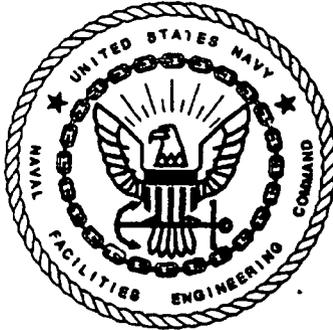


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**RCRA FACILITY INVESTIGATION
DATA VALIDATION REPORT — ASSEMBLY A
NAVAL AIR STATION MEMPHIS
MILLINGTON, TENNESSEE**

VOLUME I of II



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1.0 INTRODUCTION

This report presents the analytical data collected during the RCRA Facility Investigation (RFI) of NAS Memphis Assembly A Solid Waste Management Units (SWMU) 1, 3, 5, 7, 8, and 60 and the quality assurance/quality control (QA/QC) evaluation of those data. The purpose of the data evaluation is to verify that the QC requirements of the data set have been met and to characterize the weakness of any questionable data.

The Assembly A soil and groundwater samples were collected at NAS Memphis between January and May 1995, submitted to National Environmental Testing, Inc. (NET) Laboratory in Cambridge, Massachusetts, and reported using USEPA Data Quality Objectives (DQO) Level III and Level IV. The analytical methods and DQO laboratory deliverables are summarized in Table 1-1.

Table 1-1 NAS Memphis Analytical Program			
Analytical Method	Data Quality Level	Method Reference	Site
Full Scan			
Volatile Organic Compounds (VOCs)	IV	SW-846 8240	SWMU 1 SWMU 3 SWMU 5 SWMU 7 SWMU 8 SWMU 60 Background
Semivolatile Organic Compounds (SVOCs)	IV	SW-846 8270	
Pesticides/Polychlorinated Biphenyls (Pest/PCBs)	IV	SW-846 8080	
Chlorinated Herbicides	IV	SW-846 8150	
Organophosphorus Pesticides (OP Pesticides)	IV	SW-846 8140	
Total Petroleum Hydrocarbons (TPH)	III	USEPA 418.1	
Metals	IV	40 CFR Part 264 Appendix IX (SW-846 6010/7060/7421/7470/7740)	
Cyanide	IV	SW-846 9010	
Hydrocarbons	III	Modified 8015/TN Glycol	SWMU 5

Table 1-1 NAS Memphis Analytical Program			
Analytical Method	Data Quality Level	Method Reference	Site
Remedial Design			
Kjeldahl Nitrogen	III	USEPA 351.2	SWMU 3 SWMU 5 SWMU 7 SWMU 8 SWMU 60
Nitrate	III	USEPA 353.2	
Total Organic Carbon (TOC)	III	SW-846 Modified 9060	
Total Phosphorus	III	USEPA 365.3	
Alkalinity	III	USEPA 310.1	
5-Day biochemical Oxygen Demand (BOD ₅)	III	USEPA 405.1	
Chemical Oxygen Demand (COD)	III	USEPA 410.1	
Hardness	III	SW-846 6010	
Sulfate	III	USEPA 300.0	
Total Suspended Solids (TSS)	III	USEPA 160.2	
Turbidity	III	USEPA 180.1	
Waste Characterization			
TCLP Lead	III	SW-846 1311/6010	SWMU 60

The references for the methods listed in Table 1-1 were obtained from the following sources:

- USEPA Office of Solid Waste and Emergency Response (OSWER), *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846), 3rd Edition, revised July 1992.
- USEPA Environmental Monitoring and Support Laboratory, *Methods for Chemical Analysis of Water and Wastes* (EPA-600/4-79-020, revised March 1983).
- USEPA 40 Code of Federal Regulations Part 264, Appendix IX [52 Federal Register 25947, July 1987]

- Data validation was performed using the following documents (as appropriate): *USEPA Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review, February 1994*. Office of Solid Waste and Emergency Response.

The NAS Memphis data were validated by either EnSafe Allen and Hoshall (E/A&H) or E/A&H's subcontractors, CKY Environmental Services, Inc. of Torrance, California, or Validata Chemical Services of Norcross, Georgia. Ninety-five percent of the data were validated at Level III while 5 percent of the data were validated at Level IV. The data validation findings were summarized separately for each individual sample delivery group (SDG). The individual SDGs usually contain 20 samples of one matrix type, i.e., either a solid (soil and/or sediment) or water (groundwater and/or surface water) samples, except for QC samples. The validation summary reports and data summary tables are included in Attachment A to this document.

The following sections discuss the significant data validation findings for each individual SWMU. The following outlines the SWMUs for this project and the analytical parameters associated with each SWMU.

Data Validation Summary of the Investigative Samples:

Section 2.0	Organic, Metals, and TPH Data	SWMU 1
Section 3.0	Organic, Metals, General Chemistry, and TPH Data	SWMU 3
Section 4.0	Organic, Glycol, Metals, General Chemistry, and TPH Data	SWMU 5
Section 5.0	Organic, Metals, General Chemistry, and TPH Data	SWMU 7
Section 6.0	Organic, Metals, General Chemistry, and TPH Data	SWMU 8
Section 7.0	Organic, Metals, TCLP Lead, General Chemistry, and TPH Data	SWMU 60
Section 8.0	Organic, Metals, and TPH Data	Background

1.1 Organic Evaluation Criteria

The USEPA methods described in the following define quality control criteria that the laboratory must meet but the methods do not address data evaluation from a user's perspective: *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, and *Methods for Chemical Analysis of Water and Wastes*. Evaluation criteria are available in *USEPA Contract Laboratory National Functional Guidelines for Organic Data Review* (Functional Guidelines), February 1994, which was used throughout the data evaluation process when the analytical methods did not address data usability.

Data evaluation for samples collected at NAS Memphis included the following parameters:

- Holding times
- GC/MS instrument performance checks
- Surrogate spike recoveries
- Instrument calibration
- Matrix spike and matrix spike duplicates (MS/MSD)
- Blank analysis
- Internal standard performance
- Compound quantitation
- Field duplicate precision

According to *Functional Guidelines*, when the QC parameters do not fall within the specific method guidelines, the data evaluator annotates or "flags" the corresponding compounds where deficiencies were found. The data from NAS Memphis were evaluated using this approach. The following flags were used to annotate data with laboratory and/or field deficiencies or problems:

- U Undetected** — The analyte was analyzed for but not detected or was also found in an associated blank, but at a concentration less than 10 times the blank concentration for common laboratory constituents (contaminants) or five times the blank concentration for other constituents; the associated value shown is the quantitation limit. The quantitation limit is described as the minimum level of detection acceptable under the contract Statement of Work.
- J Estimated Value** — One or more QC parameters were outside control limits or the concentration of the analyte was less than the Practical Quantitation Limit (PQL).
- UJ Undetected and Estimated** — The analyte was analyzed for but not detected above the listed estimated quantitation limit; the quantitation limit is estimated because one or more QC parameters was outside control limits.
- D Diluted Result** — The compound was re-analyzed at a secondary dilution factor. If one or more compounds are outside the calibration range during an initial analysis, the laboratory flags the analyte "E." When diluted, the sample results will be flagged "D." Generally, values from the initial analysis will be used except where the value exceeded the calibration range. Values exceeding the calibration range in the initial analysis will be substituted by the diluted value to ensure the most representative data. The "D" flag will remain on the value to alert the data user that the value from a secondary dilution was used.
- R/UR Unusable Data** — One or more QC parameters grossly exceeded control limits.

These validation flags were applied to data where data deficiencies were noted. Attachment A includes tables of all qualified data.

1.1.1 Holding Times

Acceptable technical holding times are specified in the analytical methods. The sample holding time depends on the type of analysis and whether the sample was preserved. For water samples, the holding time for preserved VOC analysis is 14 days from the collection date. SVOCs, pesticides/PCBs, organophosphorus pesticides, and chlorinated herbicides water samples must be extracted within seven days and analyzed within 40 days after extraction. Holding times for soil matrices are not specified in SW-846. Therefore, it is at the discretion of the data reviewer to apply the water sample holding times criteria to soil.

The holding time for total petroleum hydrocarbons (by USEPA method 418.1) is 28 days from the day of collection for water samples that are preserved and refrigerated. No holding time is cited for soil samples; therefore, it is at the discretion of the data reviewer to apply the water sample holding time criterion to soil.

1.1.2 GC/MS Mass Calibration (Instrument Performance Checks)

Tuning and performance criteria are established to ensure that the data produced by the instrument may be correctly interpreted according to the requirements of the method being used. These criteria are not sample specific; conformance is determined using standard materials. Therefore, these criteria must be met in all circumstances. Performance standards for VOC [bromofluorobenzene (BFB)] and SVOC [decafluorotriphenylphosphine (DFTPP)] analyses are analyzed to determine if the data produced by the instrument may be correctly interpreted according to the requirements of the method being used. Performance standards must be analyzed within 12 hours of sample analysis, and the results must be within the established criteria.

1.1.3 Surrogate Spike Recoveries

Surrogate compounds are added to samples and laboratory blanks before extraction and sample preparation to evaluate the effect of the sample matrix on extraction and measurement procedures. Surrogates are organic compounds which are chemically similar to analytes of interest but not normally found in environmental samples. Three surrogate compounds are added to samples for VOC analysis, eight are added to samples for SVOC analysis, two are added to pesticide/PCB samples, and one is added to both organophosphorus pesticides and chlorinated herbicides. Percent recovery of the surrogates is calculated by comparing the amount of the compound recovered by the analysis to the amount added to the sample.

Below is a list of surrogate compounds recommended by the SW-846 methods. Abbreviations for each compound are in parentheses (when applicable).

VOC Surrogates

Toluene-d8 (TOL)
Bromofluorobenzene (BFB)
1,2-Dichloroethane-d4 (DCE)

Pesticide/PCB Surrogates

Tetrachloro-m-xylene (TCMX)
Decachlorobiphenyl (DCB)

Herbicide Surrogate

DCAA

SVOC Surrogates

Nitrobenzene-d5 (NBZ)
2-Fluorobiphenyl (FBP)
Terphenyl-d14 (TPH)
2,4,6-Tribromophenol (TBP)
Phenol-d5 (PHL)
2-Chlorophenol-d4 (2CP)
1,2-Dichlorobenzene-d4 (DCB)
2-Fluorophenol (2FP)

Organophosphorus Pesticide Surrogate

4-Chloro-3-Nitrobenzotrifluoride (CNBT)

1.1.4 Instrument Calibration

Instruments are initially and continually calibrated with standard solutions to verify that they are capable of producing acceptable quantitative data for the compounds.

Initial calibration (GC/MS): The instrument is initially calibrated at the beginning of the analytical run to check its performance and to establish a linear 5-point calibration curve. The initial calibration is verified by calculating the relative response factor (RRF) and the percent relative standard deviation (%RSD) for each compound. An RRF less than 0.05 or a %RSD greater than 30 percent is outside the QC limits for the initial calibration.

Continuing calibration (GC/MS): Standard solutions are run periodically to check the daily performance of the instrument and to establish the 12-hour RRF on which the sample quantitations are based. The continuing calibration is verified by calculating the RRF and the percent difference (%D) for each compound. An RRF less than 0.05 or a %D greater than 25 percent is outside the QC limits for the continuing calibration.

Initial calibration (GC): For single-component pesticides, two separate standard mixes are used, five-point calibrations are analyzed, and calibration factors (CF) are established. The CF for single-component pesticides must be less than or equal to 20 percent.

The multi-component pesticide toxaphene and all PCBs (or Arochlors) are analyzed separately. Retention times and CFs are determined for three to five primary peaks. The only review criteria for multi-component compounds is to verify these steps were taken.

A five-point initial calibration is analyzed for herbicides, organophosphorus pesticides, and TPH. Two methods for calibration may be used: external or linear regression methods. For the external method, the initial calibration may be verified by calculating the RRF and the percent relative standard deviation (%RSD) for each compound. An RRF less than 0.05 or a %RSD greater than 20 percent is outside the QC limits for the initial calibration. If linear regression is used, the correlation coefficient must meet or exceed 0.995 before analysis of the samples can begin.

Continuing calibration (GC): To confirm the calibration and evaluate instrument performance for single-component pesticides, calibration verification consisting of instrument blank, performance evaluation mixtures (PEM), and the midpoint concentration of the two standard mixes are analyzed. The %D between the calculated amount and the true amount must not exceed 15 percent on the primary column.

Multi-component compounds do not require continuing calibration.

For herbicides and organophosphorus pesticides, the continuing calibration is verified by calculating the RRF and the percent difference (%D) for each compound. An RRF less than 0.05 or a %D greater than 15 percent is outside the QC limits for the continuing calibration.

1.1.5 Matrix Spikes/Matrix Spike Duplicates

A matrix spike is used to determine the accuracy of the analysis for a given matrix. A matrix spike consists of a known quantity of stock solution added to the sample before its preparation and analysis. Evaluating the matrix spike data involves two calculations. First, the percent recovery (%R) is calculated by comparing the amount of the compound recovered by the analysis to the amount added to the sample. In addition, the relative percent difference (RPD) between the MS and the MSD samples is calculated and assessed. No specific requirements have been established for qualifying MS/MSD data. However, guidelines to aid in applying professional judgment are discussed in Functional Guidelines.

1.1.6 Laboratory Control Samples (LCS) and Laboratory Duplicates

Total petroleum hydrocarbons and GC methods may require that a LCS and laboratory duplicate be performed with each SDG. The LCS monitors the overall performance of each step during analysis, including sample preparation. All aqueous LCS percent recovery results must fall within the control limits established by the laboratory. Laboratory duplicate samples are used to demonstrate acceptable method precision at the time of analysis. The RPD between the

sample and the duplicate sample is calculated. Although no guidelines are established for organic laboratory duplicates, sample qualification is left up to professional judgment.

1.1.7 Blank Analysis

Laboratory method blanks are used to assess the existence and magnitude of potential contamination introduced during analysis. Additionally, *field blanks* may be collected to assess any contamination introduced while collecting samples. When chemicals are found both in samples and laboratory blanks analyzed within the same 12-hour period and/or field-derived blanks, the usability of the data depends on the reviewer's judgment and the blank's origin. According to Functional Guidelines, a sample result should not be considered positive unless the concentration of the compound in the sample exceeds 10 times the amount in any blank for common laboratory contaminants (i.e., methylene chloride, acetone, 2-butanone, and phthalate esters), or five times the amount for other constituents. These amounts are referred to as *action levels*. Because blank samples may not be prepared using the same weight of sample, volume of sample, or dilution, these factors should be also taken into consideration when using these blank criteria. The specific actions to be taken are as follows:

- If a chemical is found in the blank but not the sample, no action is taken.
- If the sample concentration is less than the quantitation limit and less than the action level the quantitation limit is reported.
- If the sample concentration is between the quantitation limit and the action level, the concentration is reported as nondetect "U."
- If the sample concentration is greater than the action level, the concentration may be used unqualified.

Field-Derived Blanks

For this project, three types of field-derived blanks were collected: the *field blank*, the *equipment rinsate blank* (also called a *rinsate blank*), and the *trip blank*. The field blank is a sample of the source water used onsite, primarily to decontaminate equipment. The equipment rinsate blank is a sample of runoff water from one or more pieces of the decontaminated equipment used to collect samples. The trip blank is a 40-milliliter (ml) volatile organic analysis (VOA) vial filled at the laboratory with certifiable water used to assess cross-contamination during VOC sample shipment.

The frequencies for collecting these QC samples were defined in Section 4 of the *NAS Memphis Comprehensive RFI Work Plan* (E/A&H, October 1994) as follows:

- *Field blanks* — one per source of water per sampling event.
- *Rinsate blank* — one per week.
- *Trip blank* — one per shipment containing samples for VOAs.

For data validation, each trip blank is associated only with the samples from the same shipment/cooler. The field blanks and the rinsate blanks apply to a larger number of samples because only one is collected per sampling event. Because field-derived blanks are used with method blanks to assess potential cross-contamination of field investigative samples, no action was taken if contamination was detected in the method blanks associated with the field-derived blanks.

1.1.8 Internal Standard Performance

GC/MS internal standards (IS) are added to samples to ensure the stability of the instrument's sensitivity and response during each analytical VOC and SVOC run. IS area counts for samples and blanks must not vary more than a factor of two (-50% to +100%) from the associated calibration standard. If an IS area count is outside this window, action should be taken.

Listed below are the internal standard compounds recommended by the methods. Abbreviations for each compound are in parentheses.

VOC IS Compounds

Bromochloromethane (BCM)
1,4-Difluorobenzene (DFB)
Chlorobenzene-d5 (CBZ)

SVOC IS Compounds

1,4-Dichlorobenzene-d4 (DCB)
Naphthalene-d8 (NPT)
Acenaphthene-d10 (ANT)
Phenanthrene-d10 (PHN)
Chrysene-d12 (CRY)
Perylene-d12 (PRY)

1.1.9 Field Duplicate Precision

One field duplicate was collected at NAS Memphis for each 10 water and/or soil samples collected. Field duplicate samples are analyzed to evaluate data precision which is a measure of the reproducibility of the analysis.

For the NAS Memphis REI, RPDs between the samples and duplicates were calculated during the validation processes for sample results above the PQL. If the results for any compounds did not meet RPD criteria of <30% for water and <50% for soil, the positive results for that compound were flagged as estimated for the sample and duplicate only. If one value was nondetected and the other value was above the PQL, the positive result was flagged as estimated "J", and the nondetected result as estimated "UJ."

1.2 Inorganic Evaluation Criteria

The USEPA methods described in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* and *40 Code of Federal Regulations Part 264, Appendix IX* define quality control criteria that the laboratory must meet, but the methods do not address data evaluation from a user's perspective. Evaluation criteria are available in *USEPA Contract Laboratory National Functional Guidelines for Inorganic Data Review* (Functional Guidelines), February 1994, which was used throughout the data evaluation process when the analytical methods did not address data usability.

Data evaluation for samples collected at NAS Memphis included the following parameters:

- Holding times
- Instrument calibration
- Matrix spike results (MS)
- Laboratory duplicates
- Blank analysis
- ICP interference check samples
- ICP serial dilutions
- Laboratory control sample (LCS) results
- Atomic Absorption (AA) duplicate injections and post-digestion spike recoveries
- Field duplicate precision

According to Functional Guidelines, when the QC parameters do not fall within the specific method guidelines, the data evaluator annotates or "flags" the corresponding compounds where deficiencies were found. The data from NAS Memphis were evaluated using this approach. The following flags were used to annotate data exhibiting laboratory and/or field deficiencies or problems:

- U Undetected** — The analyte was analyzed for but not detected above the instrument detection limit (IDL) or was also found in an associated blank at a concentration less than 5 times the blank concentration. The IDL is described as the lowest possible concentration an instrument can detect a particular analyte. The IDL is determined by multiplying by three the standard deviation obtained for the analysis of a standard solution at a concentration of 3X - 5X IDL on three nonconsecutive days with seven consecutive measurements per day.
- J Estimated Value** — One or more QC parameters were outside control limits or the concentration of the analyte was less than the PQL.

UJ Undetected and Estimated — The analyte was analyzed for but not detected above the listed estimated IDL; the IDL is estimated because one or more QC parameters was outside control limits.

R/UR Unusable Data — One or more QC parameters grossly exceeded control limits.

1.2.1 Holding Times

Acceptable technical holding times are specified in the analytical methods. For aqueous samples, the holding time for metals analysis is six months, except for mercury, which is 28 days from the date of collection. For aqueous samples, cyanide analysis has a sample holding time of 14 days from the date of collection. Holding times for soil matrices are not specified in the methods. Therefore, it is at the discretion of the data reviewer to apply the water sample holding times criteria to soil.

1.2.2 Instrument Calibration

Initial and continuing calibrations of the instruments with standard solutions are used to check that the instrument is capable of producing acceptable qualitative and quantitative data for the analytes on the Appendix IX List.

An initial calibration is performed to check the performance of the instrument at the beginning of the analytical run and to establish a linear calibration curve. Calibration standard solutions are analyzed periodically to check the performance of the instrument and confirm that the initial calibration curve is still valid. Calibrations are verified by calculating the percent recovery (%R) and comparing the amount of the analyte recovered by analysis to the known amount of standard. The %R for metals, except for mercury and cyanide, should fall between 90 and 110 percent. The %R for mercury and cyanide should fall between 80 and 120 percent and 85 and 115 percent, respectively.

1.2.3 Blank Analysis

Laboratory method blanks are used to assess the existence and magnitude of potential contamination introduced during analysis. Additionally, *field blanks* may be collected to assess the potential contamination introduced during sample collection. When chemicals are found in samples and laboratory blanks, the usability of the data depends on the judgment of the reviewer and the origin of the blank. According to Functional Guidelines, a sample result should not be considered positive unless the concentration of the compound in the sample exceeds 5 times the amount in any blank. These amounts are referred to as *action levels*. Because blank samples may not be prepared using the same weight of sample, volume of sample, or dilution, these factors should be also taken into consideration when using these blank criteria. The specific actions to be taken are as follows:

- If a chemical is found in the blank but not the sample, no action is taken.
- If the sample concentration is between the IDL, and less than the action level, the concentration is reported as "U."
- If the sample concentration is greater than the action level, the concentration may be used unqualified.

1.2.4 ICP Interference Check Samples

The Inductively Coupled Plasma (ICP) interference check sample is used to confirm the laboratory instrument's inter-element and background correction factors. Interference samples should be run at the beginning and end of each sample analysis run or at least twice per eight-hour working shift. The percent recoveries for the interference check sample should fall between 80 and 120 percent.

1.2.5 Laboratory Control Samples

Laboratory control samples are used to monitor the overall performance of steps in the analysis, including the sample preparation. All aqueous LCS percent recovery results must fall within the control limits of 80 to 120 percent, except for antimony and silver for which control limits have not been established. Soil LCS standards are generally provided by the USEPA (or state agency or private laboratory). Control limits are established for each soil LCS standard prepared.

1.2.6 Matrix Spike Analysis

Samples are spiked with known quantities of analytes to evaluate the effect of the sample matrix on digestion and measurement procedures. The %R should be within 75 to 125 percent. However, when the sample concentration exceeds the spike concentration by a factor of four or more, spike recovery criteria is not applicable.

1.2.7 Laboratory Duplicates

Laboratory duplicate samples are analyzed to evaluate data precision, a measure of the reproducibility of the analysis. The RPD between the sample and the duplicate sample is calculated. A control limit of 20 RPD for aqueous samples and 35 percent for soil samples should not be exceeded for analyte values greater than the quantitation limit or two times the quantitation limit, respectively.

1.2.8 ICP Serial Dilutions

ICP serial dilutions assess the absence or presence of matrix interference. One sample from each set of similar matrix type is chosen for the serial dilution (a five fold dilution). For an analyte concentration which is at least a factor of 10 times above the instrument detection limit, the measured concentrations of the undiluted sample and of the diluted sample should agree within 10 percent.

1.2.9 Atomic Absorption Duplicate Injections and Post-Digestion Spike Recoveries

During atomic absorption analysis, duplicate injections and post-digestion spikes are used to assess precision and accuracy of the laboratory analysis. The %RSD of duplicate injections must agree within 20 percent. Percent recovery of the post-digestion spike sample should fall between 85 and 115 percent.

1.2.10 Field Duplicate Precision

One field duplicate was collected for each 10 water and/or soil samples collected. Field duplicate samples are analyzed to evaluate data precision, which is a measure of the reproducibility of the analysis.

For the NAS Memphis RFI, RPDs between the samples and duplicates were calculated during the validation processes for sample results above the PQL. If the results for any compounds did not meet RPD criteria of <30% for water and <50% for soil, the positive results for that compound were flagged as estimated for the sample and duplicate only. If one value was nondetected and the other value was above the PQL, the positive result was flagged as estimated "J", and the nondetected result as estimated "UJ."

2.0 DATA VALIDATION RESULTS — SWMU 1

All samples were received by the laboratory intact and with the proper documentation. Table 2-1 summarizes the samples that were included in this solid waste management unit.

Table 2-1 SWMU 1 Sample IDs								
Samples	VOC	SVOC	Pest/PCB	Herb	OP Pest	APP IX Metals	Cyanide	TPH
001S000101	X	X	X	X	X	X	X	X
001D011095 (DI System Blank)	X	X	X	X	X	X	X	X
001T011095 (Trip Blank)	X							
001E021495 (Rinsate Blank)		X	X	X	X	X	X	X
001F021595 (Field Blank)		X	X	X	X	X	X	X
001T021595 (Trip Blank)	X							
001E050495 (Rinsate Blank)	X							

One investigative sample and six field QC samples were analyzed in one SDG for SWMU 1. Full validation reports of each SDG and data tables can be found in Attachment A of this document.

2.1 Data Quality

The overall data quality of the analytical work performed for NAS Memphis at SWMU 1 was considered to be satisfactory and usable for site remediation and risk assessment. Results that were outside QA/QC requirements were flagged as estimated "J." The estimated qualification indicates that the data could be biased either high or low. The "J" flag alerts the data user to the possibility of a high or low bias. Although the data are qualified as estimated, they remain dependable for use in risk assessment and site remediation.

2.2 Unusable Data

A few compounds were rendered unusable because the analytes grossly exceeded QC parameters. Table 2-2 summarizes the unusable data and explains the qualification.

Table 2-2 SWMU 1 Unusable Data			
Sample ID	Fraction	Analyte(s)	Reason
001S000101	OP Pesticides	merphos	LCS percent recovery
001S000101	Herbicides	dinoseb	LCS percent recovery

2.3 Blanks

Selenium and methylene chloride were detected in several method and field blanks. The blanks were examined during the validation process and sample results for methylene chloride and selenium that were believed to be from blank contamination were nullified.

3.0 DATA VALIDATION RESULTS — SWMU 3

All samples were received by the laboratory intact and with the proper documentation. Table 3-1 summarizes the samples that were included in this solid waste management unit.

Table 3-1 SWMU 3 Sample IDs									
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	General Chemistry	TPH
003S000101	X	X	X	X	X	X	X		X
003S000107	X	X	X	X	X	X	X		X
003S000114	X	X	X	X	X	X	X		X
003S000201	X	X	X	X	X	X	X		X
003S000208	X	X	X	X	X	X	X		X
003S000214	X	X	X	X	X	X	X		X
003C000214	X	X	X	X	X	X	X		X
003S000301	X	X	X	X	X	X	X		X
003S000307	X	X	X	X	X	X	X		X
003S000311	X	X	X	X	X	X	X		X
003S000401	X	X	X	X	X	X	X		X
003S000407	X	X	X	X	X	X	X		X
003S000412	X	X	X	X	X	X	X		X
003S000501	X	X	X	X	X	X	X		X
003S000507	X	X	X	X	X	X	X		X
003S000511	X	X	X	X	X	X	X		X
003S000520	X	X	X	X	X	X	X		X
003T012695 (Trip Blank)	X								
003E012695 (Rinsate Blank)	X	X	X	X	X		X		X
003P012695 (Potable Water Blank)	X	X	X	X	X		X		X
003T012695 (Trip Blank)	X								

Table 3-1 SWMU 3 Sample IDs									
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	General Chemistry	TPH
003F012795 (Field Blank)	X	X	X	X	X		X		X
003T012795 (Trip Blank)	X								
003E032095 (Rinsate Blank)	X	X	X	X	X	X	X		X
003F032095 (Field Blank)	X	X	X	X	X	X	X		X
003T032195 (Trip Blank)	X								
003T032295 (Trip Blank)	X								
003SDESIGN								X ^a	
003GGM01LS	X	X	X	X	X	X	X		X
003GGM06UF	X	X	X	X	X	X	X		X
003GGM07UF	X	X	X	X	X	X	X		X
003GGM08LS	X	X	X	X	X	X	X		X
003GMW02LS	X	X	X	X	X	X	X		X
003GMW03LS	X	X	X	X	X	X	X		X
003GMW03MF	X	X	X	X	X	X ^c	X	X ^b	X
003HMW03MF	X	X	X	X	X	X	X		X
003GMW04LF	X	X	X	X	X	X ^c	X	X ^b	X
003GMW04LS	X	X	X	X	X	X ^c	X	X ^b	X
003GMW05MF	X	X	X	X	X	X	X		X

Notes:

^a Kjeldahl, Nitrate, TOC, Total Phosphate

^b Alkalinity, BOD₅, COD, Hardness, Kjeldahl, Nitrate, Total Phosphate, TSS, Turbidity

^c Iron, Manganese, Calcium, Magnesium

Twenty-nine investigative samples and 10 field QC samples were analyzed in five SDGs for SWMU 3. Full validation reports of each SDG and data tables can be found in Attachment A.

3.1 Data Quality

The overall data quality of the analytical work performed for NAS Memphis at SWMU 3 was considered to be satisfactory and usable for site remediation and risk assessment. Results outside QA/QC requirements were flagged as estimated "J." The estimated qualification indicates that the data could be biased either high or low. The "J" flag alerts the data user to the possibility of a high or low bias. Although the data are qualified as estimated, they remain dependable for use in risk assessment and site remediation.

3.2 Unusable Data

A few samples were rendered unusable because the samples grossly exceeded QC parameters. Table 3-2 summarizes the unusable data and explains the qualification.

Table 3-2 SWMU 3 Unusable Data			
Sample ID	Fraction	Compound(s)	Reason
003GMW03MF 003GMW04LF 003GMW04LS 003GMW05MF 003HWM03MF	Semivolatile	acid fraction	Surrogate percent recovery
003S000107	Herbicides OP Pesticides	dalapon naled	MS/MSD percent recovery
003S000501 003S000507 003S000511 003S000520	Herbicides OP Pesticides	dinoseb merphos	LCS percent recovery
003S000101 003S000107 003S000114 003S000201 003S000208 003S000214 003C000214 003S000401 003S000407 003S000412	OP Pesticides	merphos	LCS percent recovery
003GGM06UF	OP Pesticides	naled	LCS percent recovery
003GMW04LS	OP Pesticides	naled	column percent difference

Samples 003GMW03MF, 003GMW04LF, 003GMW04LS, 003GMW05MF, and 003HWMW03MF were re-analyzed; however, the surrogate results remained unchanged. The re-analysis of each sample exceeded the 14 day extraction holding time by more than two times the initial holding time. Therefore, all results in the re-analysis were qualified as unusable (R). Because the initial analysis represented the preferred holding time, the results from the first analysis were used for investigative interpretation and appear in the data summary tables.

3.3 Blanks

Acetone, methylene chloride, chlorobenzene, di-n-butylphthalate, iron, calcium, tin, and zinc were detected in several method and field blanks. The blanks were examined during the validation process and sample results for acetone, methylene chloride, chlorobenzene, di-n-butylphthalate, iron, calcium, tin, and zinc that were believed to be from blank contamination were nullified.

4.0 DATA VALIDATION RESULTS — SWMU 5

All samples were received by the laboratory intact and with the proper documentation. Table 4-1 summarizes the samples that were included in this solid waste management unit.

Table 4-1 SWMU 5 Sample IDs										
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	General Chemistry	Glycol	TPH
005S000101	X	X	X	X	X	X	X		X	X
005S000108	X	X	X	X	X	X	X		X	X
005S000112	X	X	X	X	X	X	X		X	X
005S000201	X	X	X	X	X	X	X		X	X
005S000208	X	X	X	X	X	X	X		X	X
005S000210	X	X	X	X	X	X	X		X	X
005S000301	X	X	X	X	X	X	X		X	X
005S000307	X	X	X	X	X	X	X		X	X
005S000317	X	X	X	X	X	X	X		X	X
005S000401	X	X	X	X	X	X	X		X	X
005C000401	X	X	X	X	X	X	X		X	X
005S000405	X	X	X	X	X	X	X		X	X
005S000410	X	X	X	X	X	X	X		X	X
005S000601	X	X	X	X	X	X	X		X	X
005S000607	X	X	X	X	X	X	X		X	X
005S000612	X	X	X	X	X	X	X		X	X
005S000701	X	X	X	X	X	X	X		X	X
005S000710	X	X	X	X	X	X	X		X	X
005S000712	X	X	X	X	X	X	X	X	X	X
005C000712	X	X	X	X	X	X	X	X	X	X
005S000801										X
005S000901										X
005S001001										X
005S001101										X

Table 4-1 SWMU 5 Sample IDs										
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	General Chemistry	Glycol	TPH
005E012895 (Rinsate Blank)	X	X	X	X	X	X	X	X		X
005F012995 (Field Blank)	X	X	X	X	X	X	X	X		X
005P012995 (Potable Water Blank)	X	X	X	X	X	X	X			X
005T013095 (Trip Blank)	X									
005F013195 (Field Blank)						X				
005F021595 (Field Blank)										X
005T032795 (Trip Blank)	X									
005F032795 (Field Blank)	X	X	X	X	X	X	X			X
005T032995 (Trip Blank)	X									
005E032995 (Rinsate Blank)	X	X	X	X	X	X	X			X
005T041795 (Trip Blank)	X									
005E041795 (Rinsate Blank)	X	X				X	X			X
005F041795 (Field Blank)	X	X				X	X			X
005SDESIGN								X ^a		
005GMW01UF	X	X	X	X	X	X	X			X
005GMW02UF	X	X	X	X	X	X ^c	X	X ^b		X
005GMW03LS	X	X	X	X	X	X ^c	X	X ^d		X
005GMW03UF	X	X	X	X	X	X	X			X
005GMW04LS	X					X	X			X
005GMW04UF	X	X	X	X	X	X	X			X
005GMW05LF	X	X	X	X	X	X	X			X

Table 4-1 SWMU 5 Sample IDs										
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	General Chemistry	Glycol	TPH
005GMW05LS (03/29/95)	X	X	X	X	X	X	X			X
005GMW05LS (04/17/95)	X	X				X	X			X
005GMW06LS (03/24/95)	X	X	X	X	X	X	X			X
005GMW06LS (04/17/95)	X	X				X	X			X
005GMW07LS	X	X	X	X	X	X	X	X ^a		X
005GMW08LS	X	X				X	X			X
005GMW09LS	X	X				X	X			X
005GMW4AUF	X	X				X	X			X
005GMW4BUF	X	X				X	X			X

Notes:

- ^a Kjeldahl, Nitrate, TOC, Total Phosphate
- ^b Alkalinity, BOD₅, COD, Hardness, Kjeldahl, Nitrate, Total Phosphate, TSS, Turbidity
- ^c Iron, Manganese, Calcium, Magnesium
- ^d Hardness, Sulfate

Thirty-nine investigative samples and 13 field QC samples were analyzed in seven SDGs for SWMU 5. Samples 005GMW05LS and 005GMW06LS were resampled for VOA, SVOA, metals, cyanide and TPH analyses to verify that contamination was present at the site. Both results were reported in the validation narratives and the data tables with the respective collection date. Full validation reports of each SDG and data tables can be found in Attachment A.

4.1 Data Quality

The overall data quality of the analytical work performed for NAS Memphis at SWMU 5 was considered to be satisfactory and usable for site remediation and risk assessment. Results that were outside QA/QC requirements were flagged as estimated "J." The estimated qualification indicates that the data could be biased either high or low. The "J" flag alerts the data user to

the possibility of a high or low bias. Although the data are qualified as estimated, they remain dependable for use in risk assessment and site remediation.

4.2 Unusable Data

A few samples were rendered unusable because the samples grossly exceeded QC parameters. Table 4-2 summarizes the unusable data and an explanation of the qualification.

Table 4-2 SWMU 5 Unusable Data			
Sample ID	Fraction	Compound(s)	Reason
005S000607 005S000612 005S000701 005S000710 005S000712 005C000712	Herbicides	2,4-DB dinoseb	LCS percent recovery
005S000307	Herbicides	dalapon	Matrix spike/Matrix spike duplicate percent recovery
005S000317 005S000401 005C000401 005S000405 005S000410 005S000601 005S000101 005S000108 005S000112 005S000201 005S000208 005S000210 005S000301 005S000307	Herbicides	dinoseb	LCS percent recovery
005S000101 005S000108 005S000112 005S000201 005S000208 005S000210 005S000301 005S000307 005S000317 005S000401 005C000401 005S000405 005S000410 005S000601	OP Pesticides	merphos	LCS percent recovery
005S000307	glycol	triethylene glycol	Matrix spike/Matrix spike duplicate percent recovery

4.3 Blanks

Acetone, methylene chloride, bis(2-ethylhexyl)phthalate, selenium, tin, and zinc were detected in several method and field blanks. The blanks were examined during the validation process and sample results for acetone, methylene chloride, bis(2-ethylhexyl)phthalate, selenium, tin, and zinc that were believed to be from blank contamination were nullified.

5.0 DATA VALIDATION RESULTS — SWMU 7

All samples were received by the laboratory intact and with the proper documentation. Table 5-1 summarizes the samples that were included in this solid waste management unit.

Table 5-1 SWMU 7 Sample IDs									
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	General Chemistry	TPH
007S000101	X	X	X	X	X	X	X		X
007S000109	X	X	X	X	X	X	X		X
007S000114	X	X	X	X	X	X	X		X
007S000128	X								
007S000201	X	X	X	X	X	X	X		X
007S000208	X	X	X	X	X	X	X		X
007S000218	X	X	X	X	X	X	X		X
007S000225	X	X	X	X	X	X	X		X
007S000301	X	X	X	X	X	X	X		X
007S000308	X	X	X	X	X	X	X		X
007S000310	X	X	X	X	X	X	X		X
007S000401	X	X	X	X	X	X	X		X
007S000409	X	X	X	X	X	X	X		X
007S000419	X	X	X	X	X	X	X		X
007C000419	X	X	X	X	X	X	X		X
007S000501	X	X	X	X	X	X	X		X
007S000510	X	X	X	X	X	X	X		X
007S000527	X	X	X	X	X	X	X		X
007S000601	X	X	X	X	X	X	X		X
007S000611	X	X	X	X	X	X	X		X
007S000624	X	X	X	X	X	X	X		X
007S000701	X	X	X	X	X	X	X		X
007S000710	X	X	X	X	X	X	X		X
007S000732	X	X	X	X	X	X	X		X

Table 5-1 SWMU 7 Sample IDs									
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	General Chemistry	TPH
007C000732	X	X	X	X	X	X	X		X
007S000801	X	X	X	X	X	X	X		X
007S000811	X	X	X	X	X	X	X		X
007S000822	X	X	X	X	X	X	X		X
007S000901	X	X	X	X	X	X	X		X
007S000908	X	X	X	X	X	X	X		X
007S000923	X	X	X	X	X	X	X		X
007S000953	X								
007S001107	X								
007H002437	X								
007C002512	X								
007H002544	X								
007C002712	X								
007C002812	X								
007H002936	X								
007C005100	X								
007T020795 (Trip Blank)	X								
007F020795 (Field Blank)	X	X	X	X	X	X	X		X
007T020895 (Trip Blank)	X								
007P020995 (Potable Water Blank)	X	X	X	X	X	X	X		X
007T020995 (Trip Blank)	X								
007T021095 (Trip Blank)	X								
007E021195 (Rinsate Blank)	X	X	X	X	X	X	X		X

Table 5-1 SWMU 7 Sample IDs									
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	General Chemistry	TPH
007T022395 (Trip Blank)	X								
007T022495 (Trip Blank)	X								
007T030795 (Trip Blank)	X								
007E030795 (Rinsate Blank)	X	X	X	X	X	X	X		X
007T030895 (Trip Blank)	X								
007T030995 (Trip Blank)	X								
007F030995 (Field Blank)	X	X	X	X	X	X	X		X
007T031095 (Trip Blank)	X								
007T031395 (Trip Blank)	X								
007F031395 (Field Blank)	X	X	X	X	X	X	X		X
007T031495 (Trip Blank)	X								
007E031495 (Rinsate Blank)	X	X	X	X	X	X	X		X
007T031595 (Trip Blank)	X								
007T031695 (Trip Blank)	X								
007T050295 (Trip Blank)	X								
007T050595 (Trip Blank)	X								
007T221095 (Trip Blank)	X								
007SDESIGN								X*	
007GGM09MF	X	X	X	X	X	X	X		X

Table 5-1 SWMU 7 Sample IDs									
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	General Chemistry	TPH
007GMW01LF	X	X	X	X	X	X	X		X
007GMW01LF (05/04/95)	X								
007GMW01LS	X	X	X	X	X	X	X		X
007GMW01LS (05/04/95)	X								
007GMW01UC	X	X	X	X	X	X	X		X
007GMW01UC (05/04/95)	X								
007GMW01UF	X	X	X	X	X	X	X		X
007GMW01UF (05/04/95)	X								
007GMW02GM	X								
007GMW02UC	X	X	X	X	X	X	X		X
007GMW02UC (05/04/95)	X								
007GMW03LF	X	X	X	X	X	X ^c	X	X ^b	X
007GMW03LF (05/05/95)	X								
007GMW03LS	X	X	X	X	X	X ^c	X	X ^b	X
007GMW03LS (05/04/95)	X								
007GMW03UC	X	X	X	X	X	X ^c	X	X ^b	X
007GMW03UC (05/05/95)	X								
007Hmw03UC	X	X	X	X	X	X	X		X
007GMW03UF	X	X	X	X	X		X	X ^a	X
007GMW03UF (05/05/95)	X								
007GMW04LF	X	X	X	X	X	X	X		X
007GMW04LF (05/03/95)	X								
007GMW04UC	X	X	X	X	X	X	X		X

Table 5-1 SWMU 7 Sample IDs									
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	General Chemistry	TPH
007GMW04UC (05/03/95)	X								
007GMW04UF	X	X	X	X	X	X	X		X
007GMW04UF (05/03/95)	X								
007GMW05LF	X	X	X	X	X	X	X		X
007GMW05LF (05/03/95)	X								
007GMW05LS	X	X	X	X	X	X	X		X
007GMW05LS (05/03/95)	X								
007GMW05UC	X	X	X	X	X	X	X		X
007GMW05UC (05/03/95)	X								
007HMW05UC (05/03/95)	X								
007GMW05UF	X	X	X	X	X	X	X		X
007GMW05UF (05/03/95)	X								
007GMW06LF	X	X	X	X	X	X	X		X
007GMW06LF (05/05/95)	X								
007GMW06LS	X	X	X	X	X	X	X		X
007GMW06LS (05/05/95)	X								
007GMW06UC	X	X	X	X	X	X	X		X
007GMW06UC (05/05/95)	X								
007HMW06UC	X	X	X	X	X	X	X		X
007HMW06UC (05/05/95)	X								
007GMW06UF	X	X	X	X	X	X	X		X
007GMW06UF (05/05/95)	X								

Table 5-1 SWMU 7 Sample IDs									
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	General Chemistry	TPH
007GMW07LF	X	X	X	X	X	X	X		X
007GMW07LF (05/02/95)	X								
007GMW07LS	X	X	X	X	X	X	X		X
007GMW07LS (05/02/95)	X								
007GMW07UC	X	X	X	X	X	X	X		X
007GMW07UC (05/02/95)	X								
007GMW07UF	X	X	X	X	X	X	X		X
007GMW07UF (05/02/95)	X								
007GMW08LF	X	X	X	X	X	X	X		X
007GMW08LF (05/02/95)	X								
007GMW08LS	X	X	X	X	X	X	X		X
007GMW08UC	X	X	X	X	X	X	X		X
007GMW08UC (05/01/95)	X								
007GMW08UF	X	X	X	X	X	X	X		X
007GMW08UF (05/02/95)	X								
007GMW09LF	X	X	X	X	X	X	X		X
007GMW09LF (05/02/95)	X								
007GMW09LS	X	X	X	X	X	X	X		X
007GMW09LS (05/02/95)	X								
007GMW09UC	X	X	X	X	X	X	X		X
007GMW09UC (05/02/95)	X								
007HMMW09UC	X	X	X	X	X	X	X		X
007GMW09UF	X	X	X	X	X	X	X		X

Table 5-1 SWMU 7 Sample IDs									
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	General Chemistry	TPH
007GMW09UF (05/02/95)	X								
007GMW69LF	X								

Notes:

- * Kjeldahl, Nitrate, TOC, Total Phosphate
- ° Alkalinity, BOD₅, COD, Hardness, Kjeldahl, Nitrate, Total Phosphate, TSS, Turbidity
- ° Iron, Manganese, Calcium, Magnesium
- ° Hardness, Sulfate
- ° Alkalinity, BOD₅, Nitrate, TSS, Turbidity

Eighty investigative samples and 24 field QC samples were analyzed in 14 SDGs for SWMU 7. Thirty-two sample locations were resampled for VOA analysis to provide a more accurate contaminant history than possible in a single event and to verify that contamination was present at the site. Both sample results are reported in the validation narrative and the data tables with the respective collection dates. Full validation reports of each SDG and data tables can be found in Attachment A of this document.

5.1 Data Quality

The overall data quality of the analytical work performed for NAS Memphis at SWMU 7 was considered to be satisfactory and usable for site remediation and risk assessment. Results that were outside QA/QC requirements were flagged as estimated "J." The estimated qualification indicates that the data could be biased either high or low. The "J" flag alerts the data user to the possibility of a high or low bias. Although the data are qualified as estimated, they remain dependable for use in risk assessment and site remediation.

5.2 Unusable Data

A few samples were rendered unusable because the samples grossly exceeded QC parameters. Table 5-2 summarizes the unusable data and explains the qualification.

Table 5-2 SWMU 7 Unusable Data			
Sample ID	Fraction	Analyte(s)	Reason
007S000101 007S000109 007S000208 007S000218 007S000225 007S000201 007S000114	OP Pesticides	merphos	LCS percent recovery
007S000801 007S000811 007S000822 007S000901 007S000908 007S000923	Metals	silver	Matrix spike percent recovery
007S000801	OP Pesticides	merphos	Matrix spike/Matrix spike duplicate percent recovery
	Herbicides	dinoseb	
007GMW01LS	Semivolatiles	acid fraction	Surrogate percent recovery
007S000401	Semivolatiles	all	Surrogate percent recovery
007S000501	OP Pesticides	naled	Matrix spike/Matrix spike duplicate percent recovery
007S000401 007S000409 007S000419 007C000419 007S000501 007S000510 007S000527 007S000601 007S000611 007S000624 007S000701 007S000710 007S000732 007C000732 007S000301 007S000308 007S000310	OP Pesticides	merphos	LCS percent recovery
007S000501	Herbicides	dicamba dinoseb	Matrix spike/Matrix spike duplicate percent recoveries
007GMW04LF 007GMW05LS 007GMW06UF 007GMW07UF 007GMW09LF 007GMW09UF	Semivolatiles	acid fraction	Surrogate percent recovery
007GMW06UC	Herbicides	all	Surrogate percent recovery
007GMW09LS	OP Pesticides	all	Surrogate percent recovery
007GMW05LF 007GMW05UF 007GMW09UC 007HMW09UC 007GMW03LF 007GMW03UF 007GMW07UC 007GMW08UF 007GMW09LS	OP Pesticides	merphos	LCS percent recovery

Samples 007GMW01LS and 007S000401 were re-analyzed for semivolatiles due to surrogate percent recovery. The surrogate results remained unchanged in sample 007GMW01LSRE while all surrogates met the QC requirements in sample 007S000401RE. The re-analysis of sample 007GMW01LS exceeded the 14-day extraction holding time by more than two times the initial holding time. Therefore, all results in the re-analysis of sample 007GMW01LS were qualified as unusable (R). Because the initial analysis represented the preferable holding time, the results from the first analysis were used for investigative interpretation and appear in the data summary tables. The re-analysis of sample 007S000401 exceeded the holding time by three days. All results in sample 007S000401 were qualified as estimated (J) for positive results and (UJ) for undetected results. Because all results in the initial analysis of sample 007S000401 were qualified as unusable (R), sample 007S000401RE was used for investigative interpretation.

Samples 007GMW04LF, 007GMW05LS, 007GMW06UF, 007GMW07UF, and 007GMW09UF were re-analyzed for semivolatiles; however, the surrogate results remained unchanged in samples 007GMW04LFRE and 007GMW07UFRE. Because the initial analysis represented the preferred holding time, the results from the first analysis of samples 007GMW04LF and 007GMW07UF were used for investigative interpretation and appear in the data summary tables. Samples 007GMW05LSRE, 007GMW06UFRE, and 007GMW09UFRE were used for investigative interpretation because the surrogate percent recoveries were within the QC requirements.

Sample 007GMW06UC was re-analyzed for herbicides due to low surrogate percent recoveries. The surrogate percent recovery improved with the re-analyzed sample. The re-analyzed sample was used for investigative interpretation.

Sample 007GMW09LS was re-analyzed for OP pesticides due to low surrogate percent recoveries. The surrogate percent recovery improved with the re-analyzed samples. The re-analyzed sample was used for investigative interpretation.

5.3 Blanks

Acetone, methylene chloride, bromomethane, bis(2-ethylhexyl)phthalate, silver, tin, and zinc were detected in several method and field blanks. The blanks were examined during the validation process and sample results for acetone, methylene chloride, bromomethane, bis(2-ethylhexyl)phthalate, silver, tin, and zinc that were believed to be from blank contamination were nullified.

6.0 DATA VALIDATION RESULTS – NET SWMU 8

All samples were received by the laboratory intact and with the proper documentation. Table 6-1 summarizes the samples that were included in this solid waste management unit.

Table 6-1 SWMU 8 Sample IDs									
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	General Chemistry	TPH
008S000101	X	X	X	X	X	X	X		X
008S000112	X	X	X	X	X	X	X		X
008S000119	X	X	X	X	X	X	X		X
008S000201	X	X	X	X	X	X	X		X
008S000214	X	X	X	X	X	X	X		X
008C000214	X	X	X	X	X	X	X		X
008S000220	X	X	X	X	X	X	X		X
008S000301	X	X	X	X	X	X	X		X
008S000312	X	X	X	X	X	X	X		X
008S000322	X	X	X	X	X	X	X		X
008S000401	X	X	X	X	X	X	X		X
008S000410	X	X	X	X	X	X	X		X
008S000424	X	X	X	X	X	X	X		X
008T020195 (Trip Blank)	X								
008F020195 (Field Blank)	X	X	X	X	X	X	X		X
008P020195 (Potable Water Blank)	X	X	X	X	X	X	X		X
008T020295 (Trip Blank)	X								
008E020295 (Rinsate Blank)	X	X	X	X	X		X		X
008F032395 (Field Blank)	X	X	X	X	X	X	X		X

Table 6-2 SWMU 8 Unusable Data			
Sample ID	Fraction	Analyte(s)	Reason
008S000101 008S000112 008S000119 008S000201 008S000214 008C000214 008S000220 008S000301 008S000312 008S000322 008S000401 008S000410 008S000424	Metals	Lead	Matrix Spike percent recovery
008S000101	Pesticides/PCBs	Dieldrin	Matrix spike/Matrix spike duplicate percent recovery
008S000101 008S000112 008S000119 008S000201 008S000214	OP Pesticides	merphos	LCS percent recovery
008S000101	Herbicides	dalapon MCP dinoseb	Matrix spike/Matrix spike duplicate percent recovery
008GMW002F	Semivolatiles	acid fraction	Surrogate percent recovery

Sample 008GMW002F was re-analyzed for semivolatiles; however, the surrogate results remained unchanged. The reanalysis of sample 008GMW002F exceeded the 14 day extraction holding time by more than two times the initial holding time. Therefore, all results in the re-analysis were qualified as unusable (R). Because the initial analysis represented the preferred holding time, the results from the first analysis were used for investigative interpretation.

6.3 Blanks

Acetone, bromomethane, bis(2-ethylhexyl)phthalate, silver, calcium, iron, arsenic, and tin were detected in several method and field blanks. The blanks were examined during the validation process and sample results for acetone, bromomethane, bis(2-ethylhexyl)phthalate, silver, calcium, iron, arsenic, and tin that were believed to be from blank contamination were nullified.

7.0 DATA VALIDATION RESULTS — NET SWMU 60

All samples were received by the laboratory intact and with the proper documentation.

Table 7-1 summarizes the samples that were included in this solid waste management unit.

Table 7-1 SWMU 60 Sample IDs										
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	TCLP Lead	General Chemistry	TPH
060S000101	X	X	X	X	X	X	X			X
060S000107	X	X	X	X	X	X	X			X
060S000114	X	X	X	X	X	X	X			X
060S000127	X	X	X	X	X	X	X			X
060C000127	X	X	X	X	X	X	X			X
060S000201	X	X	X	X	X	X	X			X
060S000210	X	X	X	X	X	X	X			X
060S000214	X	X	X	X	X	X	X			X
060S000301	X	X	X	X	X	X	X			X
060C000301	X	X	X	X	X	X	X			X
060S000310	X	X	X	X	X	X	X			X
060S000314	X	X	X	X	X	X	X			X
060S000401	X	X	X	X	X	X	X			X
060S000409	X	X	X	X	X	X	X			X
060S000415	X	X	X	X	X	X	X			X
060S000501	X	X	X	X	X	X	X			X
060S000507	X	X	X	X	X	X	X			X
060S000512	X	X	X	X	X	X	X			X
060S000601	X	X	X	X	X	X	X			X
060S000608	X	X	X	X	X	X	X			X
060S000612	X	X	X	X	X	X	X			X
060T013195 (Trip Blank)	X									
060E013195 (Rinsate Blank)	X	X	X	X	X	X	X			X

Table 7-1 SWMU 60 Sample IDs										
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	TCLP Lead	General Chemistry	TPH
O60HMW02LF	X	X	X	X	X	X	X			X
O60GMW02LS	X	X	X	X	X	X	X			X
O60GMW03LF	X	X	X	X	X	X	X			X
O60GMW03LS	X	X	X	X	X	X	X			X
O60GMW04LF	X	X	X	X	X	X	X			X
O60HMW04LF	X	X	X	X	X	X	X			X
O60GMW04LS	X	X	X	X	X	X	X			X
O60GMW05LS	X	X	X	X	X	X	X			X
O60GMW06LS	X	X	X	X	X	X	X			X

Notes:

- ^a Kjeldahl, Nitrate, TOC, Total Phosphate
- ^b Alkalinity, BOD₅, COD, Hardness, Kjeldahl, Nitrate, Total Phosphate, TSS, Turbidity
- ^c Iron, Manganese, Calcium, Magnesium
- ^d Hardness, Sulfate

Forty investigative samples and 13 field QC samples were analyzed in eight SDGs for SWMU 60. Full validation reports of each SDG and data tables can be found in Attachment A.

7.1 Data Quality

The overall data quality of the analytical work performed for NAS Memphis at SWMU 60 was considered to be satisfactory and usable for site remediation and risk assessment. Results that were outside QA/QC requirements were flagged as estimated "J." The estimated qualification indicates that the data could be biased either high or low. The "J" flag alerts the data user to the possibility of a high or low bias. Although the data are qualified as estimated, they remain dependable for use in risk assessment and site remediation.

Samples 060S000201, 060S000301, and 060S000314 were re-analyzed for herbicides due to surrogate percent recoveries. The surrogate percent recovery improved with the re-analyzed samples. Re-analyzed samples were used for investigative interpretation.

7.3 Blanks

Acetone, methylene chloride, di-n-butylphthalate, bis(2-ethylhexyl)phthalate, silver, barium, tin, and zinc were detected in several method and field blanks. The blanks were examined during the validation process and sample results for acetone, methylene chloride, di-n-butylphthalate, bis(2-ethylhexyl)phthalate, silver, barium, tin, and zinc that were believed to be from blank contamination were nullified.

8.0 DATA VALIDATION RESULTS - BACKGROUND DATA

All samples were received by the laboratory intact and with the proper documentation.

Table 8-1 summarizes the samples that were included in this solid waste management unit.

Table 8-1 Background Sample IDs								
Samples	VOC	SVOC	Pest/ PCB	Herb	OP Pest	APP IX Metals	Cyanide	TPH
1BGS000100	X	X	X	X	X	X	X	X
1BGS000101	X	X	X	X	X	X	X	X
1BGS000110	X	X	X	X	X	X	X	X
1BGT032095 (Trip Blank)	X							
1BGF032095 (Field Blank)	X	X	X	X	X	X	X	X
1BGGMW01LF	X	X	X	X	X	X	X	X
1BGHMW01LF	X	X	X	X	X	X	X	X
1BGGMW01LS	X	X	X	X	X	X	X	X
1BGGMW01UF	X	X	X	X	X	X	X	X
2BGS000201	X	X	X	X	X	X	X	X
2BGS000210	X	X	X	X	X	X	X	X
2BGE031795 (Rinsate Blank)	X	X	X	X	X	X	X	X
2BGF031795 (Field Blank)	X	X	X	X	X	X	X	X
2BGGMW02LF	X	X	X	X	X	X	X	X
2BGGMW02LS	X	X	X	X	X	X	X	X
2BGGMW02UF	X	X	X	X	X	X	X	X
3BGS000301	X	X	X	X	X	X	X	X
3BGS000310	X	X	X	X	X	X	X	X
4BGS000401	X	X	X	X	X	X	X	X
4BGS000411	X	X	X	X	X	X	X	X
4BGF031695 (Field Blank)	X	X	X	X	X	X	X	X
4BGGMW04LF	X	X	X	X	X	X	X	X

Thirty investigative samples and 11 field QC samples were analyzed in four SDGs for the background data. Full validation reports of each SDG and data tables can be found in Attachment A of this document.

8.1 Data Quality

The overall data quality of the analytical work performed for the background data for NAS Memphis was considered to be satisfactory and usable for site remediation and risk assessment. Results that were outside QA/QC requirements were flagged as estimated "J." The estimated qualification indicates that the data could be biased either high or low. The "J" flag alerts the data user to the possibility of a high or low bias. Although the data are qualified as estimated, they remain dependable for use in risk assessment and site remediation.

8.2 Unusable Data

A few samples were rendered unusable because the samples grossly exceeded QC parameters. Table 8-2 summarizes the unusable data and explains the qualification.

Table 8-2 Background Unusable Data			
Sample ID	Fraction	Compound(s)	Reason
2BGGMW02LF	Semivolatiles	acid fraction	Surrogate percent recovery
2BGGMW02LF	OP Pesticides	phorate demeton, S diazinon methyl parathion ronnel ferthion chlorpyritos merphos fensulfothion stirophos	Matrix spike/Matrix spike duplicate percent recoveries

8.3 Blanks

Acetone, methylene chloride, di-n-butylphthalate, bis(2-ethylhexyl)phthalate, cadmium and lead were detected in several method and field blanks. The blanks were examined during the validation process and sample results for acetone, methylene chloride, di-n-butylphthalate, bis(2-ethylhexyl)phthalate, cadmium, and lead that were believed to be from blank contamination were nullified.