpose
- Description of Current Conditions
- Corrective Action Objectives
- Identification, Screening, and Development of Corrective Measure Alternatives
- Evaluation of a Final Corrective Measure Alternative
- Recommendation for a Final Corrective Measure Alternative
- Public Involvement Plan

5.2 Project Schedule

This section provides a schedule for completing the CMS. Appendix C of the HSWA portion of the Part B permit contains a facility submission or compliance schedule based on task versus

duration for completing the RFI/CMS. In accordance with HSWA permit Condition II.G.1, a Corrective Action Management Plan (CAMP) was prepared and submitted to the USEPA. The CAMP was originally approved by USEPA Region IV on June 29, 1993, and revised in November 1994 to address changing priorities resulting from BRAC. It has been revised since that time to reflect the current status of the CAMP at NSA Mid-South.

The CAMP outlined a proposed schedule for completing RFI and CMS implementation. Figure 5-1 shows a proposed schedule for the SWMU 39 fluvial deposits groundwater CMS. This schedule is an updated version of the one presented in the most recent version of the CAMP (October 1997).

5.3 Project Management Responsibilities

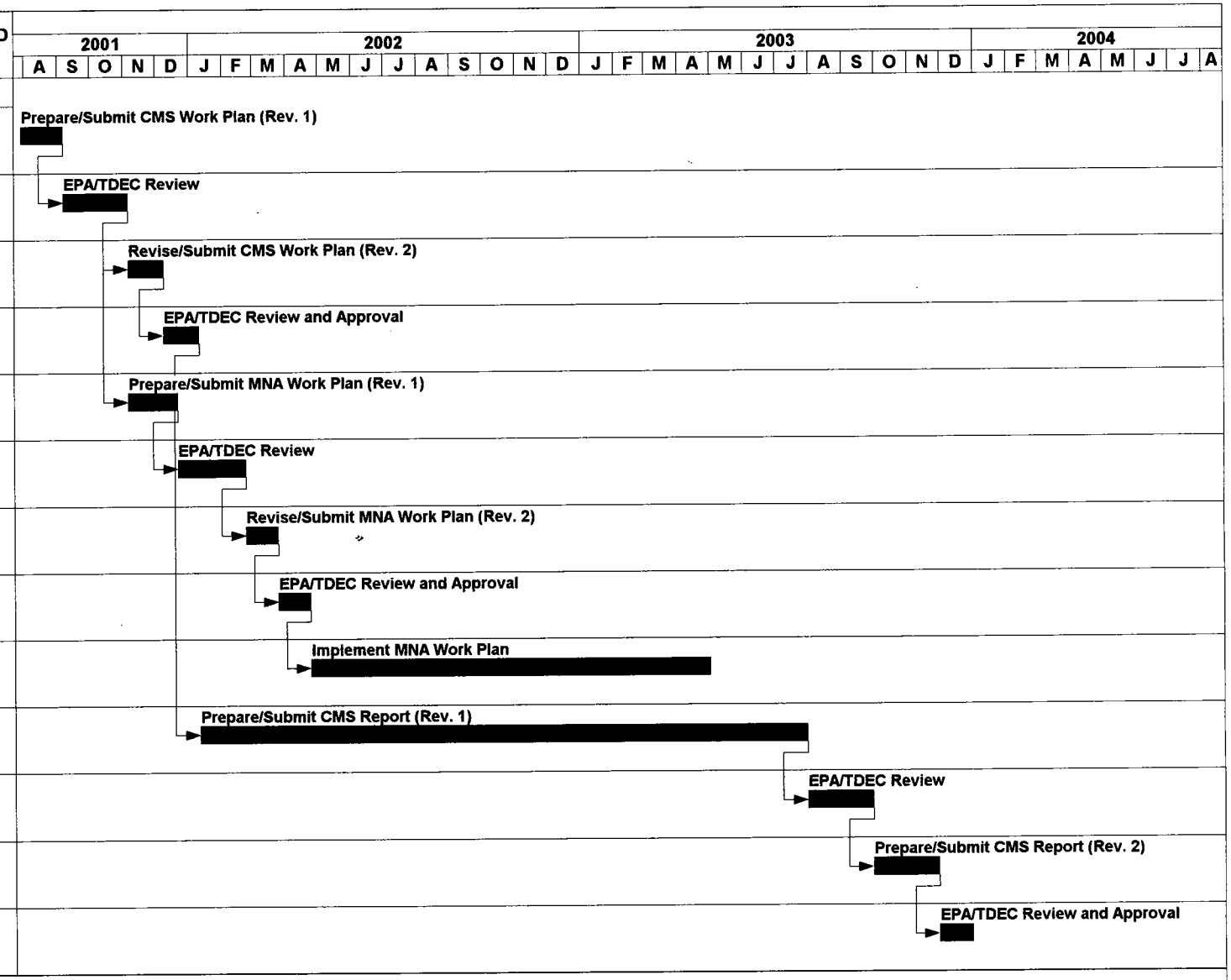
NSA Mid-South

NSA Mid-South holds a RCRA permit for a storage facility. The Commanding Officer, Wanda Riddle, is responsible for all compliance with environmental laws. Other key persons at NSA Mid-South are Tonya Barker, Public Works Environmental Division Director, and Rob Williamson, IRP Coordinator.

SOUTHNAVFACENGCOM

Jim Reed, the SOUTHNAVFACENGCOM Engineer-in-Charge (EIC), is responsible for the technical and financial management of IRP activities at NSA Mid-South. He prepares the project statement of work; manages the project scope, schedule, and budget; and provides technical review and approval of all deliverables.

TASK	DURATION	PROJECTED START	PROJECTED FINISH
SWMU 39 CMS			
00137	38	30JUL01	06SEP01
00147	60	07SEP01	05NOV01
00157	31	06NOV01	08DEC01
00160	31	09DEC01	10JAN02
00167	44	06NOV01	21DEC01
00177	60	22DEC01	22FEB02
00187	30	23FEB02	24MAR02
00197	30	25MAR02	23APR02
00227	365	24APR02	30APR03
00237	555	11JAN02	29JUL03
00247	60	30JUL03	28SEP03
00257	60	29SEP03	28NOV03
00267	30	29NOV03	29DEC03



Start date	30JUL01
Finish date	29DEC03
Data date	30JUL01
Run date	05SEP01
Number/Version	LA07/00 6/01
Page number	1A
© Primavera Systems, Inc.	

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Progress bar
Summary bar
Progress point
Summary point
Start milestone point
Finish milestone point

Figure 5-1

NSA MID-SOUTH PROJECTED CMS SCHEDULE

SWMU 39

CORRECTIVE MEASURES STUDY
NAVAL SUPPORT ACTIVITY MID-SOUTH
MILLINGTON TN

USEPA Region IV

Region IV of the USEPA is responsible for reviewing reports and coordinating with state agencies to ensure that federal requirements are addressed. The USEPA representative is Jennifer Herndon.

TDEC

The Tennessee Department of Environment and Conservation (TDEC) is responsible for reviewing and approving documents. The TDEC representative is Clayton Bullington.

EnSafe

EnSafe is under contract to SOUTHNAVFACENGCOM to administer, plan, and implement the CMS at NSA Mid-South. John Stedman is the designated Task Order Manager and CMS Project Manager, and Keith Johns will serve as the Community Relations Specialist.

U.S. Geological Survey (USGS)

The USGS, Water Resources Division, Tennessee District, along with EnSafe, conducted the RFI at SWMU 39. Mr. Jack Carmichael is the USGS Project Manager and will continue to provide support to the Navy by reviewing and evaluating CMS documents.

6.0 COMMUNITY INVOLVEMENT

Though the RCRA corrective action process typically does not require a community participation program for facilities that are experiencing RCRA-regulated assessment, investigation, and/or cleanup, it has been the policy of the U.S. Navy for NSA Mid-South to emulate a public involvement plan comparable to what would be expected under CERCLA-mandated assessment and remediation projects.

6.1 Community Relations Plan

In response to Navy guidance, EnSafe was tasked with developing a Community Relations Plan (CRP) detailing community involvement and strategy for the entire RCRA corrective action process. The CRP has been implemented to encourage open communication among NSA Mid-South; federal, state, and local regulatory agencies; interested community groups, and individual community residents regarding environmental activities that are subsequent to NSA Mid-South remediation and closure. Community involvement has been encouraged from the beginning of the corrective action process (i.e., RFA) and will continue through the end (i.e., CMI).

6.2 Benefits

Community involvement and input result in many benefits. In particular, the Restoration Advisory Board (RAB), as described in the CRP, provides a forum where applicable project information is presented to the community, and public input is actively solicited and acted upon. The implementation of any program has a greater chance for success when the community has taken an active role in the full program from start-up to alternative solution selection and implementation. Community support is vital during the period of solution implementation.

6.3 Public Interaction

As mentioned in previous sections of this work plan, the final product of the CMS will include a list of possible cleanup alternative(s) as well as the recommended remedy. The CRP requires that this list be presented to the local community through a public notice published in the newspaper and at a public hearing. Written responses will be accepted from the public during a comment period that typically ranges from 30 to 45 days. EnSafe, in coordination with the BCT, will produce written responses to comments received during this period. Changes to the proposed cleanup alternative(s) may be made after consideration of public comments.

In addition to the public notice, hearing, and comment period, quarterly RAB meetings, which are open to the public, will act as a forum for citizen education, involvement, and input throughout the entire CMS process. Fact sheets and other educational material reporting CMS findings will be published if community interest is expressed.

7.0 REFERENCES

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Appendix A

Laboratory Reports

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

DIESEL							
	SAMPLE ID ------->	039-G-01LF-02	039-G-02LF-02	039-G-03LF-02	039-G-04LF-02	039-G-05LF-02	039-G-06LF-02
	ORIGINAL ID ----->	039G01LF02	039G02LF02	039G03LF02	039G04LF02	039G05LF02	039G06LF02
	LAB SAMPLE ID --->	44641.04	44683.03	44665.02	44700.02	44665.03	44665.04
	ID FROM REPORT -->	039G01LF02	039G02LF02	039G03LF02	039G04LF02	039G05LF02	039G06LF02
	SAMPLE DATE ----->	10/11/00	10/13/00	10/12/00	10/16/00	10/12/00	10/12/00
	DATE EXTRACTED -->	10/14/00	10/15/00	10/15/00	10/18/00	10/15/00	10/15/00
	DATE ANALYZED --->	10/24/00	10/25/00	10/24/00	10/24/00	10/25/00	10/25/00
	MATRIX ---------->	Water	Water	Water	Water	Water	Water
	UNITS ----------->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter	44641	44641	44641	44700	44641	44641
68334-30-5	Diesel	610.	210.	100. U	100. U	310.	100. U

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

DIESEL							
	SAMPLE ID ------>	039-G-07LF-02	039-G-08LF-02	039-G-09LF-02			
	ORIGINAL ID ----->	039G07LF02	039G08LF02	039G09LF02			
	LAB SAMPLE ID --->	44665.05	44683.02	44700.01			
	ID FROM REPORT -->	039G07LF02	039G08LF02	039G09LF02			
	SAMPLE DATE ----->	10/12/00	10/13/00	10/16/00			
	DATE EXTRACTED -->	10/15/00	10/15/00	10/18/00			
	DATE ANALYZED --->	10/25/00	10/25/00	10/24/00			
	MATRIX ---------->	Water	Water	Water			
	UNITS ---------->	UG/L	UG/L	UG/L			
CAS #	Parameter	44641	44641	44700			
68334-30-5	Diesel	190.	100. U	920.			

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

GRO							
	SAMPLE ID ------->	039-V-0227-01					
	ORIGINAL ID ----->	039V022701					
	LAB SAMPLE ID --->	010275501					
	ID FROM REPORT -->	039V022701					
	SAMPLE DATE ----->	02/27/01					
	DATE EXTRACTED -->	02/28/01					
	DATE ANALYZED --->	03/02/01					
	MATRIX ---------->	Soil					
	UNITS ----------->	MG/KG					
CAS #	Parameter	0102755					
9999900-02-5	Gasoline Range Organics	10. U					

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

IRON	SAMPLE ID ------->	039-G-01LF-02	039-G-01LS-01	039-G-02LF-02	039-G-02LS-01	039-G-03LF-02	039-G-03LS-01
	ORIGINAL ID ----->	039G01LF02	039G01LS01	039G02LF02	039G02LS01	039G03LF02	039G03LS01
	LAB SAMPLE ID --->	44641.04	45426.01	44683.03	45426.02	44665.02	45426.03
	ID FROM REPORT -->	039G01LF02	039G01LS01	039G02LF02	039G02LS01	039G03LF02	039G03LS01
	SAMPLE DATE ----->	10/11/00	12/14/00	10/13/00	12/14/00	10/12/00	12/14/00
	DATE EXTRACTED -->	10/16/00	12/19/00	10/18/00	12/19/00	10/18/00	12/19/00
	DATE ANALYZED --->	10/22/00	12/28/00	10/22/00	12/28/00	10/22/00	12/28/00
	MATRIX ---------->	Water	Water	Water	Water	Water	Water
	UNITS ---------->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L

CAS #	Parameter	44641	VAL	45426	VAL	44641	VAL	45426	VAL	44641	VAL	45426	VAL
7439-89-6	Iron	6110.	J	19300.		31900.	J	13500.		31700.	J	47600.	

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

IRON													
	SAMPLE ID ------->	039-H-03LS-01		039-G-04LF-02		039-G-04LS-01		039-G-05LF-02		039-G-06LF-02		039-G-07LF-02	
	ORIGINAL ID ----->	039H03LS01		039G04LF02		039G04LS01		039G05LF02		039G06LF02		039G07LF02	
	LAB SAMPLE ID --->	45426.05		44700.02		45426.04		44665.03		44665.04		44665.05	
	ID FROM REPORT -->	039H03LS01		039G04LF02		039G04LS01		039G05LF02		039G06LF02		039G07LF02	
	SAMPLE DATE ----->	12/14/00		10/16/00		12/14/00		10/12/00		10/12/00		10/12/00	
	DATE EXTRACTED -->	12/19/00		10/20/00		12/19/00		10/18/00		10/18/00		10/18/00	
	DATE ANALYZED --->	12/28/00		11/02/00		12/28/00		10/22/00		10/22/00		10/22/00	
	MATRIX ---------->	Water		Water		Water		Water		Water		Water	
	UNITS ----------->	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	45426	VAL	44700	VAL	45426	VAL	44641	VAL	44641	VAL	44641	VAL
7439-89-6	Iron	49400.		12700.	J	14400.		40400.	J	6500.	J	51800.	J

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

IRON							
	SAMPLE ID ------->	039-G-08LF-02	039-G-09LF-02				
	ORIGINAL ID ----->	039G08LF02	039G09LF02				
	LAB SAMPLE ID --->	44683.02	44700.01				
	ID FROM REPORT -->	039G08LF02	039G09LF02				
	SAMPLE DATE ----->	10/13/00	10/16/00				
	DATE EXTRACTED -->	10/18/00	10/20/00				
	DATE ANALYZED --->	10/22/00	11/02/00				
	MATRIX ---------->	Water	Water				
	UNITS ----------->	UG/L	UG/L				
CAS #	Parameter	44641 VAL	44700 VAL				
7439-89-6	Iron	10800. J	16700. J				

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

LEAD							
	SAMPLE ID ------->	039-V-0227-01					
	ORIGINAL ID ----->	039V022701					
	LAB SAMPLE ID --->	010275501					
	ID FROM REPORT -->	039V022701					
	SAMPLE DATE ----->	02/27/01					
	DATE EXTRACTED -->	03/07/01					
	DATE ANALYZED --->	03/07/01					
	MATRIX ---------->	Soil					
	UNITS ----------->	MG/KG					
CAS #	Parameter	0102755					
7439-92-1	Lead	19.					

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

TCLP VOA							
	SAMPLE ID ------->	039-V-0227-01					
	ORIGINAL ID ----->	039V022701					
	LAB SAMPLE ID --->	010275501					
	ID FROM REPORT -->	039V022701					
	SAMPLE DATE ----->	02/27/01					
	DATE ANALYZED --->	03/01/01					
	MATRIX ---------->	Soil					
	UNITS ----------->	%					
CAS #	Parameter	0102755					
9999000-58-8	Percent Solids	81.					

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

TN EPH							
	SAMPLE ID ------>	039-G-01LF-02	039-G-01LS-01	039-V-0227-01	039-G-02LF-02	039-G-02LS-01	039-G-03LF-02
	ORIGINAL ID ----->	039G01LF02	039G01LS01	039V022701	039G02LF02	039G02LS01	039G03LF02
	LAB SAMPLE ID --->	45276.03	45426.01	010275501	45276.09	45426.02	45276.04
	ID FROM REPORT -->	039G01LF02	039G01LS01	039V022701	039G02LF02	039G02LS01	039G03LF02
	SAMPLE DATE ----->	10/11/00	12/14/00	02/27/01	10/13/00	12/14/00	10/12/00
	DATE EXTRACTED -->	10/14/00	12/19/00	02/28/01	10/15/00	12/19/00	10/15/00
	DATE ANALYZED --->	12/05/00	12/22/00	03/05/01	12/06/00	12/22/00	12/06/00
	MATRIX ---------->	Water	Water	Soil	Water	Water	Water
	UNITS ---------->	UG/L	UG/L	MG/KG	UG/L	UG/L	UG/L
CAS #	Parameter	45276 VAL	45426 VAL	0102755	45276 VAL	45426 VAL	45276 VAL
68334-30-5	Diesel	NR	NR	NR	NR	NR	NR
9999000-96-4	TN-EPH (C12-C40)	330. UJ	100. U	22.7	200. UJ	120.	280. UJ

*** Unvalidated Data - Do NOT Cite ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

TN EPH							
	SAMPLE ID ------->	039-G-03LS-01	039-H-03LS-01	039-G-04LF-02	039-G-04LS-01	039-G-05LF-02	039-G-06LF-02
	ORIGINAL ID ----->	039G03LS01	039H03LS01	039G04LF02	039G04LS01	039G05LF02	039G06LF02
	LAB SAMPLE ID --->	45426.03	45426.05	45276.11	45426.04	45276.05	45276.06
	ID FROM REPORT -->	039G03LS01	039H03LS01	039G04LF02	039G04LS01	039G05LF02	039G06LF02
	SAMPLE DATE ----->	12/14/00	12/14/00	10/16/00	12/14/00	10/12/00	10/12/00
	DATE EXTRACTED -->	12/19/00	12/19/00	10/18/00	12/19/00	10/15/00	10/15/00
	DATE ANALYZED --->	12/22/00	12/23/00	12/04/00	12/22/00	12/06/00	12/06/00
	MATRIX ---------->	Water	Water	Water	Water	Water	Water
	UNITS ---------->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
CAS #	Parameter	45426 VAL	45426 VAL	45276 VAL	45426 VAL	45276 VAL	45276 VAL
68334-30-5	Diesel	NR	NR	NR	NR	NR	NR
9999000-96-4	TN-EPH (C12-C40)	170.	160.	100. UJ	160.	500. UJ	280. UJ

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

TN EPH							
	SAMPLE ID ------->	039-G-07LF-02	039-G-08LF-02	039-G-09LF-02			
	ORIGINAL ID ----->	039G07LF02	039G08LF02	039G09LF02			
	LAB SAMPLE ID --->	45276.07	45276.08	45276.10			
	ID FROM REPORT -->	039G07LF02	039G08LF02	039G09LF02			
	SAMPLE DATE ----->	10/12/00	10/13/00	10/16/00			
	DATE EXTRACTED -->	10/15/00	10/15/00	10/18/00			
	DATE ANALYZED --->	12/06/00	12/06/00	12/04/00			
	MATRIX ---------->	Water	Water	Water			
	UNITS ---------->	UG/L	UG/L	UG/L			
CAS #	Parameter	45276 VAL	45276 VAL	45276 VAL			
68334-30-5	Diesel	NR	NR	NR			
9999000-96-4	TN-EPH (C12-C40)	430. UJ	100. UJ	487. J			

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA													
	SAMPLE ID ------>	039-G-01LF-02		039-G-01LS-01		039-V-0227-01		039-G-02LF-02		039-G-02LS-01		039-G-03LF-02	
	ORIGINAL ID ----->	039G01LF02		039G01LS01		039V022701		039G02LF02		039G02LS01		039G03LF02	
	LAB SAMPLE ID --->	44641.04		45426.01		010275501		44683.03		45426.02		44665.02	
	ID FROM REPORT -->	039G01LF02		039G01LS01		039V022701		039G02LF02		039G02LS01		039G03LF02	
	SAMPLE DATE ----->	10/11/00		12/14/00		02/27/01		10/13/00		12/14/00		10/12/00	
	DATE ANALYZED --->	10/18/00		12/18/00		03/07/01		10/26/00		12/18/00		10/23/00	
	MATRIX ---------->	Water		Water		Soil		Water		Water		Water	
	UNITS ---------->	UG/L		UG/L		UG/KG		UG/L		UG/L		UG/L	
CAS #	Parameter	44641	VAL	45426	VAL	0102755	VAL	44641	VAL	45426	VAL	44641	VAL
74-87-3	Chloromethane	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
75-01-4	Vinyl chloride	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
74-83-9	Bromomethane	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
75-00-3	Chloroethane	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
75-35-4	1,1-Dichloroethene	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
67-64-1	Acetone	20.		5.	U	40.	U	5.	U	5.	U	5.	U
75-15-0	Carbon disulfide	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
75-09-2	Methylene chloride	10.	U	5.	U	10.	U	5.	U	5.	U	16.	U
75-34-3	1,1-Dichloroethane	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
156-60-5	trans-1,2-Dichloroethene	5.	U	5.	U	2.	U	5.	U	5.	U	2.	J
156-59-2	cis-1,2-Dichloroethene	5.	U	10.		2.	U	5.	U	5.	U	3.	J
78-93-3	2-Butanone (MEK)	5.	U	5.	U	40.	U	5.	U	5.	U	5.	U
67-66-3	Chloroform	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
71-55-6	1,1,1-Trichloroethane	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
56-23-5	Carbon tetrachloride	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
71-43-2	Benzene	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
107-06-2	1,2-Dichloroethane	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
79-01-6	Trichloroethene	5.	U	5.	U	2.	U	5.	U	5.	U	30.	
78-87-5	1,2-Dichloropropane	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
75-27-4	Bromodichloromethane	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
108-10-1	4-Methyl-2-Pentanone (MIBK)	5.	U	5.	U	10.	U	5.	U	5.	U	5.	U
108-88-3	Toluene	5.	U	5.	U	4.	U	5.	U	5.	U	5.	U
10061-02-6	trans-1,3-Dichloropropene	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
127-18-4	Tetrachloroethene	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
591-78-6	2-Hexanone	5.	U	5.	U	10.	U	5.	U	5.	U	5.	U
124-48-1	Dibromochloromethane	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
108-90-7	Chlorobenzene	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
100-41-4	Ethylbenzene	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
100-42-5	Styrene	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
75-25-2	Bromoform	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U	5.	U	2.	U	5.	U	5.	U	5.	U
1330-20-7	Xylene (Total)	5.	U	5.	U	NR		5.	U	5.	U	5.	U
75-05-8	Acetonitrile	NR		NR		100.	U	NR		NR		NR	
96-12-8	1,2-Dibromo-3-Chloropropane	NR		NR		10.	U	NR		NR		NR	
110-75-8	2-Chloroethylvinylether	NR		NR		10.	U	NR		NR		NR	

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA							
SAMPLE ID ------>	039-G-01LF-02	039-G-01LS-01	039-V-0227-01	039-G-02LF-02	039-G-02LS-01	039-G-03LF-02
ORIGINAL ID ----->	039G01LF02	039G01LS01	039V022701	039G02LF02	039G02LS01	039G03LF02
LAB SAMPLE ID --->	44641.04	45426.01	010275501	44683.03	45426.02	44665.02
ID FROM REPORT -->	039G01LF02	039G01LS01	039V022701	039G02LF02	039G02LS01	039G03LF02
SAMPLE DATE ----->	10/11/00	12/14/00	02/27/01	10/13/00	12/14/00	10/12/00
DATE ANALYZED --->	10/18/00	12/18/00	03/07/01	10/26/00	12/18/00	10/23/00
MATRIX ---------->	Water	Water	Soil	Water	Water	Water
UNITS ---------->	UG/L	UG/L	UG/KG	UG/L	UG/L	UG/L

CAS #	Parameter	44641	VAL	45426	VAL	0102755		44641	VAL	45426	VAL	44641	VAL
1634-04-4	Methyl tert-butyl ether	NR		NR		10.	U	NR		NR		NR	
630-20-6	1,1,1,2-Tetrachloroethane	NR		NR		2.	U	NR		NR		NR	
563-58-6	1,1-Dichloropropene	NR		NR		2.	U	NR		NR		NR	
87-61-6	1,2,3-Trichlorobenzene	NR		NR		2.	U	NR		NR		NR	
96-18-4	1,2,3-Trichloropropane	NR		NR		2.	U	NR		NR		NR	
120-82-1	1,2,4-Trichlorobenzene	NR		NR		2.	U	NR		NR		NR	
95-63-6	Benzene, 1,2,4-trimethyl	NR		NR		2.	U	NR		NR		NR	
106-93-4	1,2-Dibromoethane	NR		NR		2.	U	NR		NR		NR	
95-50-1	1,2-Dichlorobenzene	NR		NR		2.	U	NR		NR		NR	
108-67-8	Benzene, 1,3,5-trimethyl-	NR		NR		2.	U	NR		NR		NR	
541-73-1	1,3-Dichlorobenzene	NR		NR		2.	U	NR		NR		NR	
142-28-9	1,3-Dichloropropane	NR		NR		2.	U	NR		NR		NR	
106-46-7	1,4-Dichlorobenzene	NR		NR		2.	U	NR		NR		NR	
594-20-7	2,2-Dichloropropane	NR		NR		2.	U	NR		NR		NR	
95-49-8	2-Chlorotoluene	NR		NR		2.	U	NR		NR		NR	
106-43-4	4-Chlorotoluene	NR		NR		2.	U	NR		NR		NR	
99-87-6	p-Isopropyltoluene	NR		NR		2.	U	NR		NR		NR	
108-86-1	Bromobenzene	NR		NR		2.	U	NR		NR		NR	
74-97-5	Chlorobromomethane	NR		NR		2.	U	NR		NR		NR	
74-95-3	Dibromomethane	NR		NR		2.	U	NR		NR		NR	
75-71-8	Dichlorodifluoromethane	NR		NR		2.	U	NR		NR		NR	
87-68-3	Hexachlorobutadiene	NR		NR		2.	U	NR		NR		NR	
74-88-4	Methyl iodide	NR		NR		2.	U	NR		NR		NR	
98-82-8	Benzene, 1-methylethyl-	NR		NR		2.	U	NR		NR		NR	
104-51-8	n-Butylbenzene	NR		NR		2.	U	NR		NR		NR	
103-65-1	n-Propylbenzene	NR		NR		2.	U	NR		NR		NR	
91-20-3	Naphthalene	NR		NR		2.	U	NR		NR		NR	
135-98-8	sec-Butylbenzene	NR		NR		2.	U	NR		NR		NR	
98-06-6	tert-Butylbenzene	NR		NR		2.	U	NR		NR		NR	
75-69-4	Trichlorofluoromethane	NR		NR		2.	U	NR		NR		NR	
95-47-6	o-Xylene	NR		NR		2.	U	NR		NR		NR	
141-78-6	Ethyl acetate	NR		NR		20.	U	NR		NR		NR	
108-05-4	Vinyl acetate	NR		NR		20.	U	NR		NR		NR	
9999900-05-0	m+p Xylene	NR		NR		4.	U	NR		NR		NR	
107-02-8	Acrolein	NR		NR		40.	U	NR		NR		NR	
107-13-1	Acrylonitrile	NR		NR		40.	U	NR		NR		NR	

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA													
	SAMPLE ID ------>	039-G-03LS-01		039-H-03LS-01		039-G-04LF-02		039-G-04LS-01		039-G-05LF-02		039-G-06LF-02	
	ORIGINAL ID ----->	039G03LS01		039H03LS01		039G04LF02		039G04LS01		039G05LF02		039G06LF02	
	LAB SAMPLE ID --->	45426.03		45426.05		44700.02		45426.04		44665.03		44665.04	
	ID FROM REPORT -->	039G03LS01		039H03LS01		039G04LF02		039G04LS01		039G05LF02		039G06LF02	
	SAMPLE DATE ----->	12/14/00		12/14/00		10/16/00		12/14/00		10/12/00		10/12/00	
	DATE ANALYZED --->	12/18/00		12/18/00		10/26/00		12/18/00		10/23/00		10/26/00	
	MATRIX ---------->	Water		Water		Water		Water		Water		Water	
	UNITS ---------->	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	45426	VAL	45426	VAL	44700	VAL	45426	VAL	44641	VAL	44641	VAL
74-87-3	Chloromethane	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
75-01-4	Vinyl chloride	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
74-83-9	Bromomethane	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
75-00-3	Chloroethane	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
75-35-4	1,1-Dichloroethene	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
67-64-1	Acetone	5.	U	5.	U	5.	U	34.	U	5.	U	5.	U
75-15-0	Carbon disulfide	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
75-09-2	Methylene chloride	5.	U	5.	U	5.	U	5.	U	15.	U	6.	U
75-34-3	1,1-Dichloroethane	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
156-60-5	trans-1,2-Dichloroethene	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
156-59-2	cis-1,2-Dichloroethene	5.	U	5.	U	6.		5.	U	5.	U	5.	U
78-93-3	2-Butanone (MEK)	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
67-66-3	Chloroform	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
71-55-6	1,1,1-Trichloroethane	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
56-23-5	Carbon tetrachloride	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
71-43-2	Benzene	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
107-06-2	1,2-Dichloroethane	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
79-01-6	Trichloroethene	5.	U	5.	U	180.		5.	U	5.	U	11.	
78-87-5	1,2-Dichloropropane	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
75-27-4	Bromodichloromethane	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
108-10-1	4-Methyl-2-Pentanone (MIBK)	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
108-88-3	Toluene	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
10061-02-6	trans-1,3-Dichloropropene	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
127-18-4	Tetrachloroethene	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
591-78-6	2-Hexanone	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
124-48-1	Dibromochloromethane	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
108-90-7	Chlorobenzene	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
100-41-4	Ethylbenzene	11.		9.		5.	U	5.	U	5.	U	5.	U
100-42-5	Styrene	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
75-25-2	Bromoform	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
1330-20-7	Xylene (Total)	9.		7.		5.	J	5.	U	5.	U	5.	U
75-05-8	Acetonitrile	NR		NR		NR		NR		NR		NR	
96-12-8	1,2-Dibromo-3-Chloropropane	NR		NR		NR		NR		NR		NR	
110-75-8	2-Chloroethylvinylether	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA	SAMPLE ID ------->	039-G-03LS-01	039-H-03LS-01	039-G-04LF-02	039-G-04LS-01	039-G-05LF-02	039-G-06LF-02
	ORIGINAL ID ----->	039G03LS01	039H03LS01	039G04LF02	039G04LS01	039G05LF02	039G06LF02
	LAB SAMPLE ID --->	45426.03	45426.05	44700.02	45426.04	44665.03	44665.04
	ID FROM REPORT -->	039G03LS01	039H03LS01	039G04LF02	039G04LS01	039G05LF02	039G06LF02
	SAMPLE DATE ----->	12/14/00	12/14/00	10/16/00	12/14/00	10/12/00	10/12/00
	DATE ANALYZED --->	12/18/00	12/18/00	10/26/00	12/18/00	10/23/00	10/26/00
	MATRIX ---------->	Water	Water	Water	Water	Water	Water
	UNITS ----------->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L

CAS #	Parameter	45426	VAL	45426	VAL	44700	VAL	45426	VAL	44641	VAL	44641	VAL
1634-04-4	Methyl tert-butyl ether	NR		NR		NR		NR		NR		NR	
630-20-6	1,1,1,2-Tetrachloroethane	NR		NR		NR		NR		NR		NR	
563-58-6	1,1-Dichloropropene	NR		NR		NR		NR		NR		NR	
87-61-6	1,2,3-Trichlorobenzene	NR		NR		NR		NR		NR		NR	
96-18-4	1,2,3-Trichloropropane	NR		NR		NR		NR		NR		NR	
120-82-1	1,2,4-Trichlorobenzene	NR		NR		NR		NR		NR		NR	
95-63-6	Benzene, 1,2,4-trimethyl	NR		NR		NR		NR		NR		NR	
106-93-4	1,2-Dibromoethane	NR		NR		NR		NR		NR		NR	
95-50-1	1,2-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
108-67-8	Benzene, 1,3,5-trimethyl-	NR		NR		NR		NR		NR		NR	
541-73-1	1,3-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
142-28-9	1,3-Dichloropropane	NR		NR		NR		NR		NR		NR	
106-46-7	1,4-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
594-20-7	2,2-Dichloropropane	NR		NR		NR		NR		NR		NR	
95-49-8	2-Chlorotoluene	NR		NR		NR		NR		NR		NR	
106-43-4	4-Chlorotoluene	NR		NR		NR		NR		NR		NR	
99-87-6	p-Isopropyltoluene	NR		NR		NR		NR		NR		NR	
108-86-1	Bromobenzene	NR		NR		NR		NR		NR		NR	
74-97-5	Chlorobromomethane	NR		NR		NR		NR		NR		NR	
74-95-3	Dibromomethane	NR		NR		NR		NR		NR		NR	
75-71-8	Dichlorodifluoromethane	NR		NR		NR		NR		NR		NR	
87-68-3	Hexachlorobutadiene	NR		NR		NR		NR		NR		NR	
74-88-4	Methyl iodide	NR		NR		NR		NR		NR		NR	
98-82-8	Benzene, 1-methylethyl-	NR		NR		NR		NR		NR		NR	
104-51-8	n-Butylbenzene	NR		NR		NR		NR		NR		NR	
103-65-1	n-Propylbenzene	NR		NR		NR		NR		NR		NR	
91-20-3	Naphthalene	NR		NR		NR		NR		NR		NR	
135-98-8	sec-Butylbenzene	NR		NR		NR		NR		NR		NR	
98-06-6	tert-Butylbenzene	NR		NR		NR		NR		NR		NR	
75-69-4	Trichlorofluoromethane	NR		NR		NR		NR		NR		NR	
95-47-6	o-Xylene	NR		NR		NR		NR		NR		NR	
141-78-6	Ethyl acetate	NR		NR		NR		NR		NR		NR	
108-05-4	Vinyl acetate	NR		NR		NR		NR		NR		NR	
9999900-05-0	m+p Xylene	NR		NR		NR		NR		NR		NR	
107-02-8	Acrolein	NR		NR		NR		NR		NR		NR	
107-13-1	Acrylonitrile	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA							
SAMPLE ID ------->	039-G-07LF-02	039-G-08LF-02	039-G-09LF-02	039-S-F006-14	039-S-F007-14	039-S-F008-02
ORIGINAL ID ----->	039G07LF02	039G08LF02	039G09LF02	039SF00614	039SF00714	039SF00802
LAB SAMPLE ID --->	44665.05	44683.02	44700.01	44783.04	44783.03	44801.01
ID FROM REPORT -->	039G07LF02	039G08LF02	039G09LF02	039SF00614	039SF00714	039SF00802
SAMPLE DATE ----->	10/12/00	10/13/00	10/16/00	10/23/00	10/23/00	10/24/00
DATE ANALYZED --->	10/23/00	10/26/00	10/26/00	10/26/00	10/26/00	10/26/00
MATRIX ---------->	Water	Water	Water	Soil	Soil	Soil
UNITS ---------->	UG/L	UG/L	UG/L	UG/KG	UG/KG	UG/KG

CAS #	Parameter	44641	VAL	44641	VAL	44700	VAL	44783	VAL	44783	VAL	44783	VAL
74-87-3	Chloromethane	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
75-01-4	Vinyl chloride	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
74-83-9	Bromomethane	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
75-00-3	Chloroethane	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
75-35-4	1,1-Dichloroethene	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
67-64-1	Acetone	5.	U	5.	U	5.	U	5.	U	5.	J	5.	U
75-15-0	Carbon disulfide	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
75-09-2	Methylene chloride	16.	U	6.	U	5.	U	5.	U	6.	U	5.	U
75-34-3	1,1-Dichloroethane	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
156-60-5	trans-1,2-Dichloroethene	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
156-59-2	cis-1,2-Dichloroethene	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
78-93-3	2-Butanone (MEK)	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
67-66-3	Chloroform	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
71-55-6	1,1,1-Trichloroethane	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
56-23-5	Carbon tetrachloride	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
71-43-2	Benzene	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
107-06-2	1,2-Dichloroethane	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
79-01-6	Trichloroethene	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
78-87-5	1,2-Dichloropropane	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
75-27-4	Bromodichloromethane	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
108-10-1	4-Methyl-2-Pentanone (MIBK)	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
108-88-3	Toluene	5.	U	5.	U	5.	U	5.	U	6.	U	1.	J
10061-02-6	trans-1,3-Dichloropropene	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
127-18-4	Tetrachloroethene	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
591-78-6	2-Hexanone	5.	U	5.	U	5.	U	5.	UJ	6.	UJ	5.	UJ
124-48-1	Dibromochloromethane	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
108-90-7	Chlorobenzene	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
100-41-4	Ethylbenzene	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
100-42-5	Styrene	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
75-25-2	Bromoform	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
1330-20-7	Xylene (Total)	5.	U	5.	U	5.	U	5.	U	6.	U	5.	U
75-05-8	Acetonitrile	NR		NR		NR		NR		NR		NR	
96-12-8	1,2-Dibromo-3-Chloropropane	NR		NR		NR		NR		NR		NR	
110-75-8	2-Chloroethylvinylether	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA							
	SAMPLE ID ------->	039-G-07LF-02	039-G-08LF-02	039-G-09LF-02	039-S-F006-14	039-S-F007-14	039-S-F008-02
	ORIGINAL ID ----->	039G07LF02	039G08LF02	039G09LF02	039SF00614	039SF00714	039SF00802
	LAB SAMPLE ID --->	44665.05	44683.02	44700.01	44783.04	44783.03	44801.01
	ID FROM REPORT -->	039G07LF02	039G08LF02	039G09LF02	039SF00614	039SF00714	039SF00802
	SAMPLE DATE ----->	10/12/00	10/13/00	10/16/00	10/23/00	10/23/00	10/24/00
	DATE ANALYZED --->	10/23/00	10/26/00	10/26/00	10/26/00	10/26/00	10/26/00
	MATRIX ---------->	Water	Water	Water	Soil	Soil	Soil
	UNITS ---------->	UG/L	UG/L	UG/L	UG/KG	UG/KG	UG/KG

CAS #	Parameter	44641	VAL	44641	VAL	44700	VAL	44783	VAL	44783	VAL	44783	VAL
1634-04-4	Methyl tert-butyl ether	NR		NR		NR		NR		NR		NR	
630-20-6	1,1,1,2-Tetrachloroethane	NR		NR		NR		NR		NR		NR	
563-58-6	1,1-Dichloropropene	NR		NR		NR		NR		NR		NR	
87-61-6	1,2,3-Trichlorobenzene	NR		NR		NR		NR		NR		NR	
96-18-4	1,2,3-Trichloropropane	NR		NR		NR		NR		NR		NR	
120-82-1	1,2,4-Trichlorobenzene	NR		NR		NR		NR		NR		NR	
95-63-6	Benzene, 1,2,4-trimethyl	NR		NR		NR		NR		NR		NR	
106-93-4	1,2-Dibromoethane	NR		NR		NR		NR		NR		NR	
95-50-1	1,2-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
108-67-8	Benzene, 1,3,5-trimethyl-	NR		NR		NR		NR		NR		NR	
541-73-1	1,3-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
142-28-9	1,3-Dichloropropane	NR		NR		NR		NR		NR		NR	
106-46-7	1,4-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
594-20-7	2,2-Dichloropropane	NR		NR		NR		NR		NR		NR	
95-49-8	2-Chlorotoluene	NR		NR		NR		NR		NR		NR	
106-43-4	4-Chlorotoluene	NR		NR		NR		NR		NR		NR	
99-87-6	p-Isopropyltoluene	NR		NR		NR		NR		NR		NR	
108-86-1	Bromobenzene	NR		NR		NR		NR		NR		NR	
74-97-5	Chlorobromomethane	NR		NR		NR		NR		NR		NR	
74-95-3	Dibromomethane	NR		NR		NR		NR		NR		NR	
75-71-8	Dichlorodifluoromethane	NR		NR		NR		NR		NR		NR	
87-68-3	Hexachlorobutadiene	NR		NR		NR		NR		NR		NR	
74-88-4	Methyl iodide	NR		NR		NR		NR		NR		NR	
98-82-8	Benzene, 1-methylethyl-	NR		NR		NR		NR		NR		NR	
104-51-8	n-Butylbenzene	NR		NR		NR		NR		NR		NR	
103-65-1	n-Propylbenzene	NR		NR		NR		NR		NR		NR	
91-20-3	Naphthalene	NR		NR		NR		NR		NR		NR	
135-98-8	sec-Butylbenzene	NR		NR		NR		NR		NR		NR	
98-06-6	tert-Butylbenzene	NR		NR		NR		NR		NR		NR	
75-69-4	Trichlorofluoromethane	NR		NR		NR		NR		NR		NR	
95-47-6	o-Xylene	NR		NR		NR		NR		NR		NR	
141-78-6	Ethyl acetate	NR		NR		NR		NR		NR		NR	
108-05-4	Vinyl acetate	NR		NR		NR		NR		NR		NR	
9999900-05-0	m+p Xylene	NR		NR		NR		NR		NR		NR	
107-02-8	Acrolein	NR		NR		NR		NR		NR		NR	
107-13-1	Acrylonitrile	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA	SAMPLE ID ------->	039-S-F008-10	039-S-F009-04	039-S-F009-12	039-S-F010-02	039-S-F010-12	039-S-F011-04
	ORIGINAL ID ----->	039SF00810	039SF00904	039SF00912	039SF01002	039SF01012	039SF01104
	LAB SAMPLE ID --->	44801.02	44801.03	44801.04	44801.05	44801.06	44801.07
	ID FROM REPORT -->	039SF00810	039SF00904	039SF00912	039SF01002	039SF01012	039SF01104
	SAMPLE DATE ----->	10/24/00	10/24/00	10/24/00	10/24/00	10/24/00	10/24/00
	DATE ANALYZED --->	10/26/00	10/26/00	10/26/00	10/26/00	10/26/00	10/26/00
	MATRIX ---------->	Soil	Soil	Soil	Soil	Soil	Soil
	UNITS ---------->	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG

CAS #	Parameter	44783	VAL	44783	VAL	44783	VAL	44783	VAL	44783	VAL	44783	VAL
74-87-3	Chloromethane	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
75-01-4	Vinyl chloride	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
74-83-9	Bromomethane	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
75-00-3	Chloroethane	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
75-35-4	1,1-Dichloroethene	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
67-64-1	Acetone	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
75-15-0	Carbon disulfide	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
75-09-2	Methylene chloride	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
75-34-3	1,1-Dichloroethane	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
156-60-5	trans-1,2-Dichloroethene	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
156-59-2	cis-1,2-Dichloroethene	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
78-93-3	2-Butanone (MEK)	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
67-66-3	Chloroform	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
71-55-6	1,1,1-Trichloroethane	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
56-23-5	Carbon tetrachloride	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
71-43-2	Benzene	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
107-06-2	1,2-Dichloroethane	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
79-01-6	Trichloroethene	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
78-87-5	1,2-Dichloropropane	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
75-27-4	Bromodichloromethane	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
10061-01-5	cis-1,3-Dichloropropene	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
108-10-1	4-Methyl-2-Pentanone (MIBK)	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
108-88-3	Toluene	1.	J	5.	U	6.	U	6.	U	6.	U	6.	U
10061-02-6	trans-1,3-Dichloropropene	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
79-00-5	1,1,2-Trichloroethane	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
127-18-4	Tetrachloroethene	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
591-78-6	2-Hexanone	6.	UJ	5.	UJ	6.	UJ	6.	UJ	6.	UJ	6.	UJ
124-48-1	Dibromochloromethane	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
108-90-7	Chlorobenzene	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
100-41-4	Ethylbenzene	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
100-42-5	Styrene	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
75-25-2	Bromoform	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
79-34-5	1,1,2,2-Tetrachloroethane	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
1330-20-7	Xylene (Total)	6.	U	5.	U	6.	U	6.	U	6.	U	6.	U
75-05-8	Acetonitrile	NR		NR		NR		NR		NR		NR	
96-12-8	1,2-Dibromo-3-Chloropropane	NR		NR		NR		NR		NR		NR	
110-75-8	2-Chloroethylvinylether	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA												
	SAMPLE ID ------>	039-S-F008-10		039-S-F009-04		039-S-F009-12		039-S-F010-02		039-S-F010-12		039-S-F011-04	
	ORIGINAL ID ----->	039SF00810		039SF00904		039SF00912		039SF01002		039SF01012		039SF01104	
	LAB SAMPLE ID --->	44801.02		44801.03		44801.04		44801.05		44801.06		44801.07	
	ID FROM REPORT -->	039SF00810		039SF00904		039SF00912		039SF01002		039SF01012		039SF01104	
	SAMPLE DATE ----->	10/24/00		10/24/00		10/24/00		10/24/00		10/24/00		10/24/00	
	DATE ANALYZED --->	10/26/00		10/26/00		10/26/00		10/26/00		10/26/00		10/26/00	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	UG/KG		UG/KG		UG/KG		UG/KG		UG/KG		UG/KG	
CAS #	Parameter	44783	VAL	44783	VAL	44783	VAL	44783	VAL	44783	VAL	44783	VAL
1634-04-4	Methyl tert-butyl ether	NR		NR		NR		NR		NR		NR	
630-20-6	1,1,1,2-Tetrachloroethane	NR		NR		NR		NR		NR		NR	
563-58-6	1,1-Dichloropropene	NR		NR		NR		NR		NR		NR	
87-61-6	1,2,3-Trichlorobenzene	NR		NR		NR		NR		NR		NR	
96-18-4	1,2,3-Trichloropropane	NR		NR		NR		NR		NR		NR	
120-82-1	1,2,4-Trichlorobenzene	NR		NR		NR		NR		NR		NR	
95-63-6	Benzene, 1,2,4-trimethyl	NR		NR		NR		NR		NR		NR	
106-93-4	1,2-Dibromoethane	NR		NR		NR		NR		NR		NR	
95-50-1	1,2-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
108-67-8	Benzene, 1,3,5-trimethyl-	NR		NR		NR		NR		NR		NR	
541-73-1	1,3-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
142-28-9	1,3-Dichloropropane	NR		NR		NR		NR		NR		NR	
106-46-7	1,4-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
594-20-7	2,2-Dichloropropane	NR		NR		NR		NR		NR		NR	
95-49-8	2-Chlorotoluene	NR		NR		NR		NR		NR		NR	
106-43-4	4-Chlorotoluene	NR		NR		NR		NR		NR		NR	
99-87-6	p-Isopropyltoluene	NR		NR		NR		NR		NR		NR	
108-86-1	Bromobenzene	NR		NR		NR		NR		NR		NR	
74-97-5	Chlorobromomethane	NR		NR		NR		NR		NR		NR	
74-95-3	Dibromomethane	NR		NR		NR		NR		NR		NR	
75-71-8	Dichlorodifluoromethane	NR		NR		NR		NR		NR		NR	
87-68-3	Hexachlorobutadiene	NR		NR		NR		NR		NR		NR	
74-88-4	Methyl iodide	NR		NR		NR		NR		NR		NR	
98-82-8	Benzene, 1-methylethyl-	NR		NR		NR		NR		NR		NR	
104-51-8	n-Butylbenzene	NR		NR		NR		NR		NR		NR	
103-65-1	n-Propylbenzene	NR		NR		NR		NR		NR		NR	
91-20-3	Naphthalene	NR		NR		NR		NR		NR		NR	
135-98-8	sec-Butylbenzene	NR		NR		NR		NR		NR		NR	
98-06-6	tert-Butylbenzene	NR		NR		NR		NR		NR		NR	
75-69-4	Trichlorofluoromethane	NR		NR		NR		NR		NR		NR	
95-47-6	o-Xylene	NR		NR		NR		NR		NR		NR	
141-78-6	Ethyl acetate	NR		NR		NR		NR		NR		NR	
108-05-4	Vinyl acetate	NR		NR		NR		NR		NR		NR	
9999900-05-0	m+p Xylene	NR		NR		NR		NR		NR		NR	
107-02-8	Acrolein	NR		NR		NR		NR		NR		NR	
107-13-1	Acrylonitrile	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA													
	SAMPLE ID ------->	039-S-F011-12		039-S-F012-06		039-C-F012-06		039-S-F012-12		039-S-LS01-04		039-S-LS01-12	
	ORIGINAL ID ----->	039SF01112		039SF01206		039CF01206		039SF01212		039SLS0104		039SLS0112	
	LAB SAMPLE ID --->	44801.08		44801.09		44801.11		44801.10		44801.12		44801.13	
	ID FROM REPORT -->	039SF01112		039SF01206		039CF01206		039SF01212		039SLS0104		039SLS0112	
	SAMPLE DATE ----->	10/24/00		10/24/00		10/24/00		10/24/00		10/24/00		10/24/00	
	DATE ANALYZED --->	10/26/00		10/26/00		10/26/00		10/26/00		10/26/00		10/27/00	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	UG/KG		UG/KG		UG/KG		UG/KG		UG/KG		UG/KG	
CAS #	Parameter	44783	VAL	44783	VAL	44783	VAL	44783	VAL	44783	VAL	44783	VAL
74-87-3	Chloromethane	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
75-01-4	Vinyl chloride	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
74-83-9	Bromomethane	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
75-00-3	Chloroethane	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
75-35-4	1,1-Dichloroethene	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
67-64-1	Acetone	6.	U	11.		10.		6.	U	6.	U	5.	J
75-15-0	Carbon disulfide	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
75-09-2	Methylene chloride	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
75-34-3	1,1-Dichloroethane	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
156-60-5	trans-1,2-Dichloroethene	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
156-59-2	cis-1,2-Dichloroethene	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
78-93-3	2-Butanone (MEK)	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
67-66-3	Chloroform	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
71-55-6	1,1,1-Trichloroethane	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
56-23-5	Carbon tetrachloride	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
71-43-2	Benzene	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
107-06-2	1,2-Dichloroethane	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
79-01-6	Trichloroethene	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
78-87-5	1,2-Dichloropropane	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
75-27-4	Bromodichloromethane	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
10061-01-5	cis-1,3-Dichloropropene	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
108-10-1	4-Methyl-2-Pentanone (MIBK)	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
108-88-3	Toluene	1.	J	5.	U	5.	U	6.	U	6.	U	6.	U
10061-02-6	trans-1,3-Dichloropropene	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
79-00-5	1,1,2-Trichloroethane	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
127-18-4	Tetrachloroethene	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
591-78-6	2-Hexanone	6.	UJ	5.	UJ	5.	UJ	6.	UJ	6.	UJ	6.	UJ
124-48-1	Dibromochloromethane	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
108-90-7	Chlorobenzene	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
100-41-4	Ethylbenzene	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
100-42-5	Styrene	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
75-25-2	Bromoform	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
79-34-5	1,1,2,2-Tetrachloroethane	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
1330-20-7	Xylene (Total)	6.	U	5.	U	5.	U	6.	U	6.	U	6.	U
75-05-8	Acetonitrile	NR		NR		NR		NR		NR		NR	
96-12-8	1,2-Dibromo-3-Chloropropane	NR		NR		NR		NR		NR		NR	
110-75-8	2-Chloroethylvinylether	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA							
SAMPLE ID ------->	039-S-F011-12	039-S-F012-06	039-C-F012-06	039-S-F012-12	039-S-LS01-04	039-S-LS01-12
ORIGINAL ID ----->	039SF01112	039SF01206	039CF01206	039SF01212	039SLS0104	039SLS0112
LAB SAMPLE ID --->	44801.08	44801.09	44801.11	44801.10	44801.12	44801.13
ID FROM REPORT -->	039SF01112	039SF01206	039CF01206	039SF01212	039SLS0104	039SLS0112
SAMPLE DATE ----->	10/24/00	10/24/00	10/24/00	10/24/00	10/24/00	10/24/00
DATE ANALYZED --->	10/26/00	10/26/00	10/26/00	10/26/00	10/26/00	10/27/00
MATRIX ---------->	Soil	Soil	Soil	Soil	Soil	Soil
UNITS ---------->	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG

CAS #	Parameter	44783	VAL	44783	VAL	44783	VAL	44783	VAL	44783	VAL	44783	VAL
1634-04-4	Methyl tert-butyl ether	NR		NR		NR		NR		NR		NR	
630-20-6	1,1,1,2-Tetrachloroethane	NR		NR		NR		NR		NR		NR	
563-58-6	1,1-Dichloropropene	NR		NR		NR		NR		NR		NR	
87-61-6	1,2,3-Trichlorobenzene	NR		NR		NR		NR		NR		NR	
96-18-4	1,2,3-Trichloropropane	NR		NR		NR		NR		NR		NR	
120-82-1	1,2,4-Trichlorobenzene	NR		NR		NR		NR		NR		NR	
95-63-6	Benzene, 1,2,4-trimethyl	NR		NR		NR		NR		NR		NR	
106-93-4	1,2-Dibromoethane	NR		NR		NR		NR		NR		NR	
95-50-1	1,2-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
108-67-8	Benzene, 1,3,5-trimethyl-	NR		NR		NR		NR		NR		NR	
541-73-1	1,3-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
142-28-9	1,3-Dichloropropane	NR		NR		NR		NR		NR		NR	
106-46-7	1,4-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
594-20-7	2,2-Dichloropropane	NR		NR		NR		NR		NR		NR	
95-49-8	2-Chlorotoluene	NR		NR		NR		NR		NR		NR	
106-43-4	4-Chlorotoluene	NR		NR		NR		NR		NR		NR	
99-87-6	p-Isopropyltoluene	NR		NR		NR		NR		NR		NR	
108-86-1	Bromobenzene	NR		NR		NR		NR		NR		NR	
74-97-5	Chlorobromomethane	NR		NR		NR		NR		NR		NR	
74-95-3	Dibromomethane	NR		NR		NR		NR		NR		NR	
75-71-8	Dichlorodifluoromethane	NR		NR		NR		NR		NR		NR	
87-68-3	Hexachlorobutadiene	NR		NR		NR		NR		NR		NR	
74-88-4	Methyl iodide	NR		NR		NR		NR		NR		NR	
98-82-8	Benzene, 1-methylethyl-	NR		NR		NR		NR		NR		NR	
104-51-8	n-Butylbenzene	NR		NR		NR		NR		NR		NR	
103-65-1	n-Propylbenzene	NR		NR		NR		NR		NR		NR	
91-20-3	Naphthalene	NR		NR		NR		NR		NR		NR	
135-98-8	sec-Butylbenzene	NR		NR		NR		NR		NR		NR	
98-06-6	tert-Butylbenzene	NR		NR		NR		NR		NR		NR	
75-69-4	Trichlorofluoromethane	NR		NR		NR		NR		NR		NR	
95-47-6	o-Xylene	NR		NR		NR		NR		NR		NR	
141-78-6	Ethyl acetate	NR		NR		NR		NR		NR		NR	
108-05-4	Vinyl acetate	NR		NR		NR		NR		NR		NR	
9999900-05-0	m+p Xylene	NR		NR		NR		NR		NR		NR	
107-02-8	Acrolein	NR		NR		NR		NR		NR		NR	
107-13-1	Acrylonitrile	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA													
	SAMPLE ID ------->	039-S-LS02-04		039-S-LS02-12		039-S-LS03-04		039-S-LS03-12		039-S-LS04-04		039-S-LS04-12	
	ORIGINAL ID ----->	039SLS0204		039SLS0212		039SLS0304		039SLS0312		039SLS0404		039SLS0412	
	LAB SAMPLE ID --->	44801.14		44801.15		44801.16		44802.01		44802.02		44802.03	
	ID FROM REPORT -->	039SLS0204		039SLS0212		039SLS0304		039SLS0312		039SLS0404		039SLS0412	
	SAMPLE DATE ----->	10/24/00		10/24/00		10/24/00		10/24/00		10/24/00		10/24/00	
	DATE ANALYZED --->	10/27/00		10/27/00		10/27/00		10/27/00		10/27/00		10/31/00	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	UG/KG		UG/KG		UG/KG		UG/KG		UG/KG		UG/KG	
CAS #	Parameter	44783	VAL	44783	VAL	44783	VAL	44802	VAL	44802	VAL	44802	VAL
74-87-3	Chloromethane	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
75-01-4	Vinyl chloride	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
74-83-9	Bromomethane	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
75-00-3	Chloroethane	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
75-35-4	1,1-Dichloroethene	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
67-64-1	Acetone	15.		6.	U	21.		5.	J	24.		6.	U
75-15-0	Carbon disulfide	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
75-09-2	Methylene chloride	5.	U	6.	U	6.	U	6.	U	6.	U	6.	U
75-34-3	1,1-Dichloroethane	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
156-60-5	trans-1,2-Dichloroethene	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
156-59-2	cis-1,2-Dichloroethene	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
78-93-3	2-Butanone (MEK)	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
67-66-3	Chloroform	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
71-55-6	1,1,1-Trichloroethane	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
56-23-5	Carbon tetrachloride	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
71-43-2	Benzene	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
107-06-2	1,2-Dichloroethane	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
79-01-6	Trichloroethene	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
78-87-5	1,2-Dichloropropane	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
75-27-4	Bromodichloromethane	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
108-10-1	4-Methyl-2-Pentanone (MIBK)	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
108-88-3	Toluene	5.	U	6.	U	6.	U	6.	U	5.	U	7.	
10061-02-6	trans-1,3-Dichloropropene	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
79-00-5	1,1,2-Trichloroethane	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
127-18-4	Tetrachloroethene	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
591-78-6	2-Hexanone	5.	UJ	6.	UJ	6.	UJ	6.	UJ	5.	UJ	6.	U
124-48-1	Dibromochloromethane	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
108-90-7	Chlorobenzene	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
100-41-4	Ethylbenzene	5.	U	6.	U	6.	U	6.	U	5.	U	21.	
100-42-5	Styrene	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
75-25-2	Bromoform	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U	6.	U	6.	U	6.	U	5.	U	6.	U
1330-20-7	Xylene (Total)	5.	U	6.	U	6.	U	6.	U	5.	U	110.	
75-05-8	Acetonitrile	NR		NR		NR		NR		NR		NR	
96-12-8	1,2-Dibromo-3-Chloropropane	NR		NR		NR		NR		NR		NR	
110-75-8	2-Chloroethylvinylether	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA	SAMPLE ID ------->	039-S-LS02-04	039-S-LS02-12	039-S-LS03-04	039-S-LS03-12	039-S-LS04-04	039-S-LS04-12
	ORIGINAL ID ----->	039SLS0204	039SLS0212	039SLS0304	039SLS0312	039SLS0404	039SLS0412
	LAB SAMPLE ID --->	44801.14	44801.15	44801.16	44802.01	44802.02	44802.03
	ID FROM REPORT -->	039SLS0204	039SLS0212	039SLS0304	039SLS0312	039SLS0404	039SLS0412
	SAMPLE DATE ----->	10/24/00	10/24/00	10/24/00	10/24/00	10/24/00	10/24/00
	DATE ANALYZED --->	10/27/00	10/27/00	10/27/00	10/27/00	10/27/00	10/31/00
	MATRIX ---------->	Soil	Soil	Soil	Soil	Soil	Soil
	UNITS ---------->	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG

CAS #	Parameter	44783	VAL	44783	VAL	44783	VAL	44802	VAL	44802	VAL	44802	VAL
1634-04-4	Methyl tert-butyl ether	NR		NR		NR		NR		NR		NR	
630-20-6	1,1,1,2-Tetrachloroethane	NR		NR		NR		NR		NR		NR	
563-58-6	1,1-Dichloropropene	NR		NR		NR		NR		NR		NR	
87-61-6	1,2,3-Trichlorobenzene	NR		NR		NR		NR		NR		NR	
96-18-4	1,2,3-Trichloropropane	NR		NR		NR		NR		NR		NR	
120-82-1	1,2,4-Trichlorobenzene	NR		NR		NR		NR		NR		NR	
95-63-6	Benzene, 1,2,4-trimethyl	NR		NR		NR		NR		NR		NR	
106-93-4	1,2-Dibromoethane	NR		NR		NR		NR		NR		NR	
95-50-1	1,2-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
108-67-8	Benzene, 1,3,5-trimethyl-	NR		NR		NR		NR		NR		NR	
541-73-1	1,3-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
142-28-9	1,3-Dichloropropane	NR		NR		NR		NR		NR		NR	
106-46-7	1,4-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
594-20-7	2,2-Dichloropropane	NR		NR		NR		NR		NR		NR	
95-49-8	2-Chlorotoluene	NR		NR		NR		NR		NR		NR	
106-43-4	4-Chlorotoluene	NR		NR		NR		NR		NR		NR	
99-87-6	p-Isopropyltoluene	NR		NR		NR		NR		NR		NR	
108-86-1	Bromobenzene	NR		NR		NR		NR		NR		NR	
74-97-5	Chlorobromomethane	NR		NR		NR		NR		NR		NR	
74-95-3	Dibromomethane	NR		NR		NR		NR		NR		NR	
75-71-8	Dichlorodifluoromethane	NR		NR		NR		NR		NR		NR	
87-68-3	Hexachlorobutadiene	NR		NR		NR		NR		NR		NR	
74-88-4	Methyl iodide	NR		NR		NR		NR		NR		NR	
98-82-8	Benzene, 1-methylethyl-	NR		NR		NR		NR		NR		NR	
104-51-8	n-Butylbenzene	NR		NR		NR		NR		NR		NR	
103-65-1	n-Propylbenzene	NR		NR		NR		NR		NR		NR	
91-20-3	Naphthalene	NR		NR		NR		NR		NR		NR	
135-98-8	sec-Butylbenzene	NR		NR		NR		NR		NR		NR	
98-06-6	tert-Butylbenzene	NR		NR		NR		NR		NR		NR	
75-69-4	Trichlorofluoromethane	NR		NR		NR		NR		NR		NR	
95-47-6	o-Xylene	NR		NR		NR		NR		NR		NR	
141-78-6	Ethyl acetate	NR		NR		NR		NR		NR		NR	
108-05-4	Vinyl acetate	NR		NR		NR		NR		NR		NR	
9999900-05-0	m+p Xylene	NR		NR		NR		NR		NR		NR	
107-02-8	Acrolein	NR		NR		NR		NR		NR		NR	
107-13-1	Acrylonitrile	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA													
	SAMPLE ID ------->	039-S-LS05-04		039-S-LS05-12		039-S-LS06-04		039-S-LS06-12		039-S-LS07-04		039-S-LS07-12	
	ORIGINAL ID ----->	039SLS0504		039SLS0512		039SLS0604		039SLS0612		039SLS0704		039SLS0712	
	LAB SAMPLE ID --->	44802.04		44802.05		44802.06		44802.07		44802.08		44802.09	
	ID FROM REPORT -->	039SLS0504		039SLS0512		039SLS0604		039SLS0612		039SLS0704		039SLS0712	
	SAMPLE DATE ----->	10/24/00		10/24/00		10/24/00		10/24/00		10/24/00		10/24/00	
	DATE ANALYZED --->	10/27/00		10/27/00		10/27/00		10/27/00		10/27/00		10/30/00	
	MATRIX ---------->	Soil		Soil		Soil		Soil		Soil		Soil	
	UNITS ---------->	UG/KG		UG/KG		UG/KG		UG/KG		UG/KG		UG/KG	
CAS #	Parameter	44802	VAL	44802	VAL	44802	VAL	44802	VAL	44802	VAL	44802	VAL
74-87-3	Chloromethane	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
75-01-4	Vinyl chloride	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
74-83-9	Bromomethane	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
75-00-3	Chloroethane	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
75-35-4	1,1-Dichloroethene	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
67-64-1	Acetone	6.	U	5.	J	6.	U	6.	U	6.	U	6.	U
75-15-0	Carbon disulfide	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
75-09-2	Methylene chloride	6.	U	6.	U	7.	U	6.	U	6.	U	8.	U
75-34-3	1,1-Dichloroethane	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
156-60-5	trans-1,2-Dichloroethene	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
156-59-2	cis-1,2-Dichloroethene	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
78-93-3	2-Butanone (MEK)	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
67-66-3	Chloroform	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
71-55-6	1,1,1-Trichloroethane	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
56-23-5	Carbon tetrachloride	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
71-43-2	Benzene	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
107-06-2	1,2-Dichloroethane	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
79-01-6	Trichloroethene	6.	U	6.	U	6.	U	11.		6.	U	6.	U
78-87-5	1,2-Dichloropropane	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
75-27-4	Bromodichloromethane	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
10061-01-5	cis-1,3-Dichloropropene	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
108-10-1	4-Methyl-2-Pentanone (MIBK)	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
108-88-3	Toluene	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
10061-02-6	trans-1,3-Dichloropropene	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
79-00-5	1,1,2-Trichloroethane	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
127-18-4	Tetrachloroethene	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
591-78-6	2-Hexanone	6.	UJ	6.	UJ	6.	UJ	6.	UJ	6.	UJ	6.	U
124-48-1	Dibromochloromethane	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
108-90-7	Chlorobenzene	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
100-41-4	Ethylbenzene	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
100-42-5	Styrene	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
75-25-2	Bromoform	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
79-34-5	1,1,2,2-Tetrachloroethane	6.	U	6.	U	6.	U	6.	U	6.	U	6.	U
1330-20-7	Xylene (Total)	6.	U	6.	U	6.	U	6.	U	6.	U	2.	J
75-05-8	Acetonitrile	NR		NR		NR		NR		NR		NR	
96-12-8	1,2-Dibromo-3-Chloropropane	NR		NR		NR		NR		NR		NR	
110-75-8	2-Chloroethylvinylether	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA							
	SAMPLE ID ------->	039-S-LS05-04	039-S-LS05-12	039-S-LS06-04	039-S-LS06-12	039-S-LS07-04	039-S-LS07-12
	ORIGINAL ID ----->	039SLS0504	039SLS0512	039SLS0604	039SLS0612	039SLS0704	039SLS0712
	LAB SAMPLE ID --->	44802.04	44802.05	44802.06	44802.07	44802.08	44802.09
	ID FROM REPORT -->	039SLS0504	039SLS0512	039SLS0604	039SLS0612	039SLS0704	039SLS0712
	SAMPLE DATE ----->	10/24/00	10/24/00	10/24/00	10/24/00	10/24/00	10/24/00
	DATE ANALYZED --->	10/27/00	10/27/00	10/27/00	10/27/00	10/27/00	10/30/00
	MATRIX ---------->	Soil	Soil	Soil	Soil	Soil	Soil
	UNITS ---------->	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG

CAS #	Parameter	44802	VAL	44802	VAL	44802	VAL	44802	VAL	44802	VAL	44802	VAL
1634-04-4	Methyl tert-butyl ether	NR		NR		NR		NR		NR		NR	
630-20-6	1,1,1,2-Tetrachloroethane	NR		NR		NR		NR		NR		NR	
563-58-6	1,1-Dichloropropene	NR		NR		NR		NR		NR		NR	
87-61-6	1,2,3-Trichlorobenzene	NR		NR		NR		NR		NR		NR	
96-18-4	1,2,3-Trichloropropane	NR		NR		NR		NR		NR		NR	
120-82-1	1,2,4-Trichlorobenzene	NR		NR		NR		NR		NR		NR	
95-63-6	Benzene, 1,2,4-trimethyl	NR		NR		NR		NR		NR		NR	
106-93-4	1,2-Dibromoethane	NR		NR		NR		NR		NR		NR	
95-50-1	1,2-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
108-67-8	Benzene, 1,3,5-trimethyl-	NR		NR		NR		NR		NR		NR	
541-73-1	1,3-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
142-28-9	1,3-Dichloropropane	NR		NR		NR		NR		NR		NR	
106-46-7	1,4-Dichlorobenzene	NR		NR		NR		NR		NR		NR	
594-20-7	2,2-Dichloropropane	NR		NR		NR		NR		NR		NR	
95-49-8	2-Chlorotoluene	NR		NR		NR		NR		NR		NR	
106-43-4	4-Chlorotoluene	NR		NR		NR		NR		NR		NR	
99-87-6	p-Isopropyltoluene	NR		NR		NR		NR		NR		NR	
108-86-1	Bromobenzene	NR		NR		NR		NR		NR		NR	
74-97-5	Chlorobromomethane	NR		NR		NR		NR		NR		NR	
74-95-3	Dibromomethane	NR		NR		NR		NR		NR		NR	
75-71-8	Dichlorodifluoromethane	NR		NR		NR		NR		NR		NR	
87-68-3	Hexachlorobutadiene	NR		NR		NR		NR		NR		NR	
74-88-4	Methyl iodide	NR		NR		NR		NR		NR		NR	
98-82-8	Benzene, 1-methylethyl-	NR		NR		NR		NR		NR		NR	
104-51-8	n-Butylbenzene	NR		NR		NR		NR		NR		NR	
103-65-1	n-Propylbenzene	NR		NR		NR		NR		NR		NR	
91-20-3	Naphthalene	NR		NR		NR		NR		NR		NR	
135-98-8	sec-Butylbenzene	NR		NR		NR		NR		NR		NR	
98-06-6	tert-Butylbenzene	NR		NR		NR		NR		NR		NR	
75-69-4	Trichlorofluoromethane	NR		NR		NR		NR		NR		NR	
95-47-6	o-Xylene	NR		NR		NR		NR		NR		NR	
141-78-6	Ethyl acetate	NR		NR		NR		NR		NR		NR	
108-05-4	Vinyl acetate	NR		NR		NR		NR		NR		NR	
9999900-05-0	m+p Xylene	NR		NR		NR		NR		NR		NR	
107-02-8	Acrolein	NR		NR		NR		NR		NR		NR	
107-13-1	Acrylonitrile	NR		NR		NR		NR		NR		NR	

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA	SAMPLE ID ------>	039-S-LS08-10		039-S-LS08-12		FRA-C-1023-00				
	ORIGINAL ID ----->	039SLS0810		039SLS0812		FRAC102300				
	LAB SAMPLE ID --->	44802.10		44802.11		44783.01				
	ID FROM REPORT -->	039SLS0810		039SLS0812		FRAC102300				
	SAMPLE DATE ----->	10/24/00		10/24/00		10/23/00				
	DATE ANALYZED --->	10/30/00		10/30/00		10/25/00				
	MATRIX ---------->	Soil		Soil		Water				
	UNITS ----------->	UG/KG		UG/KG		UG/L				
CAS #	Parameter	44802	VAL	44802	VAL	44783	VAL			
74-87-3	Chloromethane	6.	U	6.	U	5.	U			
75-01-4	Vinyl chloride	6.	U	6.	U	5.	U			
74-83-9	Bromomethane	6.	U	6.	U	5.	U			
75-00-3	Chloroethane	6.	U	6.	U	5.	U			
75-35-4	1,1-Dichloroethene	6.	U	6.	U	5.	U			
67-64-1	Acetone	6.	U	6.	U	5.	U			
75-15-0	Carbon disulfide	6.	U	6.	U	5.	U			
75-09-2	Methylene chloride	9.	U	7.	U	5.	U			
75-34-3	1,1-Dichloroethane	6.	U	6.	U	5.	U			
156-60-5	trans-1,2-Dichloroethene	6.	U	6.	U	5.	U			
156-59-2	cis-1,2-Dichloroethene	6.	U	6.	U	5.	U			
78-93-3	2-Butanone (MEK)	6.	U	6.	U	5.	U			
67-66-3	Chloroform	6.	U	6.	U	5.	U			
71-55-6	1,1,1-Trichloroethane	6.	U	6.	U	5.	U			
56-23-5	Carbon tetrachloride	6.	U	6.	U	5.	U			
71-43-2	Benzene	6.	U	6.	U	5.	U			
107-06-2	1,2-Dichloroethane	6.	U	6.	U	5.	U			
79-01-6	Trichloroethene	6.	U	6.	U	5.	U			
78-87-5	1,2-Dichloropropane	6.	U	6.	U	5.	U			
75-27-4	Bromodichloromethane	6.	U	6.	U	5.	U			
10061-01-5	cis-1,3-Dichloropropene	6.	U	6.	U	5.	U			
108-10-1	4-Methyl-2-Pentanone (MIBK)	6.	U	6.	U	5.	U			
108-88-3	Toluene	6.	U	6.	U	5.	U			
10061-02-6	trans-1,3-Dichloropropene	6.	U	6.	U	5.	U			
79-00-5	1,1,2-Trichloroethane	6.	U	6.	U	5.	U			
127-18-4	Tetrachloroethene	6.	U	6.	U	5.	U			
591-78-6	2-Hexanone	6.	U	6.	U	5.	U			
124-48-1	Dibromochloromethane	6.	U	6.	U	5.	U			
108-90-7	Chlorobenzene	6.	U	6.	U	5.	U			
100-41-4	Ethylbenzene	6.	U	6.	U	5.	U			
100-42-5	Styrene	6.	U	6.	U	5.	U			
75-25-2	Bromoform	6.	U	6.	U	5.	U			
79-34-5	1,1,2,2-Tetrachloroethane	6.	U	6.	U	5.	U			
1330-20-7	Xylene (Total)	2.	J	6.	U	5.	U			
75-05-8	Acetonitrile	NR		NR		NR				
96-12-8	1,2-Dibromo-3-Chloropropane	NR		NR		NR				
110-75-8	2-Chloroethylvinylether	NR		NR		NR				

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

VOA	SAMPLE ID ------->	039-S-LS08-10	039-S-LS08-12	FRA-C-1023-00			
	ORIGINAL ID ----->	039SLS0810	039SLS0812	FRAC102300			
	LAB SAMPLE ID --->	44802.10	44802.11	44783.01			
	ID FROM REPORT -->	039SLS0810	039SLS0812	FRAC102300			
	SAMPLE DATE ----->	10/24/00	10/24/00	10/23/00			
	DATE ANALYZED --->	10/30/00	10/30/00	10/25/00			
	MATRIX ---------->	Soil	Soil	Water			
	UNITS ---------->	UG/KG	UG/KG	UG/L			

CAS #	Parameter	44802	VAL	44802	VAL	44783	VAL			
1634-04-4	Methyl tert-butyl ether	NR		NR		NR				
630-20-6	1,1,1,2-Tetrachloroethane	NR		NR		NR				
563-58-6	1,1-Dichloropropene	NR		NR		NR				
87-61-6	1,2,3-Trichlorobenzene	NR		NR		NR				
96-18-4	1,2,3-Trichloropropane	NR		NR		NR				
120-82-1	1,2,4-Trichlorobenzene	NR		NR		NR				
95-63-6	Benzene, 1,2,4-trimethyl	NR		NR		NR				
106-93-4	1,2-Dibromoethane	NR		NR		NR				
95-50-1	1,2-Dichlorobenzene	NR		NR		NR				
108-67-8	Benzene, 1,3,5-trimethyl-	NR		NR		NR				
541-73-1	1,3-Dichlorobenzene	NR		NR		NR				
142-28-9	1,3-Dichloropropane	NR		NR		NR				
106-46-7	1,4-Dichlorobenzene	NR		NR		NR				
594-20-7	2,2-Dichloropropane	NR		NR		NR				
95-49-8	2-Chlorotoluene	NR		NR		NR				
106-43-4	4-Chlorotoluene	NR		NR		NR				
99-87-6	p-Isopropyltoluene	NR		NR		NR				
108-86-1	Bromobenzene	NR		NR		NR				
74-97-5	Chlorobromomethane	NR		NR		NR				
74-95-3	Dibromomethane	NR		NR		NR				
75-71-8	Dichlorodifluoromethane	NR		NR		NR				
87-68-3	Hexachlorobutadiene	NR		NR		NR				
74-88-4	Methyl iodide	NR		NR		NR				
98-82-8	Benzene, 1-methylethyl-	NR		NR		NR				
104-51-8	n-Butylbenzene	NR		NR		NR				
103-65-1	n-Propylbenzene	NR		NR		NR				
91-20-3	Naphthalene	NR		NR		NR				
135-98-8	sec-Butylbenzene	NR		NR		NR				
98-06-6	tert-Butylbenzene	NR		NR		NR				
75-69-4	Trichlorofluoromethane	NR		NR		NR				
95-47-6	o-Xylene	NR		NR		NR				
141-78-6	Ethyl acetate	NR		NR		NR				
108-05-4	Vinyl acetate	NR		NR		NR				
9999900-05-0	m+p Xylene	NR		NR		NR				
107-02-8	Acrolein	NR		NR		NR				
107-13-1	Acrylonitrile	NR		NR		NR				

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

WET CHEM	SAMPLE ID ------>	039-G-01LF-02	039-G-01LS-01	039-G-02LF-02	039-G-02LS-01	039-G-03LF-02	039-G-03LS-01
	ORIGINAL ID ----->	039G01LF02	039G01LS01	039G02LF02	039G02LS01	039G03LF02	039G03LS01
	LAB SAMPLE ID --->	44641.04	45426.01	44683.03	45426.02	44665.02	45426.03
	ID FROM REPORT -->	039G01LF02	039G01LS01	039G02LF02	039G02LS01	039G03LF02	039G03LS01
	SAMPLE DATE ----->	10/11/00	12/14/00	10/13/00	12/14/00	10/12/00	12/14/00
	DATE ANALYZED --->	10/20/00	12/18/00	10/22/00	12/18/00	10/20/00	12/18/00
	MATRIX ---------->	Water	Water	Water	Water	Water	Water
	UNITS ---------->	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L

CAS #	Parameter	44641	VAL	45426	VAL	44641	VAL	45426	VAL	44641	VAL	45426	VAL
9999900-01-4	Total Organic Carbon (TOC)	6.6		3.7		1.	U	2.2		3.5		3.5	
14797-55-8	Nitrate (as N)	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

WET CHEM						
SAMPLE ID ------->	039-H-03LS-01	039-G-04LF-02	039-G-04LS-01	039-G-05LF-02	039-G-06LF-02	039-G-07LF-02
ORIGINAL ID ----->	039H03LS01	039G04LF02	039G04LS01	039G05LF02	039G06LF02	039G07LF02
LAB SAMPLE ID --->	45426.05	44700.02	45426.04	44665.03	44665.04	44665.05
ID FROM REPORT -->	039H03LS01	039G04LF02	039G04LS01	039G05LF02	039G06LF02	039G07LF02
SAMPLE DATE ----->	12/14/00	10/16/00	12/14/00	10/12/00	10/12/00	10/12/00
DATE ANALYZED --->	12/18/00	10/22/00	12/18/00	10/20/00	10/20/00	10/20/00
MATRIX ---------->	Water	Water	Water	Water	Water	Water
UNITS ---------->	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L

CAS #	Parameter	45426	VAL	44700	VAL	45426	VAL	44641	VAL	44641	VAL	44641	VAL
9999900-01-4	Total Organic Carbon (TOC)	3.2		3.		2.5		8.6		3.6		4.5	
14797-55-8	Nitrate (as N)	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U

*** Validation Complete ***

NSA MID-SOUTH
SWMU 39 SUPPLEMENTAL SAMPLING

WET CHEM							
	SAMPLE ID ------->	039-G-08LF-02	039-G-09LF-02				
	ORIGINAL ID ----->	039G08LF02	039G09LF02				
	LAB SAMPLE ID --->	44683.02	44700.01				
	ID FROM REPORT -->	039G08LF02	039G09LF02				
	SAMPLE DATE ----->	10/13/00	10/16/00				
	DATE ANALYZED --->	10/22/00	10/22/00				
	MATRIX ---------->	Water	Water				
	UNITS ----------->	MG/L	MG/L				
CAS #	Parameter	44641 VAL	44700 VAL				
9999900-01-4	Total Organic Carbon (TOC)	3.7	7.6				
14797-55-8	Nitrate (as N)	0.25	0.23				

*** Validation Complete ***

Appendix B

Preliminary MNA Evaluation

SITE-SPECIFIC MNA EVALUATION

Groundwater was collected from nine wells at SWMU 39 and analyzed for chemical and geochemical parameters to determine if chlorinated solvents are biodegrading naturally in fluvial deposits/Cockfield Formation groundwater. Geochemical data are also being used to determine if natural biodegradation could be used as the sole remedy for cleanup.

Chemical analyses for VOCs were performed in the laboratory. Geochemical samples were collected and analyzed in accordance with the USEPA protocol for MNA analyses (*Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water*, 1998). In accordance with MNA protocol, certain critical geochemical parameters were analyzed in the field and the remaining samples were analyzed in the laboratory.

Chemical/Geochemical Data

Chemical and geochemical data are summarized in Table B-1. This data set was used to examine the potential for MNA at SWMU 39 from a geochemical perspective. Critical geochemical parameters are analyzed below.

MNA Data Interpretation

VOCs: Three of the nine fluvial deposits wells sampled had TCE detections, with the highest concentration being 180 μg/L at 039G04LF. *Cis*-1,2-DCE (which is the daughter product of TCE reductive dechlorination) was detected at very low concentrations of 3 μg/L and 6 μg/L in wells 039G03LF and 039G04LF, respectively, indicating that its parent compound is undergoing degradation without accumulating in the aquifer. Vinyl chloride was not detected in any area wells, indicating that, if it is being formed during natural biological attenuation (reductive dechlorination), it is not accumulating in the aquifer. A good indicator of MNA feasibility is the absence of VOCs at downgradient wells 039G07LF, 039G08LF, and 039G09LF. It appears that as groundwater flows downgradient, VOCs naturally degrade to nondetect levels.

Table B-1
SWMU 39 - Lower Fluvial Deposits Groundwater
MNA Evaluation
Chemical and Geochemical Data
October 2000

Parameter	Units	Well 039G01LF	Well 039G02LF	Well 039G03LF	Well 039G04LF	Well 039G05LF	Well 039G06LF	Well 039G07LF	Well 039G08LF	Well 039G09LF
Dissolved Oxygen (DO)*	mg/L	0.3	0.15	0.4	0.9	0.13	0.17	0.2	0.22	0.32
Temperature*	°C	20.2	21.08	17.42	21.25	21.8	18.6	18.79	20.11	19.49
pH*	pH units	6.36	6.54	6.82	6.53	6.5	6.41	6.33	6.26	6.34
Oxidation Reduction Potential (ORP)*	mV	13	-55	118	-49	-38	-32	50	42	47
Chloride*	mg/L	15	20	60	20	90	15	30	15	20
Alkalinity*	mg/L	180	340	380	440	240	260	220	140	180
Ferrous Iron (Iron II)*	mg/L	3.15	6.6	0.98	7.3	5.9	4.1	3.24	2.45	1.36
Nitrate	mg/L	ND	ND	ND	ND	ND	ND	ND	0.25	0.23
Sulfate*	mg/L	45	28	28	30	19	26	58	53	20
Sulfide*	mg/L	0.201	0.07	0.16	0.122	0.072	0.038	0.249	0.237	0.071
Methane	mg/L	NS	7.18	25.81	25.47	25.1	41.54	58.12	4.97	10.32
Total Organic Carbon (TOC)	mg/L	6.6	ND	3.5	3	8.6	3.6	4.5	3.7	7.6
TCE	mg/L	ND	ND	30	180	ND	11	ND	ND	ND
cis-1,2-DCE	mg/L	ND	ND	3	6	ND	ND	ND	ND	ND
Vinyl Chloride (VC)	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
DCA	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	mg/L	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

*These parameters were measured in the field.

ND = nondetect

mg/L = milligrams per liter

mV = millivolts

Geochemistry: Dissolved oxygen is probably the single most significant geochemical indicator at sites with chlorinated-solvent-contaminated groundwater. When the DO concentration is low enough to indicate anaerobic conditions, conditions in the aquifer are likely to be conducive to degradation of TCE by reductive dechlorination. All wells sampled in the area, except for 039G04LF, had DO levels less than 0.5 mg/L, strongly supporting the hypothesis that reductive dechlorination of TCE is occurring in the aquifer. Oxidation-reduction potential (ORP) values are generally less than 50 millivolts (mVs), further suggesting an anaerobic aquifer which supports natural attenuation of TCE by reductive dechlorination.

The presence of reduced ferrous iron in measurable quantities (>5 mg/L at several locations) indicates that the aquifer is a reducing one, as also indicated by DO and ORP readings. Higher ferrous iron concentrations also indirectly indicate the capacity of an aquifer to support direct oxidation of daughter products *cis*-1,2-DCE and vinyl chloride in the aquifer under anaerobic conditions. In all likelihood, the high ferrous iron concentrations explain why these daughter products are not generally detected in area wells.

Total organic carbon (TOC) concentrations in the aquifer are greater than 3 mg/L in several area wells. TOC is the essential natural carbon source that supports reductive dechlorination of TCE. At the levels detected in the aquifer, TOC should be sufficient to sustain TCE degradation.

Other significant geochemical parameters for which some data are available include nitrate and sulfide. Nitrate could inhibit the progress of reductive dechlorination of TCE, but since it was not detected at this site, it cannot interfere with MNA activity. Sulfide was measured at low concentrations in this aquifer, suggesting that the aquifer could be classified as being in either the sulfate-reducing or iron-reducing redox state. These redox conditions, along with low DO levels, make the aquifer very conducive to chlorinated-solvent reduction.