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FINAL REPORT
MITIGATION OF PCB CONTAMINATION
BUILDING 3
ST. LOUIS ARMY AMMUNITION PLANT
ST. LOUIS, MISSOURI
(Revision 0)

PRE-PLACE REMEDIAL ACTION CONTRACT
CONTRACT NO. DACW41-00-D0019
TASK ORDER NO. 0002

Submitted to:

Department of the Army
U.S. Army Engineer District
Kansas City Corps of Engineers
700 Federal Building
601 East 12th Street
Kansas City, Missouri 64106

Department of the Army
Aviation and Missile Command
Building 3206
Redstone Arsenal, Alabama 35898

Submitted by:

Arrowhead Contracting, Inc.
12920 Metcalf, Suite 150
Overland Park, Kansas 66213

October 24, 2003

October 24, 2003

Ms. Sandy Olinger (AMSAM-EN)
Building 3206 Redstone Arsenal
Huntsville, Alabama 35898

Final Report (Revision 0)
Mitigation of PCB Contamination
Building 3, St. Louis Army Ammunition Plant
Contract No. DACW41-00-D-0019

Dear Ms. Olinger:

This letter transmits Revision 0 of the Final Report, Mitigation of PCB Contamination, Building 3, St. Louis Army Ammunition Plant (SLAAP), St. Louis, Missouri. Please note an internal draft report was previously submitted to the U.S. Army Corps of Engineers (USACE), Kansas City District for review and comment. This document incorporates USACE review comments to the internal draft. A distribution list for the report is attached. If you should have any questions regarding our responses, please call us at (913) 814-9994.

Sincerely,

Greg Wallace, R.G.
Project Manager

Scott Siegwald, CIH
QA/QC Manager

Enclosures

12920 Metcalf, Suite 150 • Overland Park, KS 66213 • (913) 814-9994 • FAX (913) 814-9997

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Final Report (Revision 0) – Mitigation of PCB Contamination
Building 3, St. Louis Army Ammunition Plant

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List of Acronyms

ACM	asbestos-containing material
AMCOM	Aviation and Missile Command
AMSL	above mean sea level
ATCOM	Aviation and Troop Command
AVSCOM	Aviation Systems Command
bgs	below ground surface
APR	air-purifying respirator
BRAC	Base Realignment and Closure
BTEX	benzene, toluene, ethylbenzene, and xylene
CALM	Cleanup Action Levels for Missouri
CENWK	U.S. Army Corps of Engineers, Kansas City District
CERCLA	Comprehensive, Environmental, Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CO	carbon monoxide
COR	Contracting Officer Representative
CY	cubic yards
DFW	definable feature of work
DoD	Department of Defense
DOT	Department of Transportation
DQCR	Daily Quality Control Reports
EBS	environmental baseline survey
EE/CA	Engineering Evaluation and Cost Analysis
EPA	U.S. Environmental Protection Agency
EQ	Environmental Quality
FI	Field Investigation
FLB	fluorescent light bulbs
FOST	Finding of Suitability to Transfer
ft^2	square feet
FWV	Field Work Variance
HEPA	high-efficiency particulate air (filter)
in.	inch
LF	liner feet
MDNR	Missouri Department of Natural Resources
mm	millimeter
MS	matrix spike
MSD	matrix spike duplicate
NESHAP	National Emission Standards for Hazardous Air Pollutants
NON	notice of noncompliance

List of Acronyms (cont.)

O&G	oil and grease
PCB	polychlorinated biphenyl
PEL	permissible exposure limit
PPE	personal protective equipment
ppm	parts per million
PRAC	Pre-Placed Remedial Action Contract
QA	quality assurance
QC	quality control
RA	Removal Action
RAWP	Removal Action Work Plan
RCRA	Resource Conservation and Recovery Act
SAP	Sampling and Analysis Plan
SLAAP	St. Louis Army Ammunition Plant
SLOP	St. Louis Ordnance Plant
SVOCs	semi-volatile organic compounds
T&D	transportation and disposal
TCLP	Toxicity Characteristic Leaching Potential
TSCA	Toxic Substances Control Act
USACE	U.S. Army Corps of Engineers
UST	underground storage tank
VOCs	volatile organic compounds

1.0 Introduction

This document constitutes the Final Report associated with the mitigation of polychlorinated biphenyl (PCB) contamination at Building 3, one of the former production facilities at the Saint Louis Army Ammunition Plant (SLAAP). SLAAP is located at 4800 Goodfellow Boulevard, St. Louis, Missouri (refer to Figure 1-1). This document was prepared on behalf of the U. S. Army Corps of Engineers (USACE), Kansas City District (CENWK) and the U.S. Army Aviation and Missile Command (AMCOM), Huntsville, Alabama, by Arrowhead Contracting, Inc. (Arrowhead) under a Pre-Placed Remedial Action Contract (PRAC) number DACW41-00-D0019, Task Order 0002. Arrowhead served as the prime contractor for PCB remediation activities as described herein. These activities were conducted at various time periods between November 2001 and June 2003.

The clean-up activities undertaken by AMCOM at the Building 3 site were aimed at meeting two primary objectives: (1) removing a Notice-of-Noncompliance (NON) for the presence of PCB contamination, issued by the U.S. Environmental Protection Agency (EPA) Region 7 in 1991 and (2) facilitating a Finding of Suitability to Transfer (FOST) the SLAAP property in accordance with the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA), Section 120(h). Initially, AMCOM elected to address the removal of materials containing PCBs at concentrations exceeding 50 parts per million (ppm), the threshold concentration specified in the Toxic Substances Control Act (TSCA), as amended by the 1998 TSCA Amendments, or Mega Rule. (For convention, these materials will be referred to herein as "TSCA wastes.") This action, referred to as Phase 1 of the PCB Removal Action (RA), was not necessarily undertaken to remove the NON. Rather, it was designed to reduce PCB levels within Building 3 to the extent that would allow the Army to sell/transfer the SLAAP property to a non-DoD (Department of Defense) entity under FOST guidelines. Due to the residual PCB contamination less than 50 ppm that would have remained inside the building, restrictions would have been placed on the sale of the property requiring the new owner to demolish Building 3. However, during Phase 1, additional PCB classified as TSCA waste was discovered in a gravel layer beneath the building's spread footing, thereby making it necessary to demolish the building to complete the removal action for TSCA wastes. Due to the immediate need to demolish Building 3, AMCOM made the decision to expand the scope of work to include the comprehensive remediation of the Building 3 site to the extent required for lifting the NON and meeting federal cleanup standards. Remediation of Building 3 thereafter was performed in accordance with Title 40 Code of Federal Regulation (40 CFR) Part 761.61(c) of TSCA, which provides for the calculation of a site-specific, risk-based cleanup standard. A subsurface PCB cleanup standard of 7.6 ppm was

ultimately selected and endorsed by EPA. The field effort associated with the remediation of the site to the subsurface cleanup standard is referred to herein as Phase 2 of the RA. Phase 2 included the demolition of Building 3 and removal of the remaining PCB contamination in the building footprint (former basement floor) to the subsurface cleanup standard.

The objectives of this Final RA Report are as follows:

- To describe the history of events leading to the RA and the bases for remediation efforts
- To summarize the remedial design process for both phases of the RA
- To describe field activities that were conducted at the site during the RA
- To present the data indicating that the RA was successful in achieving the required site clean-up standards
- To present the final status of site conditions at the completion of the RA
- To summarize the quality control and health and safety conducted during the RA
- To present a summary of project costs

Accordingly, the report has been organized into nine sections. The contents of each section are discussed below.

- Section 1.0 – Introduction
  - Presents an introduction, including the site history and background, chronology of project activities, nature and extent of PCB contamination, and RA objectives.

- Section 2.0 – Remedial Design Summary
  - Presents a summary of the remedial design for RA Phases 1 and 2.

- Section 3.0 – Removal Action Phase 1
  - Presents a detailed discussion of the field activities that occurred during RA Phase 1, including the methods and equipment used.

- Section 4.0 – Removal Action Phase 2
  - Presents a detailed discussion of the field activities that occurred during RA Phase 2, including the methods and equipment used.

- Section 5.0 – Confirmation of Site Cleanup
  - Presents a discussion of confirmation sampling that was performed to verify that the site was cleaned up to the appropriate standards.

- Section 6.0 – Final Status of Site Conditions
  - Presents a discussion of the final status of the condition of the site following remediation, including the residual contamination left in the subsurface.

- Section 7.0 – Quality Control
  - Presents a summary of the quality control (QC) activities that were performed during the RA.

- Section 8.0 – Health and Safety
  - Presents a summary of the health and safety activities and primary site hazards.

- Section 9.0 – Summary of RA Costs
  - Presents a summary of the Building 3 RA costs.

- Section 10.0 – References
  - Lists the references used in this report.

1.1 Site History and Background

The St. Louis Ordnance Plant (SLOP) was constructed in 1941 to produce 0.30- and 0.50-caliber munitions in support of World War II. In 1944, approximately 21 acres in the northeast portion of SLOP was converted from small arms munitions production to 105-millimeter (mm) Howitzer shell production and was designated as SLAAP. The SLAAP property consisted of eight buildings that were used to house the primary operating processes. The Removal Action for PCBs focuses solely on Building 3, also historically referred to as Building 202ABC. The processes completed in Building 3 included shell shaping, heat-treating, cleaning, painting, and packaging shells for shipment. Cutting oils formerly used in Building 3 were known to contain PCBs. These oils were primarily used as a coolant in the milling, lathing, and smoothing processes associated with munitions production. Following World War II, SLAAP was placed on standby status, only to be reactivated to support the Korean Conflict (from November 1951 through December 1954) and the Vietnam War (from November 1966 through December 1969). In 1984, Building 3 was renovated to include office space for personnel from the U.S. Army Aviation Systems Command (AVSCOM). The building was occupied in this capacity until

1996. In 1989, the DoD determined that SLAAP was no longer needed for munitions support and all industrial equipment was removed from the facilities. From 1998 through its demolition, Building 3 was vacant and under the control of AMCOM. In January 2003, the responsibility for the SLAAP property was transferred to the Base Realignment and Closure (BRAC) office in Atlanta.

The physical and construction characteristics of former Building 3 are summarized in Table 1-1. Building 3 encompassed an area of approximately 170,000 square feet (ft^2) and consisted of two stories (first and second floors), a basement, and five penthouses on the roof. The building's vertical, steel support beams (I-beams) extended from the concrete footers in the basement to the roof and were spaced evenly across the building at 20-ft. intervals. Overall, the building spanned 840 feet (43 I-beams) from west to east and 200 feet (11 I-beams) from north to south. Historically, each I-beam was identified alphanumerically corresponding to the beam's specific location within the building. Rows of I-beams aligned north-south were identified as numbers "1" through "43," where the westernmost and easternmost rows of I-beams formed Row 1 and Row 43, respectively. Rows of I-beams aligned east-west were identified as letters "A" through "L" (skipping the letter "I"), where the northernmost and southernmost rows of I-beams formed Row A and Row L, respectively. For example, the I-beam located at the intersection of Row 22 and Row C was identified as I-beam C22. Similarly, a 20 ft. x 20 ft. "sector" defined by four I-beams (located at the corners of the square area) was identified by the I-beam in the northwest position. For example, Sector C22 was the 20 ft. x 20 ft. area defined by I-beams C22, D22, D23, and C23, with I-beam C22 in the northwest position. This identification scheme will be used throughout this report, including the figures, to describe the locations of various features and areas of PCB contamination within the building.

The depth of the concrete flooring on the first and second floors ranged from seven to 10 inches (in.) in most areas. This included a two to three inches. concrete cap that was poured over the surface of the original flooring was scarified in the early 1990's (refer to Section 1.21). A 30,000 ft^2 portion of the first floor (from Row 9 through Row 22) was approximately 18 in. thick, with the corresponding area on the second floor approximately 10 in. thick. To provide the necessary structural support for the increased flooring load in this portion of the building, the vertical I-beams were situated on a 17-in. thick concrete spread footer located in the basement directly beneath this area. (Throughout this report, the concrete spread footer may be referred to as the "basement concrete flooring.") A 40-ft. wide concrete corridor (hallway) was located adjacent to the spread footer between Rows 20 and 22. The hallway extended from the north basement stairwell to one of the tunnels connecting Building 3 to Building 5. In total, there was

approximately 37,000 ft^2 of continuous, concrete flooring in the basement between Rows 9 and 22, including the hallway. The remainder of the basement area (approximately 131,000 ft^2) consisted of soil flooring and individual concrete footers for each vertical I-beam. The average dimension of each concrete footer in the soil flooring portion of the basement was 12 ft. x 12 ft. x 2 ft. The concrete footers located within the limits of the basement concrete flooring were approximately 8 ft. x 8 ft. x 2 ft.

The first and second floors in Building 3 were historically used for machining operations. The building housed various lathe operations; hydraulic presses; conveyors; air-driven machinery for steel cutting, shaping, and finishing; and metal preservative operations. Other equipment included welding machines; machine, electrical, and carpenter shops; and a small automotive shop. Metal scrap, cuttings, and shavings generated during the various metal fabrication processes on the first and second floors were transferred to the basement via the Chip Chute. The "Chip Chute area" of the basement refers to a 20 ft. x 20 ft. area of soil flooring where the scrap metal cuttings were temporarily stockpiled. This area was located adjacent to the concrete flooring on the north side of the building (between I-beams A17 and A18). At the beginning of the RA, this area contained a pile of residual, oil-soaked metal cuttings/shavings. Historically, the piles of metal cuttings were then transferred to the northwest loading dock (on the outside of the building) using a conveyor system just south of the Chip Chute area. From the northwest loading dock, the cuttings were presumably loaded into rail cars for transport to an unknown, off-site disposal site. One leg of the SLAAP rail spur ran along the north side of Building 3 and serviced three primary loading docks.

The historical use, processes, and hazardous materials information for Building 3 are summarized in Table 1-2. The following paragraphs provide further details regarding the historical plant layout and production operations at Building 3.

- **Second Floor** – Fourteen annealing furnaces were located between Rows 28A through 43 on the second floor. Rough machining equipment was also located on the second floor of Building 3. Forged shells were put through the bore nose or Sundstrand lathe (between Rows 11A and 14) followed by shot blasting (between Rows 14 and 17). The shells progressed through the machining process from west to east, ending at the annealing furnaces at the east end of the building. Center lathes were located between Rows 18 and 20, and the rough-turning gross lathe was located between Rows 21 through 25.

- **First Floor** – On the first floor, a paint stripping room was located on the east end of the building north of the garage. Quench oil tanks used to quench the shells after heat treatment in the annealing furnaces were located west of the paint stripping room inside Building 3. Shell washing was conducted before painting, which was conducted in paint booths west of the quench oil tanks. The paint mixing room was located between Rows 28A and 32. The area outside the paint mixing room stored empty barrels. Four paint mixing stations were used. Various lathing, welding, and grinding areas were located between Rows 6 through 24. Grinders, shapers, mills, and lathes were also located between Rows 6 through 9. A hydraulic oil reclaiming unit was located on the north side of the first floor of Building 3, between Rows 10 and 11A, and 11 B. A soluble oil mixing room was located next to Row 13, between Rows A and B. Additionally, a self-contained liquid storage area on the first floor, located between Rows 28 and 31, was used for storage of various oils, solvents, and chemicals.

- **Basement** – The majority of the basement in Building 3 was vacant. In addition to the Chip Chute area (discussed above), the basement contained four transformer vaults, a cable vault, elevator pits, two quench oil transfer pump systems, former quench oil tanks, and a former sludge pit. A gasoline underground storage tank (UST) was formerly located outside the building near the northeast corner of the foundation. The quench oil tanks supplied make-up oil to each of the quench oil tanks. A return line located between Rows E and F collected quench oil from the first floor and conveyed it to the quench oil sludge pit to remove particulates and sediment. This tank overflowed into the quench oil tank next to the quench oil sludge pit. The three quench oil tanks were hydraulically connected. The concrete floor area of the basement (i.e. the spread footer for the building and the hallway) was located between Rows 9 and 22 as discussed above.

- **Roof** – The roof of Building 3 contained cooling towers, paint room exhaust fans, furnace exhaust fans, and dust collectors for machining operations performed on the second floor. The cooling towers served the furnaces and cooled quench oil, hydraulic oil, and other fluids through cooling water from Building 7.

1.2 Project Chronology

This subsection presents the chronology of project activities at the Building 3 site, including the environmental investigations, engineering and design efforts, and regulatory interventions that led to the remediation of the site and removal of the NON.

1.2.1 Environmental Activities Prior to 2001

Polychlorinated biphenyls were first discovered in Building 3 in creosote-treated wood flooring blocks during renovation activities in March 1991. The EPA Region VII was notified of the discovery and, in turn, issued a NON under TSCA in May 1991 (TSCA Docket Number VII-91-304). The NON stated that the facility was not in compliance with the National Spill Clean-Up Policy for PCBs, 40 CFR Part 761.125, and requested documentation of the following four items:

- Evidence of the removal and proper disposal of all contaminated mastic and wood from both floors of Building 3.
- Evidence of the removal and proper disposal of all contaminated plastic and fiberboard from the file storage area.
- Decontamination of all non-porous surfaces to less than 10 micrograms per 100 square centimeters (10 $\mu g/100\ cm^2$) and verification of same by submitting results of analyses from post decontamination wipe sampling.
- Decontamination of all porous surfaces (concrete) to less than 10 ppm PCBs as determined by destructive sampling (core sampling).

Following issuance of the NON, a number of decontamination and confirmatory sampling activities were conducted at the site. Rust Remedial Services, Inc., formerly Chemical Waste Management, Inc., performed decontamination and confirmatory sampling activities for the PCB contamination in Building 3 from September 1991 through August 1994. Decontamination activities included removal of the PCB-contaminated wood blocks, scarification of the concrete floor surfaces, and washing of block walls on the first and second floors of the building. Additional decontamination activities were performed in the summer of 1996 to remove PCB contamination from the first floor. As part of the remedial approach for Building 3, a health-based risk assessment was completed to determine risk-based cleanup levels for the basement and the first and second floors of Building 3. The risk assessment concluded that residual contamination in the building did not present an unacceptable health impact and that further remediation was not necessary. The Agency for Toxic Substances and Disease Registry (ATSDR) did not endorse the health-based risk assessment. Samples collected from porous surfaces (concrete) and the non-porous surfaces (steel) in support of the risk assessment evaluation indicated residual PCB contamination was still present at concentrations that exceeded federal guidelines.

In August 1997, the U.S. Army Aviation and Troop Command (ATCOM) sent a letter to the EPA Region VII documenting its agreement to complete the following tasks for Building 3:

- Paint the walls and ceilings and cap the floor with concrete
- Isolate the chip chute by constructing a wall in the basement
- Develop a sampling plan and perform a health risk assessment to be reviewed by the appropriate Army agency
- Take ambient air samples to measure PCB levels after completion
- Meet with EPA Region VII to determine if any future action is needed.

The EPA later indicated that the clean-up standards set forth in the 1998 TSCA Amendments (Mega Rule) would supercede the standards as set forth in the NON.

In April 1999, Tetra Tech EM, Inc. (Tetra Tech) completed a Phase I Environmental Baseline Survey (EBS) of SLAAP that included a recommendation for sampling in Building 3 as part of a Phase II EBS. The results of the Phase II EBS were documented in the *Final Environmental Baseline Survey Report for the St. Louis Army Ammunition Plant, St. Louis, Missouri, December 28, 2000* (Tetra Tech, 2000). Conclusions in the EBS regarding PCB contamination in Building 3 were as follows:

- There is PCB-contaminated concrete flooring on the first floor of the building
- There is PCB-contaminated soil in the basement of the building
- There is PCB-contaminated concrete and brick walls in the basement and Chip Chute area
- There is PCB-contaminated soil beneath the northwest loading dock (located outside the building adjacent to the Chip Chute)
- There is PCB-contaminated drain and sump water

1.2.2 Alternatives Evaluation

In June 2001, Arrowhead prepared a document entitled *Alternative Evaluation for the Removal of PCBs, St. Louis Army Ammunition Plant* (Arrowhead, 2001a). This document constituted an engineering evaluation and cost analysis (EE/CA) that presented AMCOM with removal options for addressing PCB contamination at Building 3. Assumptions regarding the nature and extent of PCB contamination were based on the results of prior studies as discussed in Section 1.2.1. Five removal options were presented:

- Alternative #1 - No action
- Alternative #2 - Removal of PCB contamination exceeding 50 ppm
- Alternative #3 - Removal of PCB contamination exceeding risk-based cleanup criteria
- Alternative #4 - Demolish the building
- Alternative #5 - Repair floor cracks and apply epoxy coating

Each alternative was evaluated with respect to technical feasibility, implementation, and cost. Ultimately, AMCOM selected Alternative #2. Under this alternative, portions of the basement, first floor, penthouse, and chip chute that contained PCBs in excess of 50 ppm (classified as TSCA waste) would be removed and disposed at a facility approved to accept TSCA wastes. Additionally, PCB contamination on the walls and concrete pillars above 50 ppm would also be removed. Institutional controls (deed restrictions) would be established to preclude any use of the facility other than demolition, thereby avoiding exposure to PCBs that would remain in place until demolition commenced. Reduction of PCB levels below 50 ppm at Building 3 would allow the Army to sell the SLAAP property to a non-DoD entity under a FOST, with restrictions placed on the sale that that would require the new owner to demolish Building 3. Demolition activities could then be conducted by the new ownership without special provisions for handling the TSCA-regulated waste material. Although Alternative #2 allowed AMCOM to transfer the property, it did not necessarily address the NON, because the PCB contamination remaining in the building would still exceed the cleanup standards under the Mega Rule (refer to Section 1.2.3). AMCOM directed CENWK to proceed with Alternative #2 in April of 2001. A remedial investigation was conducted prior to RA Phase 1 as discussed in Section 1.2.4. The field work associated with Alternative #2 constituted RA Phase 1 (refer to Section 1.2.5).

1.2.3 Identification of Regulatory Drivers

The *Alternatives Evaluation* (refer to Section 1.2.2) also identified the regulatory requirements applicable to the PCB remediation efforts at Building 3. The PCB contamination within Building 3 was subject to the rules and regulations set forth in TSCA, as amended by the Mega Rule in 1998. These regulations provide standards governing the distribution of PCB-contaminated items, including acceptable cleanup approaches and standards, disposal requirements, and sampling and analysis protocols. Section 761.20 of TSCA prohibits the "distribution in commerce of PCBs at concentrations of 50 ppm or greater". Because PCB contamination existed from spills within Building 3 at concentrations that exceed the 50 ppm threshold criterion, the sale of the property was prohibited until those concentrations were reduced to levels deemed acceptable by EPA.

Because historical releases of PCB contamination resulted in concentrations that exceeded 50 ppm, all portions of the resulting contamination must be remediated to an acceptable level. Under TSCA, remedial activities may be self-implemented in accordance with 40 CFR 761.61(a). Accordingly, cleanup standards are established for porous surfaces (including concrete) as follows:

- High Occupancy Areas: 1 ppm without restriction, 10 ppm with a 10-inch cap, and a surface cleanup standard at 10 $\mu g/100cm^2$.
- Low Occupancy Areas: 25 ppm, or 25-50 ppm if fenced and marked, 25-100 ppm with a 10-inch cap, and a surface cleanup standard at 100 $\mu g/100cm^2$.

It is important to point out that these cleanup standards are applied with regard to all contaminated material. In other words, cleanup of all PCB contamination exceeding the cleanup standards is required, not just those portions that exceed the 50 ppm triggering criterion. The definition of high and low occupancy areas is provided in 40 CFR 761.3. However, the high and low occupancy criterion does not necessarily apply to the transfer of the property.
An alternate (risk-based) cleanup number different from the aforementioned cleanup standards may be established in accordance with §761.61(c) if deemed by EPA as sufficiently protective (refer to Section 1.2.8).

Contamination removed from the site must be handled in accordance with the Bulk PCB Remediation Waste Criteria found in 40 CFR 761.61(a)(5). Materials containing PCBs at or above 50 ppm must be disposed in a TSCA-permitted chemical waste landfill [or in a landfill at a similar Resource Conservation and Recovery Act (RCRA) facility]. In contrast, materials containing PCBs less than 50 ppm may be disposed at a municipal or non-hazardous waste landfill, provided the facility is permitted by the State to accept low-level PCBs [referencing 40 CFR 76161(a)(5)(v)].

Requirements for measuring the effectiveness of concrete cleaning are provided in Subpart N. Confirmatory sampling requirements are provided in Subpart O.

1.2.4 Field Investigation for PCB TSCA Waste

As discussed in Section 1.2.2, AMCOM decided to implement Alternative #2, the removal of TSCA wastes from Building 3. However, there was insufficient data for identifying/delineating the areas and materials inside of the building classified as TSCA waste. As a result, AMCOM requested that a field investigation (FI) be conducted to define the area and volume of TSCA

waste present in Building 3. An approach for the FI was designed by Arrowhead taking into consideration all available sources of information up to this point in the project, including:

- Existing data and data gaps from prior studies (refer to Section 1.2.1), particularly the results of the Phase I/II EBS (Tetra Tech, 2000)
- Figures provided by AMCOM representing average concentrations within selected areas of the building, based on statistical sampling data collected prior to placement of the concrete cap
- Visual observations of oil-staining during site visits
- Knowledge of historical processes based on available literature and as-built drawings depicting the location of process equipment and plant layout

Details of the design and approach to the FI were presented in the *Sampling and Analysis Plan, Determination of PCB TSCA Waste Quantities, Building 3, St. Louis Army Ammunition Plant* (Arrowhead, 2001). In general the FI focused on areas of the building suspected of containing elevated PCB levels, including the concrete flooring on the first and second floors, concrete flooring in the basement, soil flooring in the basement, concrete footers and pillars, soil outside the building adjacent to the Chip Chute (near the northwest loading dock), and waste materials (metal cuttings/shavings) in the Chip Chute. Sample collection associated with the FI was conducted by Arrowhead in June and July of 2001. During this period, over 1,500 concrete samples (floors, walls, pillars, and footers), 100 soil samples, and seven waste samples were collected. The results of this investigation were presented in a *Field Investigation Report, Determination of PCB TSCA Waste Quantities, Building 3, St. Louis Army Ammunition Plant, St. Louis, Missouri* (Arrowhead, 2001b).

Due to uncertainties with regard to the analytical errors for PCBs, there was a possibility that TSCA waste materials with actual concentrations near or slightly above 50 ppm could be misidentified as non-TSCA waste (i.e. false negative). This could have occurred if the recovery of PCBs from the sample during analysis was less than 100%, due to potential matrix effects. To minimize the potential for false negatives and increase the confidence level that Building 3 materials exceeding 50 ppm are appropriately identified, a modified action level was established using the lowest achieved matrix spike/matrix spike duplicate (MS/MSD) recovery (87%) for site samples spiked with 50 ppm of Aroclor 1248. The modified action level was established at 43.5 ppm (87% x 50 ppm). In accordance with this approach, the areas of PCB contamination to be removed during the RA were identified/delineated based on sample results with PCB concentrations greater than or equal to 43.5 ppm.

Based on the sample results from the FI, it was determined that PCBs at concentrations greater than 43.5 ppm were present in the following areas or materials:

- Select portions of concrete flooring on the first and second floors
- Select portions of concrete flooring in the basement
- Select portions of soil flooring in the basement
- Soil and waste materials in the Chip Chute area
- Various oil-stained concrete footers and pillars in the basement
- An area of contaminated soil and gravel outside the building in the vicinity of the former Chip Chute loading dock

The general locations of the areas classified as TSCA waste are depicted on Figures 1-2, 1-3, 1-4, and 1-5. The initial quantity of TSCA waste was estimated to be 2,200 tons.

The results of the FI were also used to identify areas or materials containing PCBs less than the modified action level. These areas would not be removed during RA Phase 1, and included:

- Select portions of concrete flooring on the first and second floors
- Material within the basement catch basin
- Intermediate concrete columns in the basement (located between Rows 9 and 22)
- Concrete foundation wall adjacent to PCB contamination outside the building (near the former Chip Chute load-out area)
- Concrete walls in the Chip Chute area

The FI Report also presented the data gaps that would need to be addressed to more conclusively delineate the PCB contamination in selected areas. The data gaps included areas of concrete and soil flooring where the preliminary data (provided by the laboratory in the field) and final data did not agree and/or areas where the data was otherwise limited. Also, the cast-iron sewer lines in the basement were not sampled during the FI. These lines were potential receptors of PCBs because they were connected to floor drains that served production areas on the first and second floors. Data gap sampling activities were deferred to a pre-investigation sampling program as part of RA Phase 1.

During the FI, additional information was collected to support planning and design efforts for the Phase 1, including:

- **Waste characterization samples** – Based on waste characterization samples (concrete and soil) collected during the FI, including samples submitted for analysis of Toxicity Characteristic Leaching Procedure (TCLP) constituents, it was determined that the PCB-contaminated materials to be removed during the RA would not be classified a hazardous waste under RCRA.

- **Building Structural Data** – In anticipation of the need to cut and remove large sections of concrete flooring during the RA, Arrowhead subcontracted with a structural engineer to perform a comprehensive structural evaluation of Building 3.

- **Asbestos-containing materials (ACM)** – The basement of the building was surveyed to quantify the asbestos-insulated piping that would need to be removed to provide clearance for RA construction equipment. Samples of loose debris on the basement flooring were also collected and found to be positive for asbestos fibers.

Further details and the complete results of this study are presented in the Field Investigation Report (Arrowhead, 2001). A discussion of the overall nature and extent of PCB contamination at Building 3 is discussed in Section 1.3.

1.2.5 RA Phase 1

The primary objective of RA Phase 1 was to remove the materials classified as PCB TSCA wastes from the interior of Building 3. The remedial design for Phase 1 of the RA is discussed in Section 2.0 and documented in the *Removal Action Work Plan, PCB TSCA Waste, Building 3, St. Louis Army Ammunition Plant* (Arrowhead, 2001). Field work associated with Phase 1 of the RA was conducted from November 11, 2001 through March 7, 2002. During this time period, approximately 1,100 tons of TSCA waste were removed from the basement, first floor, and second floors of the building. The field activities that occurred during RA Phase 1 are discussed in detail in Section 3.0. Upon discovery of significant PCB contamination beneath the basement concrete flooring (refer to Section 1.2.6), removal of TSCA wastes during RA Phase 1 was discontinued, and remedial design efforts for RA Phase 2 were subsequently initiated.

1.2.6 Contamination Beneath Basement Concrete Flooring

In January 2002 during RA Phase 1, while excavating waste materials in the Chip Chute area, a 2 to 3 inch layer of heavily oil-stained gravel beneath the basement concrete floor was discovered after approximately 10 feet of the floor profile was exposed. Samples of the gravel material and underlying soil were colleted and submitted for PCB analysis. The reported results

indicated the presence of PCBs at concentrations significantly greater than 50 ppm in the gravel and in the upper portions of the soil beneath the gravel. The reported result for the gravel samples was 7,700 ppm. To evaluate the extent of the PCB contamination beneath the 37,000 ft^2 basement concrete floor, additional gravel and soil samples were collected as discussed in Section 3.8. In addition, test pits were excavated in the soil along the southern edge of the basement concrete floor. The results of this investigation confirmed the presence of heavy oil staining and PCB contamination well above 50 ppm in materials below the concrete flooring between Rows 9 and 20. However, PCBs were not detected in the soil beneath the basement hallway, between Rows 20 and 22. Figure 1-6 presents the sample locations and results of the investigation.

Due to the discovery of TSCA-regulated PCB contamination beneath the basement concrete flooring, Phase 1 activities were discontinued by AMCOM until further notice. AMCOM later implemented a risk-based approach that included the removal of the remaining TSCA wastes (including the materials beneath the basement concrete flooring) as well as the remaining non-TSCA PCB contamination in the building to the extent necessary for lifting the NON (refer to Section 1.2.8). The change in approach led to the development and execution of Phase 2 of the RA, which ultimately released the Building 3 site from non-compliance status.

1.2.7 Building 3 Site-Specific EBS Sampling

Concurrent with Phase 1 of the RA, other potential areas of soil contamination were investigated as part of the Building 3 portion of the Site-Specific EBS. The Site-Specific EBS was conducted by AMCOM in accordance with DoD standards in preparation for the eventual transfer the property to a new owner under FOST. The prime contractor for the EBS was URS Corporation (URS). Since Arrowhead was already onsite completing Phase 1 of the RA effort, URS subcontracted to Arrowhead the collection of EBS soil samples from the basement of Building 3. Sampling and analysis were implemented by Arrowhead in March 2002, prior to demobilizing. Samples were collected from random locations for risk assessment purposes and from specific areas where oil staining was observed. The results of the sampling effort indicated that two additional, small areas of PCB contamination would need to be remediated due to the presence of PCBs above the subsurface cleanup level of 7.6 ppm (refer to Section 1.2.8). Appendix A contains correspondence regarding the Building 3 Site-Specific EBS sample results. The PCB-contaminated areas identified during the EBS were incorporated into the work plans for Phase 2 of the RA.

1.2.8 Risk-Based Cleanup Approach

As discussed in Section 1.2.6, additional PCB contamination classified as TSCA waste was discovered within a gravel layer beneath the concrete flooring in the basement of Building 3 during Phase 1 of the RA. The presence of this contamination resulted in a significant change in the original approach to the RA. To remove the PCB contamination beneath the concrete basement flooring, the building would need to be demolished, because the concrete flooring was the spread footer for vertical I-beams supporting the upper floors and roof of the building. The need to demolish the building presented an opportunity to AMCOM to remove the remaining PCB contamination (less than 50 ppm) in the building, thereby eliminating the NON and accelerating the schedule for transferring the property. In response to this opportunity, AMCOM elected to demolish Building 3 and complete the cleanup of PCB contamination. Thus, the focus of the RA at this point in the project switched from the removal of TSCA wastes to the removal of the remaining PCB contamination (TSCA and non-TSCA) to the extent necessary for lifting the NON. AMCOM declared its intent to complete a "self-implementing remediation" in accordance with 40 CFR Part 761.61. Notification to EPA, as required under 40 CFR 761.61(a)(3), was provided by AMCOM upon issuing *Addendum No. 1, Removal Action Work Plan, PCB TSCA Waste, Building 3, St. Louis Army Ammunition Plant* (Arrowhead, 2002a). This document outlined the design and risk-based approach for completing Phase 2 of the RA. The remainder of this subsection addresses the development of the risk-based approach.

The demolition of Building 3 would involve the removal of building materials above the basement flooring. The demolition debris would not be classified as TSCA waste, because the building materials containing PCBs above 50 ppm (i.e. select portions of concrete flooring) were previously removed during RA Phase 1. During the demolition; however, building materials containing PCBs less than 50 ppm would need to be segregated for disposal as "special waste" in a municipal landfill, including:

- Select portions of concrete flooring on the first and second floors
- Material within the basement catch basin
- Various cast-iron sewer lines in the basement
- Intermediate concrete pillars in the basement (located between Rows 9 and 22)
- Concrete foundation wall adjacent to PCB contamination outside the building (near the former Chip Chute loading dock area)
- Concrete walls in the Chip Chute area

All other building materials above the basement floor level (i.e. brick, concrete block walls, steel I-beams) would be disposed as non-hazardous construction waste. Thus, the removal and disposal of the building structure during demolition would effectively complete the mitigation of PCBs associated with the building structure located above the basement floor.

However, following demolition and removal of TSCA wastes from the basement area, PCB-contaminated materials would still be present in the base of the building footprint, including:

- Basement soil flooring
- Concrete footers for the primary building support beams
- A portion of the basement concrete flooring (between Rows 20 and 22)

These materials would become buried approximately 8 to 10 feet below ground surface (bgs) after the building excavation was backfilled. Under TSCA, for EPA to accept the presence of residual PCB contamination in the subsurface, it must be demonstrated that the materials do not pose an unreasonable risk to human health and the environment. Accordingly, a site-specific risk assessment was performed as outlined in 40 CFR 761.61(c) (*Risk-based disposal approval*). The risk assessment included the calculation of a health-based, site-specific cleanup standard consistent with future anticipated land use and exposure scenarios. Materials found to be contaminated with PCBs above the site-specific, subsurface cleanup standard would be remediated prior to backfilling the building footprint excavation. The PCB subsurface cleanup standard for the site was calculated to be 7.6 ppm (Aroclor-1248), based on the carcinogenic effects of PCBs and a target cancer risk of 1×10^{-6} for a future construction workers exposure scenario. Appendix B provides the assumptions, approach, and calculations used to derive the 7.6 ppm subsurface cleanup standard. [Note: As discussed in Section 1.2.4, a modified action level for PCBs was established based on the lowest achieved MS/MSD recovery of 87%. The modified action level served as a factor of safety to maximize confidence that PCBs exceeding the action level were properly identified. When this concept is applied the risk-based, subsurface cleanup standard, the modified value becomes 6.6 ppm (87% of 7.6 ppm). However, as shown in Figure 4-3 (Final Subsurface Site Conditions and Residual PCB Contamination), all of the sample results associated with PCB contamination remaining in the subsurface, including soil confirmation samples from the RA, were well less than 6.6 ppm. Accordingly, the remainder of this report will refer to the 7.6 ppm as the value of the subsurface cleanup goal for the site.]

The concrete footers that would be left in the building footprint were not expected to be a significant concern with respect to PCB contamination. Oil-stained concrete pillars and footers

were sampled during the Field Investigation (Arrowhead, 2001b). The majority of the concrete footers located outside the limits of the concrete flooring in the basement were not oil-stained or contaminated with PCBs at elevated levels. In contrast, many of the concrete footers and intermediate concrete pillars located within the limits of concrete flooring in the basement were found to be oil-stained with relatively high levels of PCBs. Several of the oil-stained pillars and footers were previously decontaminated during the RA Phase. Additionally, 100 concrete footers located between Rows 9 and 20 would be removed along with the concrete flooring during the removal of TSCA wastes. All intermediate pillars (372 each) between Rows 9 and 22 would also be removed during demolition of the building. One concrete footer located east of Row 22 (at I-beam G25) was known to be contaminated with PCBs above the subsurface cleanup goal, based on the results of the Field Investigation; this footer would be removed and disposed during the remediation effort. Furthermore, the concrete flooring between Rows 20 and 22 would be left in the building excavation following demolition. The upper two inches of this concrete was scabbled during RA Phase 1 to remove PCB contamination exceeding 50 ppm. Confirmation samples collected following the scabbling operation indicated that residual PCB levels were below the subsurface cleanup level of 7.6 ppm.

Consequently, the primary concern with respect to residual PCB contamination left in the building footprint was the soil flooring in the basement. Areas where PCB contamination was present at concentrations above the subsurface cleanup standard would need to be remediated to less than 7.6 ppm prior to backfilling the building excavation. The areas of concern for soil in the former basement area of the building included the following (refer to Figure 1-4 for the general locations of all areas):

- **Soil beneath basement concrete flooring** – The soil beneath the basement concrete flooring between Rows 9 and 20 would need to be remediated to the subsurface cleanup level as part of the removal of TSCA wastes in this area.

- **Soil in Chip Chute area** – Approximately three feet of PCB-contaminated soil remained within the Chip Chute area following RA Phase 1. This area would need to be remediated to remove the remaining TSCA waste and to achieve the subsurface cleanup level. The former Chip Chute metal cuttings pile was removed during Phase 1.

- **Soils south and west of concrete flooring where TSCA wastes were removed during RA Phase 1** – During RA Phase 1, soils classified as TSCA waste were removed from areas immediately south and west of the concrete flooring in the basement. Confirmation

samples indicated that the majority of TSCA wastes were successfully removed; however, PCBs in some areas were still present above the subsurface cleanup level of 7.6 ppm. These areas would require further remediation.

- **Soils south and west of concrete flooring identified during FI** – The results of the FI indicated that there were additional areas of PCB contamination at concentrations between 7.6 ppm and 43.5 ppm in the soils south and west of the basement concrete flooring. These areas were not addressed during RA Phase 1, because the contamination was not classified as TSCA waste. These areas would also require remediation.

- **Soils identified during Site-Specific EBS** – The results of the EBS sampling effort (refer to Section 1.2.7 and Appendix A) indicated that two additional areas of PCB contamination would require remediation due to the presence of PCBs above the subsurface cleanup standard. These areas include oil-stained soil near Sectors K9 and C8.

- **Soils east of Row 22 identified during Field Investigation** – Oil-stained soils east of Row 22 were characterized during the FI. Sample results from the FI indicated that the soil in two areas contained PCBs at concentrations above the subsurface cleanup standard. One area was located near Sector E28, while the other area was located between Sectors C22 and D22. These areas were not remediated during the initial phase of the RA, because the soils were not classified as TSCA waste. Remediation of these areas would be required.

- **Area identified during Phase I/II EBS** – During the Phase I/II EBS of SLAAP conducted by Tetra Tech, PCBs were detected above the subsurface cleanup standard in a localized area of oil-stained soil near Sector E38. This particular result was documented in the *Final Environmental Baseline Survey Report for the St. Louis Army Ammunition Plant, St. Louis, Missouri, December 28, 2000* (Tetra Tech, 2000). This area would also require remediation to meet the subsurface cleanup goal.

To further address EPA's concern regarding PCB contamination at Building 3, AMCOM also elected to remove the PCB-contaminated materials found outside the building near the former Chip Chute loading dock. The soil and gravel in this area were sampled during the FI. The concentrations of PCBs exceeded 50 ppm in samples collected as deep as 3.5 ft. bgs and it was assumed (for estimating purposes) that PCB contamination penetrated to a depth of 5 ft. bgs. The areal extent of contamination was initially estimated to be 2,500 ft^2 (refer to Figure 1-5).

Even though the cleanup of this area was not required by the NON, it was incorporated into the scope for RA Phase 2 due to its close proximity to the building.

In summary, the risk-based approach presented by AMCOM addressed supplemental remediation activities at Building 3, including:

- Mitigation of TSCA waste beneath the concrete flooring in the basement.
- Mitigation of TSCA waste outside Building 3, adjacent to the former Chip Chute load-out area.
- Mitigation of the remaining PCB contamination (less than 50 ppm) at Building 3 to the extent required under TSCA and as necessary for lifting the NON.
    - PCB contamination in building materials above the basement floor would be mitigated through demolition and disposal of the building.
    - PCB contamination in soil and concrete left in the subsurface (building footprint) would be remediated to a risk-based cleanup level of 7.6 ppm, per 40 CFR 761.61(c).

1.2.9 RA Phase 2

The objective of RA Phase 2 was to complete the remediation of PCBs at Building 3. The remedial design for Phase 2 of the RA is discussed in Section 2.0 and documented in *Addendum No. 1, Removal Action Work Plan, PCB TSCA Waste, Building 3, St. Louis Army Ammunition Plant* (Arrowhead, 2001). The majority of the field work associated with Phase 2 of the RA was conducted between July 8, 2002 and January 15, 2003. Following a temporary work stoppage, site restoration activities were finally completed in May and June of 2003. During RA Phase 2, the building was demolished and disposed, and approximately 10,600 tons of TSCA waste and 18,000 tons of PCB special waste were removed from the site. In addition, the building footprint was backfilled and the site was restored. Confirmation samples were collected to verify that remediation efforts were successful in achieving the subsurface cleanup standard of 7.6 ppm. The field activities that occurred during RA Phase 2 are discussed in detail in Section 4.0.

1.3 Nature and Extent of PCB Contamination

The nature and extent of PCB contamination at Building 3 was based on the combined set of data from the studies referenced in Section 1.2, including the Field Investigation, Site-Specific EBS,

and Phase I/II EBS. In addition, data obtained from confirmation samples collected during RA Phase I contributed to the understanding of the nature and extent of PCB contamination. Materials contaminated with PCBs included concrete flooring, soil, miscellaneous wastes, and sewer piping. Due the need to dispose the PCB contamination on the basis of concentration, the contaminated materials at Building 3 were classified as either TSCA waste (PCBs > 50 ppm) or PCB special waste (PCBs < 50 ppm). As discussed in Section 1.2.4, a modified decision level for TSCA waste was set at 43.5 ppm. This conservative approach was used to increase the confidence that PCB concentrations greater than 50 ppm would be identified and removed from the building. Table 1-3 presents a summary of the nature and extent of PCB contamination at Building 3, including the types of contaminated materials, general range of concentrations, approximate location and extent of contamination, and source(s) of data used to define/identify the contamination. The approximate location(s) of PCB-contaminated materials associated with Building 3 are shown in Figures 1-2 through 1-5.

1.4 Removal Action Summary and Objectives

The ultimate objective of the RA was the final remediation of Building 3 resulting in the removal of the NON. To meet this objective, remediation activities complied with TSCA standards under 40 CFR 761.61(a) for the "self-implementing on-site clean-up" of PCB wastes and porous surfaces. The acceptable cleanup level for PCB-contaminated materials left in the subsurface was determined to be 7.6 ppm in accordance with 40 CFR 761.61(c) of TSCA (refer to Section 1.2.8). Section 5.0 presents the confirmation sampling results indicating that the site was successfully remediated in compliance with TSCA.

Phase 1 of the RA involved the removal of TSCA wastes, including:

- Select portions of concrete flooring on the first and second floors
- Chip Chute waste pile (metal cuttings)
- Soil within the Chip Chute area, beneath the waste pile
- The upper portions of concrete flooring in the basement hallway between Rows 20 and 22
- Select portions of soil flooring in the basement, including areas along the west and south perimeter of the concrete flooring
- Various, oil-stained concrete footers and pillars in the basement
- Various cast-iron sewer lines in the basement

Phase 2 of the RA addressed the remaining PCB contamination at Building 3, including TSCA wastes and PCB contaminated materials less than 50 ppm (i.e., PCB special wastes). The following TSCA wastes were removed during Phase 2:

- Concrete flooring between Rows 9 and 20
- Gravel and soil beneath the basement concrete flooring between Rows 9 and 20
- Soil and gravel from an area outside the building in the vicinity of the former Chip Chute loading dock
- Select portions of soil flooring in the basement that were previously excavated during Phase 1, but were associated with failed PCB confirmation sample results
- Additional soil from the Chip Chute areas
- Additional cast-iron sewer lines in the basement

The demolition and disposal of the building effectively mitigated the remaining PCB contamination (concentrations less than 50 ppm) present in building materials located above the building foundation, including:

- Select portions of concrete flooring on the first and second floors
- Various cast-iron sewer lines in the basement
- Intermediate concrete columns in the basement (located between Rows 9 and 22)
- Concrete foundation wall adjacent to the Chip Chute and PCB contamination outside the building in the vicinity of the former Chip Chute loading dock
- Interior concrete walls on the east and west sides of the Chip Chute area

The work plan issued by AMCOM allowed for some materials to permanently remain in the subsurface, including the individual concrete footers located outside the limits of the basement concrete flooring, portions of the basement concrete flooring, and basement soil flooring. As a result, these materials were required to meet with the subsurface cleanup standard of 7.6 ppm prior to being backfilled and buried. The following areas were remediated/removed during Phase 2 to comply with the subsurface cleanup standard:

- Soils in areas where TSCA wastes were previously removed to 43.5 ppm (primarily along the south and west sides of the basement concrete floor), thus, required additional excavation to achieve 7.6 ppm.

- Additional areas of soil initially containing PCB contamination greater than the subsurface cleanup level, as identified during the Field Investigation , Building 3 Site-Specific EBS, and Phase I/II EBS.
- One concrete footer at Column G25 surficially contaminated with PCBs above the subsurface cleanup level (based on the results of the Field Investigation).
- Materials within the basement catch basin.

Table 1-4 provides a summary of the primary objectives of the RA (Phases 1 and 2).

2.0 Remedial Design Summary

This section presents a summary of the remedial design process. Details of the remedial design for Phase 1 are provided in the *Removal Action Work Plan, PCB TSCA Waste, Building 3, St. Louis Army Ammunition Plant* (Arrowhead, 2001c). The remedial design criteria for Phase 2 are presented in detail in *Addendum No. 1, Removal Action Work Plan, PCB TSCA Waste, Building 3, St. Louis Army Ammunition Plant* (Arrowhead, 2002a).

The results of the FI served as the primary basis for design of RA Phases 1 and 2 in terms of the locations of PCB contamination, types of materials requiring cleanup (such as concrete flooring, soil flooring, and oil-stained concrete surfaces), estimates of waste quantities, and initial cut/excavation lines (horizontal and vertical) for removal/excavation of contaminated materials. A significant aspect of the design was the use of a modified action level of 43.5 ppm for establishing the TSCA waste cut lines for the RA Phase 1 (refer to Section 1.2.4). Although this conservative approach likely resulted in some non-TSCA materials being removed, it minimized the probability that TSCA wastes would be left in place and inappropriately disposed as non-TSCA waste during the demolition. It was further recognized that the data from the FI was limited with respect to the number of samples and areal sample coverage. The initial delineation of contamination was somewhat uncertain for large areas defined by a single PCB result or areas based upon PCB results from widely spaced samples. Thus, the remedial design incorporated both data gap sampling and confirmation sampling. Data gap sampling was included in the design to resolve FI data that was inconclusive and to investigate additional, suspect areas of PCB contamination. For example, the design called for sampling the sewer lines in the basement, which were not addressed during the FI. The objective of the confirmation sampling program was to verify that PCB remediation activities had successfully achieved the appropriate cleanup standard – 43.5 ppm for removal of TSCA wastes and 7.6 ppm for contamination left in the subsurface. Confirmation samples provided evidence that the vertical and horizontal extent of PCB contamination was properly removed.

Another key remedial design element was the proper segregation and disposal of the various waste materials generated during the RA. Waste materials included PCB TSCA wastes, and PCB special wastes, in addition to ACM, lead-based paint, and non-hazardous construction debris, among others. Each waste type required different methods and facilities for disposal. The distinction between TSCA wastes and PCB special wastes was particularly important due to the significant differences in regulatory requirements. In accordance with 40 CFR 761.61(a)(5),

PCB-contaminated wastes greater than 50 ppm must be disposed at a chemical/hazardous waste landfill with federal approval under RCRA. In contrast, PCB-contaminated wastes less than 50 ppm may be disposed at a State-approved municipal landfill. With plans to demolish the building during RA Phase 2, the concern was the identification of PCB special wastes above the basement floor level to ensure that contaminated and noncontaminated building materials were properly segregated during demolition. Additionally, soil and concrete classified PCB special waste located at or below the basement floor level would need to be removed in order to meet the subsurface cleanup goal. Thus, the identification of PCB special wastes became a primary focus of the remedial design for Phase 2. The sources of information for defining areas or materials classified as PCB special waste were the sample results from the FI, confirmation and data gap sample results from RA Phase 1, the results of the Phase I/II EBS, and visual/field observations of oil-staining on concrete and soil surfaces. Accordingly, the following PCB special wastes were identified:

- **Soil flooring in basement** - Areas of soil flooring classified as special waste are listed in Section 1.2.8 and are shown on Figure1-4.

- **Sewer piping in basement** - Approximately 2,000 linear feet (LF) of cast iron sewer piping in the basement (refer to Figure 1-6) was classified as PCB special waste, based on the results of samples collected during RA Phase 1.

- **Concrete flooring on first and second floors** - The cut lines for concrete flooring designated as PCB special waste on the first and second floors (refer to Figures 1-2 and 1-3) were drawn conservatively to ensure that the flooring was properly disposed during demolition.

- **Concrete intermediate columns in basement** - All of the intermediate concrete pillars in the basement were designated as PCB special waste based on the knowledge that select pillars were oil-stained and surficially contaminated with low levels of PCBs.

- **Concrete walls in the Chip Chute area** - Based on the results of samples collected during the FI, the oil-stained concrete walls on the east and west sides of the Chip Chute area (refer to Figure 1-4) contained surficial PCB contamination less than 50 ppm.

- **Concrete foundation wall adjacent to PCB contamination outside the building** - Approximately 100 linear feet of the concrete foundation wall along the north side of Building 3 (refer to Figure 1-4) was adjacent to the PCB contamination outside the building (in the vicinity of the former Chip Chute loading dock). Based on FI sample results associated with the Chip Chute walls, it was assumed that this section of wall was oil-stained and surficially contaminated with PCBs less than 50 ppm.

- **Material inside basement catch basin** - Waste materials found inside the basement catch basin (refer to Figure 1-4) were sampled during the FI and found to contain PCBs less than 50 ppm.

- **Concrete footer at Column G25** - The oil-stained concrete footer at Column G25 (refer to Figure 1-4) was sampled during the FI and found to contain PCBs slightly greater than 7.6 ppm. All other oil-stained footers located outside the limits of the basement concrete flooring were also sampled during the FI; however, the corresponding PCB concentrations were less than 7.6 ppm.

The following paragraphs discuss some of the other key elements of the remedial design for Phases 1 and 2.

- **Structural engineering** - The primary concerns with regard to structural safety were the load capacity of the flooring and the potential for creating unsupported (cantilevered) concrete flooring during removal of large sections of the floor. Structural engineering calculations confirmed that the flooring was capable of supporting the dead loads and the live loads (crane and slabs) associated with the RA. However, there was a concern with the ability of cantilevered flooring to support the load of heavy construction equipment. The structural integrity of the flooring was maintained through various safety measures, such as saw cutting along the center line of the supporting I-beams when possible, limiting the width of cantilevered flooring, and preventing the crane from being positioned directly on a cantilevered section of flooring. Additionally, concrete flooring in select areas was removed beyond the limits of contamination to prevent the inadvertent creation of cantilevers.

- **On-site waste transport and staging** - The presence of PCB contamination on all floors of Building 3 required the design of different methods and haul routes for moving contaminated materials from the point of removal to staging and load-out areas. For

example, during Phase 1, the Chip Chute area was used as a temporary staging area for concrete rubble, soil, and sewer piping removed from the basement. Specific haul routes were established in the basement to deliver wastes from remediation areas to the Chip Chute area. This approach required the removal of piping and electrical wires to ensure that heavy equipment used in the basement (loaders and buggies) could navigate the haul routes without being obstructed.

- **Waste load-out** - Load-out areas were located and constructed to accommodate wastes from different locations within the building. The load-out design utilized existing building features, such as overhead doors and loading docks on the north side of the building. Concrete floor slabs removed during Phase 1 were loaded out onto flatbed trailers from the northeast loading dock. Wastes staged in the Chip Chute area of the basement were loaded into roll-off containers with the use of an excavator positioned outside the building. During Phase 2, TSCA and PCB special wastes were loaded out from a stockpile area at the north edge of the basement concrete floor. A gravel road was constructed along the north side of the building excavation to provide a clean surface for haul trucks to enter the building excavation for load-out.

- **Equipment mobility** – Excavation work in the basement required the use of equipment that could meet a tight ceiling clearance and maneuver around building support columns spaced at 20-foot intervals. Similarly, concrete removal activities on the first and second floors required the use of cranes and forklifts that could clear ceiling support beams, building support I-beams, and other building obstructions.

- **Miscellaneous demolition** – During Phase 1, demolition of interior and exterior walls was necessary to gain access for removing soil, concrete, ACM, and piping throughout the building. For example, the RA design called for demolishing the outside wall of the Chip Chute to gain access to wastes removed from the basement.

- **Sequencing of activities** – During Phase I, it was necessary to conduct removal activities in a specific sequence to ensure that remediation equipment could move freely within work areas, without being restricted by open holes in the flooring, building demolition operations, or site restoration activities. Building demolition operations as part of Phase 2 were sequenced such that safe access to the basement area for remediation work could be obtained at the earliest time possible.

- **Off-site transportation** - The multiple waste types (i.e., concrete slabs, concrete rubble, soil, demolition debris, ACM) required different methods of transportation. During Phase 1, flat-bed trailers and roll-off containers were used to ship wastes off-site. However, during Phase 2, the majority of PCB wastes were live loaded into end-dump trucks.

- **ACM removal** – Design for the removal of ACM-covered piping in the basement was required to facilitate access to areas where contaminated concrete and soil were to be removed as part of Phase 1. In addition, due to the presence of loose asbestos fibers on the surface of the flooring throughout the basement, it was necessary to clean all horizontal surfaces in the proposed work areas prior to commencing other field activities in the basement. A comprehensive abatement of ACM was required prior to commencing building demolition activities. Asbestos-containing materials removed during the abatement included piping insulation, transite, and floor tiles. Windows containing putty classified as ACM were extracted during the building demolition.

- **Miscellaneous waste management** - Residual fluids and sediments were encountered in the building during the RA. For example, standing water was observed in at least two concrete basins (vaults) beneath transformer/switchgear rooms, and residual oil was recovered from the former distribution lines in the basement. The design included sampling for characterization of suspect waste streams to determine the proper method of handling and/or disposal.

- **Lighting and electrical power** - City utility services, including electrical power, to Building 3 were not available. Consequently, a distribution system driven by a single, 125-kilowatt generator was designed for use in Phase 1. The generator powered various junction/breaker boxes located at key points on all floors of the building.

- **Site safety** - Safety design considerations included, among other things, operation of heavy construction equipment inside the building (including the potential for carbon monoxide emissions), dust exposure, high noise levels, fall protection for work near open flooring, and physical hazards posed by the building demolition operation.

3.0 Removal Action Phase 1

This section presents a detailed discussion of the field activities conducted during Phase 1 of the RA. The intent of Phase 1 was the removal of PCB-contaminated materials greater than 50 ppm, including "bulk remediation wastes" and "porous surfaces" (concrete), in accordance with 40 CFR 761.61(a)(5). The specific objectives of RA Phase 1 were identified in the Removal Action Work Plan (RAWP) as follows:

- Removal of concrete, soil, and other materials inside Building 3 classified as TSCA waste
- Pending sampling and analysis, the removal of cast-iron sewer piping classified as TSCA waste
- Transportation and disposal of TSCA wastes at an off-site chemical/hazardous waste landfill approved under RCRA/TSCA

The specific TSCA wastes addressed during Phase 1 included:

- Concrete flooring on the first and second floors
- Soil flooring in the basement
- Concrete flooring in the basement
- Oil-stained concrete pillars and footers
- Cast-iron sewer piping
- Materials located in the former Chip Chute area.

The general locations of TSCA waste associated with these areas are presented in Figures 1-2, 1-3, and 1-4. Table 3-1 provides a summary of the materials that were removed during the RA, including the approximate quantity removed/remediated, the disposal facility, and other information relevant to the removal and/or disposal.

RA Phase 1 began on November 12, 2001. With the exception of holidays, field work during this phase generally occurred in ten-day shifts, followed by a four-day break between shifts. Field work during Phase 1 ended on March 7, 2002. At that time, asbestos abatement activities (in preparation for building demolition) were in progress. Table 3-2 provides a week-by-week summary of field activities that were conducted during Phase 1.

3.1 Site Preparation

Several tasks were completed to prepare the building for subsequent PCB removal work. This subsection discusses those activities.

3.1.1 Access to Chip Chute

The remedial design called for the Chip Chute to be the primary location for transferring materials and equipment into/out of the basement and for staging materials from the basement prior to load-out (refer to Section 2.0). Consequently, it was necessary to provide access to the Chip Chute from outside and inside the building. To provide exterior access to the Chip Chute, a section of the outside wall adjacent to the Chip Chute (approximately 20 ft. x 35 ft.), extending from the foundation to the roof, was removed. Using a track-mounted saw, the wall was saw cut to the steel I-beam supporting the roof. Holes were then drilled through the wall at select locations. The holes served as attachment points for wire rope cable and lifting hardware. Using the wire rope secured to the wall with the lifting hardware, the wall was pulled away from the building with an excavator. The debris from the wall was placed into a roll-off box for disposal as non-hazardous demolition material. The metal bracing on the inside face of the wall was then cut (using an acetylene cutting torch) and removed.

Once the wall and steel bracing were removed, the concrete ceiling above the Chip Chute area was saw-cut into individual slabs along the centerline of underlying, horizontal steel I-beams. Two holes were cored through each concrete slab to serve as attachment points for lifting hardware (hoist rings). Each slab was then rigged and hoisted out of the building using a mobile crane positioned outside the building. The slabs were staged on the northeast loading dock for subsequent disposal as TSCA waste (due to heavy oil staining from historic Chip Chute operations). Following removal of the ceiling, three horizontal I-beams were cut and removed, which provided unobstructed access to the Chip Chute area from outside the building. Finally, the former Chip Chute conveyor system was dismantled and removed.

3.1.2 Asbestos Floor Cleaning

The presence of loose asbestos debris and fibers was confirmed during the FI. To prevent loose ACM debris on the basement flooring from becoming airborne, the surface of the concrete floor and portions of the soil floor (i.e. where PCB-contaminated soil was to be removed, approximately 3,000 ft^2) were cleaned prior to commencing any other work in the basement. The flooring was cleaned by manually picking up visual pieces of ACM debris and by vacuuming. Vacuuming was performed using a VECLOADER 522™ external vacuum system, also called a "Super Sucker." The vacuum exhaust was equipped with a high-efficiency particulate air

(HEPA) filter. The VECLOADER was positioned outside the building during the cleaning process. The full surface area (37,000 ft^2) of the concrete pad was vacuumed and cleaned. In the soil areas, the surface of the soil was vacuumed to a minimum depth of 0.5 inches bgs. If visible ACM debris (such as pieces of ACM insulation) were observed after removing the upper 0.5 inches of soil, additional vacuuming was performed to remove the visible debris. Wastes from the flooring cleaning process were disposed as follows:

- Asbestos debris from cleaning the concrete floor was collected in a polyethylene bladder bag placed inside a 20-cubic yard (CY) roll-off container. The roll-off box was situated outside the building. Waste materials were disposed as ACM at a local municipal landfill (refer to Section 3.10).

- Asbestos debris manually picked up from the floor were collected in asbestos disposal bags. The waste materials were wetted, double-bagged, and sealed prior to being placed inside a 40-CY, closed roll-off container. The ACM was disposed at a local municipal landfill.

- The mixture of ACM and PCB-contaminated soil, generated by vacuuming the soil flooring, was collected in asbestos disposal bags inside 55-gallon drums. Fourteen drums of ACM/PCB soil were generated. These drums were shipped and disposed as TSCA waste (refer to Section 3.10).

The floor cleaning operation was performed in accordance with "gross removal" requirements. A containment area was established by erecting temporary walls and critical barriers using 6-mil polyethylene sheering, and negative air machines were used to maintain negative pressure within the containment area. A wet decontamination station was constructed at the entrance to the basement from the first floor. The decontamination station consisted of a "clean room" [to change from regular clothing to personal protective equipment (PPE)], shower room, and equipment storage room. During the asbestos work, a Missouri-certified air sampler collected both personal and area air samples. Air samples were collected prior to commencing asbestos work to establish background conditions. During asbestos removal activities, area samples were collected inside and outside the containment area. Finally, air clearance samples were collected inside and outside the containment area once the asbestos work was completed. Air samples were analyzed on-site using phase contrast microscopy (PCM) in accordance with National Institute of Occupational Safety and Health (NIOSH) Method 7400.

3.1.3 Asbestos Piping Removal

The presence of overhead piping in the basement obstructed access to the Chip Chute area, restricted the maneuverability of heavy equipment (to be used for concrete and soil removal) within the basement, and/or blocked aisles that would function as haul routes. Additionally, piping was suspended from the basement ceiling beneath areas where concrete was to be removed from the first floor. As a result, select sections of piping were removed from the basement prior to commencing the removal of TSCA wastes. Piping wrapped with asbestos insulation was removed by "wrap-and-cut" methods combined with glove-bagging as outlined in the Removal Action Work Plan (RAWP). Damaged insulation was repaired with duct tape prior to commencing removal. Once the pipe was double-wrapped with 6-mil poly sheeting, a 1-ft. section of insulation was removed at each cutting point using a glove bag. Cutting points were spaced at 10 to 15 foot intervals along straight runs of piping. After the exposed pipe at the cutting point was encapsulated and the glove bag removed, the pipe was cut using an acetylene torch or hand-held band saw. Individual sections of double-wrapped piping were then hand-carried to the Chip Chute area for staging. The piping and disposal bags (containing the glove bags and insulation from each cutting point) were loaded into 40-CY closed roll-off containers that were double-lined with poly sheeting. The ACM was disposed off-site at a local municipal landfill (refer to Section 3-10).

Alternatively, in areas where the piping was suspended from concrete flooring to be removed from first floor, but did not otherwise interfere with remediation work in the basement, the insulation was removed using glove bags in accordance with the RAWP. After the ACM was removed and the pipe was encapsulated, the hangars were cut/detached from the ceiling. The pipe was then allowed to remain on the floor or ground.

3.1.4 Interior Demolition

To provide access for heavy construction equipment (for use during concrete flooring removal), select interior walls of the building required demolition and removal. The walls were demolished by various methods. Concrete block walls were removed by saw-cutting followed by demolition using a backhoe, or by demolishing using a Brokk 150 robotic breaker. Interior metal-stud walls were demolished using a backhoe. Demolition debris were removed from the building by loaders, placed in 20-CY roll-off boxes, and disposed as municipal waste.

3.1.5 Flooring Layout

Prior to removing concrete flooring, the saw cut lines (first and second floors) or initial limits of excavation (basement) were marked on the floor using orange spray paint. In accordance with the RAWP, PCB-contaminated concrete flooring on the first and second floors was removed by cutting the floor into individual concrete slabs of various dimensions. The cut line configuration was based on the design of the underlying support system. In areas supported by vertical concrete pillars (corresponding to the first floor directly above the basement concrete flooring, between Rows 9 and 22), the cut line dimensions were either 5 ft. x 5 ft. or 2.5 ft. x 5 ft. In areas supported by horizontal I-beams, the cut line dimensions were 5 ft. x 6.7 ft.

3.1.6 Concrete Coring and Saw Cutting

In preparation for removing sections (slabs) of concrete flooring , two 1-inch diameter holes were cored through each slab. The holes provided a means for securing the hardware that was used to hoist each slab, including bolts, washers, nuts, and hoist rings. Each hole was located equal distance from the sides of the slab to facilitate a balanced lift. The holes were cored using a Milwaukee coring machine.

The first floor concrete flooring between Rows 9 and 22 (above the basement concrete flooring) was approximately 18 inches thick, and was supported by intermediate concrete pillars in the basement. Prior to removing PCB-contaminated flooring in this area, the flooring had to be detached from the support pillars. Using a track-mounted concrete saw, a horizontal cut was made across the top of the corresponding pillars, at a point approximately four inches below the basement ceiling.

3.2 Sewer Line Sampling

Prior to sampling, the network of cast-iron sewer piping in the basement was surveyed to evaluate the interconnection and arrangement of each floor drain system. Based on this information, the specific sewer lines to be sampled within each system were identified. Each line identified for sampling was breached using a sledge hammer, and a sample of the sediment or residue within the line (if any) was collected by hand or using a plastic spoon. The sediment was transferred to a 4-ounce glass jar for PCB analysis. If sediment was not present at the point of the breach, an attempt to collect a second sample was made at another location within the pipe run. The sediment was obtained from the majority of the of the pipe runs.

Different types of sediment were encountered inside the sewer lines in terms of color, consistency, and moisture content. The sediments ranged from dry, orange/reddish-brown metal shavings to wet, dark brown-black sludge-like material. A description of the sediment sample from each sewer line is provided on sample collection field sheets. In total, 31 sewer line samples were collected during Phase 1. The locations of sewer line samples are depicted in Figure 1-6. The results indicated that approximately 350 LF of piping sewer lines contained sediments with PCB concentrations exceeding the modified action level (43.5 ppm). These lines were marked with orange spray paint and subsequently removed and disposed as TSCA waste as discussed in Section 3.4.1. The sewer line PCB sample results are presented on Figure 1-6. Sewer line samples were identified with the prefix "PS".

Samples from four sewer lines were also collected for analysis of TCLP constituents to determine if the sediments were potentially classified as RCRA hazardous waste. The four samples were representative of the different types of sediment found inside the lines. Based on the TCLP results, presented in Table 3-3, the sediments were not classified as hazardous waste under RCRA.

3.3 Concrete Floor Data Gap Sampling

Concrete floor samples were collected at select locations on the first and second floors of Building 3 to address data gaps identified following the FI. These data gaps resulted because of differences between preliminary and final chemical analytical results. That is, the final sample results received following completion of the field work were different from the preliminary results used to guide the selection of sample locations in the field. The data gaps potentially represented additional concrete flooring classified as TSCA waste. To address these data gaps, the following sectors were sampled:

- CF1K11
- CF1K13
- CF1K17

In addition, the following quadrants (i.e., quarter sections of a sector) were sampled due to inconsistent PCB results from adjacent quadrants:

- CF1A20A
- CF1B25B
- CF1C14B
- CF1D13D
- CF1E18C

- CF1F19A
- CF1K19A
- CF2D19D
- CF2E11D
- CF2F14B
- CF2G11C
- CF2G22B

The sample locations are depicted on Figures 3-1 (first floor) and 3-2 (second floor). The upper 1 in. of flooring was sampled by coring and pulverizing in accordance with the Sampling and Analysis Plan (SAP), consistent with the method used during the FI, referencing the SAP (Arrowhead, 2001c). The table from Figure 3-1 presents the results of the concrete floor data gap samples. Based on the results, select quadrants within Sectors K11 and K13 were determined to contain PCBs at concentrations exceeding the modified action level. As a result, these areas were designated as TSCA waste and marked for subsequent removal during Phase 1.

In addition to the data gap samples collected on the first and second floors, concrete floor samples were also collected in the basement. The objectives of these samples were (1) to provide improved delineation of the areas of concrete flooring (between Rows 9 and 22) identified for removal, and (2) to determine if additional areas were applicable. During Phase 1 of the RA, 30 concrete floor samples (identified as CFB23-01 through CFB52-01) were collected. (Note: Samples CFB01 through CFB22 were collected during the FI. The sample nomenclature system was continued during the RA for consistency.) The samples were collected from the 0 to 1 inch depth interval (below the original flooring surface) using a hammer drill in accordance with the SAP. The sample results are presented in Table 3-4; however, a figure showing the sample locations is not provided. This data became irrelevant once the project direction changed, and it was apparent that the entire concrete floor between Rows 9 and 20 would be removed and disposed as TSCA waste during Phase 2. However, sample data from the basement hallway (between Rows 20 and 22) was used to further define the extent of PCB contamination in this area, and the limits of remediation were expanded accordingly. The data from the basement hallway was relevant, since the scabbled concrete flooring between Rows 20 and 22 was being permitted to permanently remain in the subsurface. The remediation of contaminated concrete in the basement hallway is discussed in Section 3.4.5.

3.4 Removal of TSCA Wastes

Activities associated with the removal of PCB TSCA wastes began in the third week of RA Phase 1, following the preparatory activities discussed in Section 3-1.

3.4.1 Sewer Lines

The sewer piping classified as TSCA waste is identified on Figure 1-6. These lines were removed as follows:

- First, using a hand-held band saw or pipe cutter, cuts were made in each line at 10 to 15 foot intervals while the pipe remained suspended from the ceiling.

- The ends of each section of pipe were then wrapped and sealed with two layers of 6-mil polyethylene and duct tape. This step was necessary to ensure that sediment and residues were retained inside the pipe.

- The pipe hangars were cut/detached, and each 10 to 15 foot section of pipe was manually lowered to the ground.

- The piping was transferred to the Chip Chute staging area and loaded into 23-CY roll-off containers for off-site disposal as TSCA waste.

During Phase 1, approximately 350 LF of TSCA sewer piping was removed from the basement. The remaining TSCA sewer piping (approximately 300 LF) was removed during RA Phase 2.

3.4.2 Chip Chute Area

During Phase 1, the majority of the Chip Chute waste pile and approximately two feet of soil beneath the waste pile were removed. The materials were loaded into 23-CY roll-off boxes for off-site disposal as TSCA waste. An excavator was positioned outside the building for removing and loading the materials from the Chip Chute area. The remaining materials in the Chip Chute (soil and residual waste) were spread across the floor to construct an even surface for staging soil and concrete rubble subsequently removed from the basement. For the remainder of Phase 1, the Chip Chute area functioned as a temporary staging area for TSCA wastes generated in the basement. The remaining PCB contamination in the Chip Chute was not removed until Phase 2.

3.4.3 Basement Soil Flooring

Basement soil flooring classified as TSCA waste was generally located along the south and west sides of the basement concrete flooring. Initially, five areas of soil contamination totaling approximately 1,110 ft^2 were identified for removal. The areas were delineated based on visual observation of oil-staining on the surface of the soil. In the RAWP, the areas were labeled as Areas "A" through "E". Prior to commencing soil excavation during Phase 1, additional oil-

stained areas were identified in the vicinity of Areas A through E. These additional areas were assumed to be TSCA waste and were designated for removal accordingly. Contaminated soil was excavated using mini-loaders and walk-behind excavators. Excavated soil was then transported to the Chip Chute staging area using gas-powered buggies. An excavator, positioned outside the building, was used to remove the soil from the Chip Chute area and load it into 23-CY roll-off containers for off-site disposal as TSCA waste (refer to Section 3.10). Approximately 160 tons of TSCA soil was removed during Phase 1. Soil confirmation samples were collected from the excavated areas as discussed in Section 3.5.

3.4.4 Concrete Flooring on First and Second Floors

The limits of concrete flooring classified as TSCA are shown on Figures 1-2 and 1-3. The majority of the areas were identified based on the results of the FI. However, additional areas on the first floor (Row K) were identified via the data gap sampling discussed in Section 3.3. During Phase 1, approximately 13,500 ft^2 of concrete totaling 843 tons was removed from the first and second floors of Building 3. The flooring thickness ranged from seven to 18 inches.

As discussed in Section 3.1.5, the flooring was saw-cut into individual slabs for removal. The flooring was prepared for removal by marking the cut lines, coring the holes required for securing the lifting hardware (refer to Section 3.1.6), and cutting the tops of the intermediate columns in the basement (refer to Section 3.1.7). At numerous locations in the basement, piping was suspended from the ceiling beneath areas of the first floor identified for removal. Piping that intersected these areas was detached from the basement ceiling by cutting the hangers. The piping was placed on the floor at the point where it was detached from the ceiling or transferred to another part of the basement where it would not interfere with the flooring removal. Piping wrapped with asbestos insulation was previously abated as discussed in Section 3.1.3.

Concrete flooring on the first floor was removed as follows:

- The concrete flooring was cut along the cut lines using a hydraulically-operated, walk-behind concrete saw with a pro-grade diamond blade.

- Once the saw-cuts were completed, each concrete slab was rigged to a mobile crane and extracted from the floor. The slabs were rigged by one of two methods. At both core hole locations, steel hoist rings were secured to the slab using bolts, nuts, and washers. The slab was then secured to the crane using a chain sling reaved through the hoist rings. Alternatively, two eye bolts were secured to the slab by drilling two holes (with a

hammer drill) and tapping the eye bolts. The slab was the secured to the crane using a chain sling reaved through the eye bolts.

- The slabs were placed directly on the forks of a telescopic forklift for transfer to the staging area near the northeast loading dock. The slabs were stacked within the staging area in preparation for off-site disposal as TSCA waste (refer to Section 3.10).

- Residual concrete that could not be saw cut from around the base of the vertical support beams and from the tops of the horizontal I-beams was removed using a Brokk 150 robotic breaker. The pulverized concrete from this operation was collected manually and placed in bins. Using a telescopic forklift, the contents of the bins were dumped into 23-CY roll-off containers staged outside the building. The concrete was disposed as TSCA waste as discussed in Section 3.10.

On the second floor, the flooring was initially saw-cut along the cut lines and extracted from the floor using a manual gantry crane, or by hoisting with a mobile crane (as described above) positioned on the first floor. All of the TSCA waste flooring located south of Row G was removed in this manner. However, in the areas north of the Row G, it was difficult to extract the slabs from the floor due to the presence of angle iron bracing beneath the flooring, which was securely attached to the horizontal I-beams. As a result, the extrication/hoisting method was discontinued and flooring was hammered out using a Brokk 150 robotic breaker. The concrete rubble was collected from the first floor using mini-loaders and transferred to 23-CY roll-off containers staged outside the building. The concrete was disposed as TSCA waste as discussed in Section 3.10.

As discussed in the FI Report (Arrowhead 2001b), the first and second floors of Building 3 were covered with a concrete cap ranging in thickness from two to five inches. The cap was poured following scarification of the original flooring by Rust Remedial Services, Inc. (refer to Section 1.2.1). During the removal of concrete flooring (as discussed above), the concrete cap material frequently became separated from the underlying, original flooring. No efforts were made to purposely separate the cap and original flooring. When portions of the cap separated and fell to the floor, the loose concrete (rubble) was collected and transferred to 23-CY roll-off containers. Since the cap made direct contact with PCB-contaminated flooring, the concrete rubble from the cap was also disposed as TSCA waste.

3.4.5 Basement Concrete Flooring

The demolition and removal of PCB-contaminated concrete flooring between Rows 9 and 20 was deferred to RA Phase 2, concurrent with the removal of the underlying soil and gravel contamination. Because it would not be possible to segregate contaminated and non-contaminated concrete flooring once the floor was demolished, the entire floor between Rows 9 and 20 would need to be disposed as TSCA waste. However, PCB contamination was not detected beneath the concrete floor in the hallway between Rows 20 and 22. Due to the absence of PCBs beneath this flooring, AMCOM allowed the basement hallway to permanently remain in the subsurface, provided that the PCB contamination in the upper portions of the flooring was removed to the subsurface cleanup level. During Phase 1, the concrete flooring in the basement hallway was scabbled to a depth of two inches in the areas identified on Figure 3-3, corresponding to areas where oil-staining was observed and/or areas associated with concrete floor samples (FI or Phase I data gap sampling) containing PCBs greater than 7.6 ppm. These areas covered approximately 4,800 ft^2. The concrete was scabbled using a Brokk 150 robotic breaker. Concrete rubble was shoveled into a mini-loader and transferred to the Chip Chute staging area. An excavator positioned outside the building was used to remove the concrete rubble from the building and to load it into 23-CY roll-off containers for off-site disposal as TSCA waste (refer to Section 3.10). Concrete fines and debris that could not be shoveled were vacuumed using a Super Sucker system. The Super Sucker was stationed outside the building. The concrete fines were collected within a polyethylene bladder bag, placed inside a 23-CY roll-off box for disposal as a TSCA waste. Approximately 40 tons of concrete were removed from the hallway. Concrete floor confirmation samples were collected from the scabbled areas as discussed in Section 3.6.

3.4.6 Oil-Stained Pillars and Footers

The pillars and footers that were decontaminated during Phase 1 included those I-beams at B13, B18, C18, F12, H14 and H15. These pillars and footers were heavily oil-stained and were generally co-located with oil-stained concrete flooring classified as TSCA waste. Decontamination was performed using TECHXTRACT®, a three-stage chemical washing process developed by Active Environmental Technologies, Inc. The three stages included surface preparation, contaminant extraction, and rinsing. The following describes the general method that was used to decontaminate the oil-stained pillars and footers:

- In preparation for chemical washing, polyethylene sheeting and absorbents were placed around the base of the pillar and around the footer.

- Using a pump sprayer, the chemical solutions (TECHXTRACT® 200 and 300) for surface preparation were applied as a mist to the surface of the concrete. The chemical solutions were then scrubbed into the surface using abrasive pads, stiff bristle brushes, and sponges.

- Following approximately 30 minutes of dwell time, the rinsing solution (10% TECHXTRACT® 300) was applied. The fluids were collected on the plastic sheeting and absorbents placed around the base of the pillar.

- Using a pump sprayer, the extraction solution (TECHXTRACT® 100) was applied as a mist to the surface of the concrete, and the solution was scrubbed into the surface using abrasive pads, stiff bristle brushes, and sponges.

- Following at least two hours of dwell time, the rinsing solution was applied. The fluids were collected on the plastic sheeting and absorbents.

- The sequence of applying, rinsing, and removing each of the formulations was repeated as necessary until the oil-staining had diminished.

The plastic sheeting and absorbents containing the waste byproducts from the decontamination process were incorporated with other TSCA wastes in the Chip Chute and disposed off-site accordingly.

3.5 Soil Confirmation Sampling

Following excavation and removal of TSCA waste soil in the basement (refer to Section 3.4.3), soil confirmation samples were colleted from the excavated areas to verify that the soil was remediated to the modified action level of 43.5 ppm. Confirmation samples were collected from the base (floor) and sidewalls of the excavations. Samples from the base of the excavations were distributed evenly at approximately 20-ft. intervals. Samples from the sidewalls were also collected at 20-ft. intervals, with appropriate adjustments made for the concrete footers for the building support beams. The soil confirmation sample locations are depicted on Figure 3-3. Discrete (grab) samples were collected from 0 to 6 inches bgs using a stainless steel trowel. The soil was mixed/blended within a Ziploc bag prior to a portion of the blended soil being removed and placed into a 4-ounce sample jar. The soil confirmation sample results are presented in Figure 3-3. During Phase 1 of the RA, 42 samples (identified SS54 through SS96) were collected from the excavations for TSCA waste. (Note: Samples SS01 through SS53 were

collected during the FI. The sample nomenclature system was continued during the RA for consistency.) Two of the samples contained PCBs at concentrations exceeding the modified action level. The areas represented by these samples were not re-excavated during Phase 1. Rather, further removal of soil from the basement was deferred to Phase 2. Based on the results, it was evident that additional excavation would be required to achieve the subsurface cleanup standard of 7.6 ppm.

3.6 Concrete Floor Confirmation Sampling

Following removal of the upper 2 in. of concrete flooring in a 4,800 ft^2 section of the basement hallway (refer to Section 3.4.5), concrete floor confirmation samples were collected. The sample locations are depicted on Figure 3-3. The samples were collected to a depth of 1 in. beneath the scabbled surface using a hammer drill in accordance with the SAP, consistent with the method using during the FI. The table from Figure 3-3 presents the results of the concrete floor confirmation samples (identified as CFB53-01 through CFB91-01). Based on the results, it was determined that the flooring in this area was successfully remediated with respect to the removal of TSCA waste. The results further confirmed that residual PCBs in the concrete were below the subsurface cleanup standard of 7.6 ppm, except for the area associated with sample CFB53-01 (PCBs at 8.23 ppm). No further action was taken for the slight exceedance in sample CFB53-01, because the flooring represented by this sample was designated for removal during RA Phase 2.

3.7 Miscellaneous Waste Management

Miscellaneous wastes generated during RA Phase 1 included cooling water and concrete slurry and sediment from concrete coring and saw cutting activities. During coring and saw cutting operations, the cooling water/concrete sediment mixture was collected with Shop-Vacs and transferred to steel 55-gallon drums. In total, 60 drums were filled and moved to the southeast garage for temporary storage. The concrete sediment settled to the bottom of the drum, such that the water and solid portions of the mixture could be readily separated. Accordingly, the cooling water from each drum was decanted and transferred to new drums while the concrete sediment from the 60 original drums was consolidated to 24 drums. Due to the high residual water content of the concrete sediment, the material was classified as a slurry. Both waste streams, water and slurry, were sampled to determine the proper method for disposal. Table 3-5 presents a summary of the waste characterization sample parameters, sample results, and final disposition of the wastes. Due to the presence of PCBs in the concrete sediment, the 24 drums of slurry were shipped off-site for disposal as PCB-contaminated waste (refer to Section 3.10). Additionally, due the presence of residual slurry (presumably containing PCBs) on the interior of each drum, the 36 empty drums were also shipped off-site for disposal. In contrast, the cooling water did not

contain PCBs and was determined to be eligible for discharge to the sanitary sewer system. Under a written permit from the St. Louis Metropolitan Sewer District (refer to Appendix G), the 60 drums (approximately 3,000 gallons) of the cooling water was discharged to the a sanitary sewer manhole near the southeast corner of Building 3. The empty drums remained onsite for possible reuse.

3.8 Sampling Beneath Basement Concrete Flooring

In January 2002, during excavation of soil in the Chip Chute area, a two to three inch layer of heavily oil-stained gravel underlying the basement concrete floor was discovered after approximately 10 feet of the flooring profile was exposed along the southern edge of the Chip Chute (refer to Figure 1-7). The oily material within the ground layer was observed to be pooling in places and discharging out from the gravel layer into the Chip Chute. In addition, the oily material had a very strong odor that resembled other areas where PCB contamination had been found. A sample of the gravel was collected and submitted for PCB analysis. The reported result was 7,700 ppm PCBs. Two samples of the soil underlying the gravel were also collected and submitted for analysis. The reported results were 45 ppm and 2.5 ppm for the samples six inches and 12 inches below the gravel base, respectively, indicating that vertical migration of the PCBs was generally restricted to the upper foot of clay soil beneath the gravel at the location of the sample.

To evaluate the extent of the PCB contamination in the gravel layer beneath the 40,000 ft^2 area of basement concrete flooring, nine holes were cored through the concrete floor in various locations (refer to Figure 1-7). In addition, test pits were excavated in the soil along the southern edge of the basement concrete floor. The results of this investigation confirmed the presence of heavy oil staining and PCB contamination classified as TSCA waste in the gravel layer below the concrete flooring between rows 9 and 20 (approximately 30,000 ft^2). No evidence of the gravel layer, nor PCB contamination, was found beneath the basement concrete flooring located between Rows 20 and 22. The removal of the PCB contamination beneath the basement concrete flooring occurred during RA Phase 2.

3.9 Site-Specific EBS Sampling

Sampling and analysis associated with the Building 3 Site-Specific EBS were conducted in March 2002, prior to demobilizing from the RA Phase 1. Samples were collected from random locations for risk assessment purposes and from specific areas where oil staining was observed in accordance with the work plan developed by URS. There were 23 sample locations the in the basement of the building as shown on Figure 3-4. Samples were collected from 0 to 6 inches and

24 to 36 inches bgs. Sample located within the limits of the concrete flooring were collected from 32 to 38 inches and 56 to 68 inches below the concrete floor surface, beneath the base the of PCB contamination that would eventually be excavated in Phase 2. The deeper sample intervals ensured that the samples would be representative of soils remaining in the subsurface after the RA was completed. There were also two sample locations placed outside the building within the limits of PCB contamination in the vicinity of the former Chip Chute loading dock area. Samples from these locations were collected from five to six foot. bgs and 9 to 10 foot bgs, beneath the anticipated base of the excavation that would be completed in Phase 2. All samples inside the building were collected using stainless-steel hand augers. The samples outside the building were collected using a Geoprobe hydraulic push-probe. Soil from a given depth interval was mixed/blended within a stainless-steel mixing bowl, using a stainless-steel mixing spoon, prior to placing a portion of the blended soil into the appropriate sample containers. Samples were collected for several different analytes, including PCBs. Correspondence regarding the results of the Building 3 portion of the Site-Specific EBS samples is presented in Appendix A. The results of the sampling effort indicated that two additional areas of PCB contamination would need to be remediated due to the presence of PCBs above the subsurface cleanup level of 7.6 ppm. These areas included oil-stained soil near Sectors K9 and C8 (refer to Figure 1-4).

3.10 Transportation and Disposal

This subsection discusses the transportation and disposal (T&D) methods and presents the final waste quantities for each type of waste. A chronological listing of all off-site shipments of TSCA and other wastes that occurred during RA Phase 1 is presented in Table 3-6. A complete roll-up of waste quantities for the project (RA Phases 1 and 2) is provided in Table 3-7.

3.10.1 TSCA Wastes

All TSCA waste materials were shipped to EQ – Environmental Quality Company's RCRA/TSCA disposal facility, Wayne Disposal, Inc., located in Wayne, Michigan. Concrete slabs were loaded onto flatbed trailers for shipment. To comply with Department of Transportation (DOT) gross weight limits, each trailer was loaded with approximately 24 tons of concrete, which typically equated to 15 slabs per shipment. Concrete rubble, soil, and sewer piping were loaded into 23-CY roll-off containers. Each roll-off shipment contained a pay load of approximately 17 tons. Overall, there were 56 loads totaling 1,103 tons of TSCA waste that were shipped and disposed off-site during Phase 1. The following is the breakdown of TSCA wastes that were removed by area and media:

- Concrete flooring on the first and second floors – 843 tons
- Soil flooring in the basement (excluding Chip Chute area) – 161 tons
- Concrete flooring in the basement – 40 tons
- Cast iron sewer piping – 16 tons
- Soil and waste from Chip Chute area – 43 tons

As discussed in Section 3.1.2, asbestos debris from the floor cleaning operation became mixed with PCB-contaminated soil. The ACM/PCB mixed waste was collected in 55-gallon drums for disposal as a TSCA waste at EQ's Wayne Disposal facility in Wayne, Michigan. Fourteen drums (5.2 tons) were generated and shipped off-site during Phase 1.

3.10.2 Other PCB Wastes

During RA Phase 1, 24 drums (5.4 tons) of PCB-contaminated concrete slurry (refer to Section 3.7) were shipped to the Wayne Disposal facility. In addition, 36 empty drums that formerly contained PCB-contaminated concrete slurry were shipped the Wayne Disposal facility. All of the drums were shipped by semi-trailer.

3.10.3 ACM Waste

Asbestos insulation, piping, and debris from the basement were double-bagged or wrapped and loaded into 40-CY, closed roll-off containers for shipment and disposal at the Allied Waste Roxana Landfill in Roxana, Illinois. Loose asbestos debris generated during the floor cleaning operation, which was collected in a bladder bag placed inside a 20-CY roll-off container, was also shipped to the Roxana Landfill for disposal. All roll-off containers were double-lined with poly sheeting. During Phase 1, there were six shipments and 29 tons of ACM waste that were removed and disposed.

3.10.4 Non-Hazardous Waste

Non-hazardous debris from interior demolition operations and non-ACM piping from the basement were loaded into 20-CY roll-off containers for shipment to the Allied Waste Bridgeton Landfill in Bridgeton, Missouri. During Phase 1, five loads of non-hazardous waste totaling 43 tons were shipped off-site for disposal.

4.0 Removal Action Phase 2

This section presents a detailed discussion of the field activities conducted during Phase 2 of the RA. According to Addendum No. 1 to the RAWP, the goal of Phase 2 was to complete the removal and cleanup of the remaining PCB contamination at Building 3, including PCBs less than 50 ppm (PCB special waste), as well as TSCA waste materials not previously addressed during Phase 1. Addendum No. 1 to the RAWP provided the required notification, per 40 CFR 761.61(a)(3), of AMCOM's intent to complete the "self-implementing remediation" of Building 3 and satisfy the requirements of the NON. Remediation of Building 3 during Phase 2 was performed in accordance with the risk-based approach under 40 CFR 761.61(c) of TSCA. Under this approach, the acceptable residual PCB level for materials left in the subsurface was determined to be 7.6 ppm (refer to Section 1.2.8).

The TSCA wastes addressed during Phase 2 included:

- Concrete flooring between Rows 9 and 20
- Gravel and soil beneath the basement concrete flooring between Rows 9 and 20
- Contamination from the area outside the building near the former Chip Chute loading dock
- Select portions of basement soil flooring that were excavated during Phase 1, but where residual PCB contamination exceeding 43.5 ppm remained
- Contaminated soil remaining in the Chip Chute area
- Cast-iron sewer piping in the basement containing PCBs > 43.5 ppm

The PCB special wastes addressed during Phase 2 included.

- Contaminated building materials located above the basement floor level, such as concrete flooring and pillars.
- Additional areas of soil containing PCB contamination greater than the subsurface cleanup level, as identified from the Field Investigation, Building 3 Site-Specific EBS for Building 3, and Phase I/II EBS.
- Cast-iron sewer piping in the basement containing PCBs < 43.5 ppm
- Materials inside the basement catch basin.

The general locations of the PCB contamination (TSCA wastes and PCB special wastes) associated with these areas are presented in Figures 1-2 through 1-5.

Phase 2 began on July 8, 2002 with the continuation of asbestos abatement activities that began during Phase 1. Field work during the asbestos abatement operation generally occurred in ten-day shifts, followed by a four-day break between shifts. Once demolition activities began in late August, the field work shifts became 5-days per week (Monday through Friday), consistent with the primary demolition subcontractor's work schedule. On November 4, 2002, PCB remediation activities commenced, and the 10-day work schedule was resumed. On January 17, 2003, field work activities were discontinued due to insufficient funding. Remediation work had concluded the prior week, however, site restoration work was in progress. At the time work was discontinued, backfill had been placed across the entire Building 3 site (including the excavation outside the building) to an elevation approximately equivalent to the elevation at the north side of the building. Backfill had not been placed/graded to match the topography of the surrounding area. Authorization of the additional funding required to complete the project was issued in April 2003. In May and June of 2003, site restoration activities were completed. Table 4-1 provides as week-by-week summary of field activities that were conducted during Phase 2.

4.1 Hazardous Materials Characterization

Prior to commencing the demolition of Building 3, it was necessary to identify and characterize all of the hazardous materials inside the building (excluding known PCB contamination) that would need to be removed and disposed. This subsection presents a discussion of hazardous materials characterization efforts conducted in preparation for demolition.

4.1.1 Asbestos-Containing Materials

An inspection of the building activities was performed to identify ACM that would need to be removed prior to demolition. The inspection included the collection of composite bulk samples of materials suspected of containing asbestos. The samples were analyzed for percent asbestos by a certified analytical laboratory. Based on the results of the samples collected during the inspection (refer to Appendix C), the following ACMs were identified:

- Piping insulation in the basement – approximately 24,000 LF
- Piping insulation located within bathroom crawl spaces on the first and second floors – 500 LF
- Floor tile in various offices on the first floor and second floors – approximately 10,000 ft^2
- Exterior transite siding on the east end of the building, catwalks, and roof – approximately 15,000 ft^2

- Transite paneling at various locations inside the building on the first floor, including over 200 panels in the ceiling between Rows 9 and 28 - approximately 8,000 ft^2
- Putty on windows throughout the building

In accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61 (Asbestos), regulated asbestos containing materials (RACM) included the piping insulation, floor tile, and transite. The piping insulation was classified as Friable RACM, whereas the transite and floor tile were classified as Category II Non-Friable. The window putty was also determined to be Category I Non-Friable ACM, but it was not removed from the building prior to demolition. Rather, the windows containing ACM putty were extracted during demolition as discussed in Section 4.2.6. The following materials were found to be non-ACM based on the results of bulk sampling and analysis: floor tile mastic, select floor tiles, sheet rock and joint compound, dropped ceiling panels, and roofing materials. The data associated with the ACM inspection and bulk sampling was submitted to the EPA, as required for obtaining the permit for demolition. Asbestos abatement activities are discussed in Section 4.2.1.

4.1.2 Lead-Based Painted Surfaces

Painted surfaces inside Building 3 were sampled prior to demolition in accordance with the Missouri Department of Natural Resources (MDNR) standard for the disposal of painted concrete and brick from demolition sites (issued May 2002). According to the standard, painted surfaces must be sampled to verify the concentrations of eight heavy metals, including lead. One composite sample must be collected for every 5,000 ft^2 of painted surface of a given color. The concentrations of heavy metals must be compared to published (allowable) limits. If the concentrations of heavy metals in the painted surfaces are below the published limits, the corresponding materials are considered "clean" and may be used as construction fill material at other sites. Conversely, if the concentrations of heavy metals in the painted surfaces exceed the published limits, the corresponding materials must be segregated during demolition and disposed as demolition debris in a municipal landfill.

In accordance with this standard, 41 composite samples were collected from painted surfaces inside Building 3, and samples were submitted for analysis using SW-846 Methods 6010 and 7470. Based on the results, the concentrations of all regulated metals were below Missouri MDNR allowable limits with the exception of lead. Lead exceeded the upper limit of 5,000 mg/kg in 8 of the 41 samples. The results for all of the paint samples are presented in Appendix D. In general, the samples containing lead above the allowable limit were associated with brick walls on the west end of the building (first and second floors), including interior walls in the

office areas. To facilitate segregation of the brick and prevent it from mixing with clean materials during building demolition, the affected walls were selectively demolished, removed, and disposed prior to demolition of other portions of the building (refer to Section 4.2.4).

4.1.3 Fluorescent Light Bulbs and Ballasts

The building was surveyed to identify the locations and types of fluorescent light bulbs (FLBs) and fluorescent lighting ballasts. There were several hundred FLBs inside the building on the first and second floors. The FLBs required removal prior to demolition due the presence of mercury vapors and lead components inside the bulb. Numerous fluorescent lighting ballasts were removed from the fixtures, and the manufacturer's label was checked for references to PCBs. The labels on all of the ballasts that were checked during the survey stated "No PCBs."

4.1.4 Standing Water Inside Concrete Vaults

Standing water was found in the concrete "vaults" (totally-enclosed rooms, 20 ft. x 20 ft. x 10 ft.) located at Sectors K14 and K24 in the basement. These structures were located directly beneath electrical substations on the first floor. Approximately one to two feet. of standing water was present inside each vault. The water inside the vault at K14 appeared clear. In contrast, the water inside the vault at K24 was characterized as discolored with a petroleum odor and sheen. The standing water inside each vault was sampled to determine the contents and proper method for disposal (if necessary). One sample was colleted from each vault by submerging a bottle sampler below the water surface. The water was poured directly from the bottle sampler into the appropriate sample container. Samples were analyzed for PCBs, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, and oil and grease (O&G). The results are presented in Table 3-5 and Appendix E. Based on the results, VOCs and SVOCs in both samples were below detection limits. In the sample from K14, PCBs were non-detect, and O&G and metals were present at trace levels. However, in the sample from K24, the reported results for PCBs and O&G were 3.3 ppm and 7,250 ppm, respectively. Based on this information, no action was taken for the water in the vault at K14. Due to the presence of PCB and petroleum contamination, the water from the vault at K24 was pumped out (using a vacuum truck) and disposed off-site as PCB-contaminated wastewater (refer to Section 4.6).

4.1.5 Waste Oil from Basement Distribution Lines

The former oil distribution lines in the basement were checked and drained prior to commencing demolition. Nearly 150 gallons of waste oil was recovered from the lines. The oil was collected in steel, 55-gallon drums, and a sample of the oil was collected and analyzed for PCBs. The

reported PCB concentration was 46.3 ppm (refer to Table 3-5 and Appendix E). Accordingly, the drums of waste oil were shipped off-site for disposal as TSCA waste (refer to Section 4.6).

4.2 Building Demolition

The demolition of Building 3 involved the removal of all building materials to "basement floor level" (defined as the surface of the soil flooring, the top of the concrete footers for the building's vertical support beams, and footers for the outer foundation wall). The demolition of Building 3 began with ACM abatement. Asbestos abatement activities began during RA Phase 1 between February and March 2002 and were completed during Phase 2 between July and September 2002. Pre-demolition and preparatory activities began in late August 2002. Demolition of the building structure subsequently required approximately 12 weeks to complete between September and November of 2002.

4.2.1 Asbestos Abatement

Prior to the demolition effort, asbestos-containing piping insulation, transite, and floor tiles were removed (abated) from the building as discussed below. The removal of ACM window putty material is discussed in Section 4.2.6

Approximately 24,000 LF of piping and insulation classified as ACM was removed primarily by "gross removal" methods in accordance with the work practices specified in paragraph (c) of the asbestos NESHAP (40 CFR Part 61). Prior to removal of the ACM, the basement area was prepared for abatement activities as discussed in the RAWP, including:

- Constructing containment and critical barriers using 6-mil polyethylene sheeting.
- Providing point-of-use negative air machines equipped with HEPA filtration.
- Constructing a waste load-out room at the Chip Chute area.
- Constructing decontamination stations (each consisting of an equipment room, shower, and clean room) at the north and south stairwell entrances to the basement.

The gross removal operation involved stripping the ACM off the pipe by hand (using box cutters, knives, and other tools) and collecting the material on drop cloths (6-mil poly sheeting) placed beneath the piping being abated. The insulation was adequately wetted with amended water prior to being disturbed and removed. Following removal, residual ACM adhering to the surface of the exposed pipe was cleaned by wet scraping and scrubbing with wire brushers and scouring pads, followed by rinsing with a high-pressure sprayer. After cleaning, the pipe was sprayed with a thick coat of encapsulant solution, applied with an airless sprayer. All loose ACM was

double-bagged (6-mil per bag), sealed, labeled, and transferred to the load-out room near the Chip Chute area. Alternatively, where the piping was not conducive to gross removal (such as hardened asbestos around pipe elbows and joints), the corresponding sections of piping were removed using wrap-and-cut methods as described in Section 3.1.3. The double-wrapped piping was cut, removed, and transferred to the load-out room. Furthermore, loose asbestos debris was found on horizontal surfaces in the basement, including the soil floor, concrete footers, and the top of the foundation wall. Loose debris was either wetted, removed by hand and placed into ACM disposal bags or collected on plastic sheeting when the area was rinsed prior to applying encapsulant. In addition to the piping, encapsulant was applied to all horizontal surfaces and outer foundation walls in the basement. ACM disposal bags and double-wrapped piping were loaded into 40-CY closed roll-off containers, the roll-offs were double-lined with poly sheeting. The ACM waste was disposed off-site at a local municipal landfill (refer to Section 4.6).

An additional 500 LF of ACM piping was hidden in crawl spaces adjacent to each bathroom on the first and second floors. To gain access to the piping, the bathroom walls were demolished using a Brokk 150 robotic breaker. The piping and insulation was then removed using the wrap-and-cut/glove-bagging method discussed in Section 3.1.3.

Approximately 10,000 ft^2 of floor tile classified as ACM was removed from the office area on the first floor (southwest corner), an office near Sector H9 on the first floor, and two offices located within catwalks on the second floor. The areas were prepared by constructing critical barriers and erecting temporary walls using 6-mil poly sheeting. Negative air machines were provided at the point-of-removal. In large open areas, the tile was removed using a tile scraping machine. Otherwise, the tile was peeled from the floor manually using spud hoes. All tile debris was shoveled into wheel barrows and transferred to a 20-CY roll-off container double-lined with poly sheeting. Prior to shipping roll-off containers off-site (refer to Section 4.6), the floor tile debris was "burrito-wrapped" and sealed. Following bulk tile removal, loose debris remaining on the floor was cleaned up using a HEPA vacuum.

Approximately 15,000 ft^2 of transite was present on the exterior of Building 3. An additional 8,000 ft^2 was found on the inside of the building. In most cases, the removal of transite required the use of scissor lifts and articulating boom lifts. Transite siding on the exterior of the building was removed from the east addition (between Rows 40 and 43), roof monitors, and catwalks connecting Building 3 with Buildings 2, 5, and 6. Transite panels were sprayed with amended water during removal. After cutting the bolts that secured the panels to the building structure (using an acetylene cutting torch), the panels were removed intact and placed directly into a

30-CY roll-off container double-lined with poly sheeting. Inside the building, transite was encountered at various locations on the first floor, including the offices and former production area. There were over 200 transite panels (dimensions approximately 2.5 ft. x 5 ft.) attached to the first floor ceiling (between Rows 9 and 28). To the extent possible, the transite inside the building was removed intact. However, select panels in the office and all of the first floor ceiling panels were hammered and/or chipped out using hand-held, non-mechanical tools. Loose transite was shoveled into wheel barrows and transferred to 20-CY roll-off containers double-lined with poly sheeting. Prior to shipping roll-off containers off-site, the transite debris was "burrito-wrapped" and sealed.

With the exception of the removal of exterior transite, a Missouri-certified air sampler collected both personal and area air samples during all asbestos abatement activities. Area air samples were collected inside and outside the containment area during abatement activities in the basement. Air samples were analyzed on-site using PCM in accordance with NIOSH Method 7400. After gross removal work in the basement was completed, a Missouri-certified asbestos inspector performed a comprehensive inspection of the area to ensure that all loose ACM was collected and that the piping was properly cleaned and encapsulated. Following the inspection, 14 air clearance samples were collected. The reported results for all of the clearance samples were <0.001 fibers/cc (refer to Appendix F), well below the clearance criteria of 0.01 fibers/cc. Based on this data, the Missouri-certified air sampler/inspector declared that the abatement activities were complete in accordance with NESHAP and OSHA standards.

4.2.2 Sewer Line Sampling and Removal

During Phase 2, eight additional sewer lines samples were collected to supplement the data previously obtained during Phase 1 (refer to Section 3.2). Based on the complete data set, all of the sewer lines containing PCBs above non-detect levels were identified and marked with orange spray paint. These lines were removed in the manner described in Section 3.4.1. The sewer piping classified as TSCA waste (an additional 300 LF) was loaded into a 23-CY roll-off container for off-site disposal. Approximately 2,000 LF of sewer piping contained PCBs between non-detect and 43.5. The lines were removed, loaded into 20-CY roll-off containers, and disposed off-site as PCB special waste. Transportation and disposal of waste materials is further discussed in Section 4.6.

4.2.3 Pre-Demolition Activities

The following activities were completed in preparation for demolition of the building structure:

- A demolition notification was submitted to EPA, including the results of asbestos inspection and bulk sampling (refer to Section 4.1.1).

- Utilities serving Building 3 were disconnected, locked-out, or capped. Ameren U/E disconnected live power lines feeding the SLAAP substation. Small excavations were performed around the perimeter of Building 3 to expose buried water lines. These lines were subsequently capped.

- Sewer lines in the basement were severed at the point where they penetrated the building foundation or basement floor and plugged with concrete. Sewer lines exiting the building beneath/through the foundation were plugged to approximately five feet outside the foundation wall by pouring concrete into the cleanouts for each line, located on the outside of the building.

- Refrigerant present within the roof-mounted air conditioning systems was recovered and recycled by Welsch Heating and Cooling Company, St. Louis, Missouri.

- All FLBs inside the building were removed, packaged on pallets, and shipped off-site to a certified recycler (Luminaire Recycling Company, St. Paul, Minnesota), as required under RCRA.

- Various items, including transformers, electrical switchgear and panels, and bathroom fixtures, were removed and salvaged. The transformers did not contain PCB cooling fluids.

- Heavy construction equipment was mobilized to the site, including excavators (CAT 345 and 330, equipped with shears, concrete processor, breaker), skid-steer loaders, and a highlift loader.

- The pieces of equipment to be used for interior demolition activities (min-excavator equipped with a breaker and small loaders) were transferred to the second floor through an opening at the southeast corner of the building.

4.2.4 Lead-Based Paint Removal

As discussed in Section 4.1.2, various brick and concrete block walls on the interior of the building were identified as being coated with lead-based paint. These materials were selectively demolished and removed prior to commencing other demolition activities. Selective demolition was generally accomplished from the inside of the building using a mini-excavator (equipped with a hydraulic breaker) and small skid-steer loaders. The concrete and brick generated during this operation was transferred to a staging area on the west side of the building. The debris was then loaded into end-dump trucks for off-site disposal at a local municipal landfill (refer to Section 4.6) in accordance with MDNR requirements.

4.2.5 Interior Demolition

Concurrent with the removal of lead-based painted materials, interior demolition activities were performed. During this operation (referred to as "gutting" the building), all combustible materials inside the building were removed, including sheetrock walls, wood paneling, fiberglass insulation, dropped ceilings, and carpet. These materials were removed using manual demolition methods and small pieces of equipment (i.e. mini-excavator and loader). The debris from this operation was transferred to a stockpile located on the south side of the building, where the materials were loaded into end-dump trucks for off-site disposal (as non-hazardous construction debris) at a local municipal landfill (refer to Section 4.6).

4.2.6 Demolition of Building Structure

Demolition of the building structure began following the removal of lead-based painted materials and combustibles inside the building. Demolition of the building proceeded from west to east in order to expose the basement concrete flooring (between Rows 9 and 20) at the earliest possible time for remediation activities to commence. Demolition was accomplished with use of multiple pieces of heavy construction equipment, including excavators and skid-steer loaders. Physical wrecking of the building was advanced with two CAT 345 excavators operating simultaneously. One excavator was equipped with a breaker attachment, used to hammer and wreck the walls, flooring, and roof. The second unit, equipped with shears, was used to cut and remove the building's steel framework. A third excavator was equipped with a concrete processor. This unit operated independently of the other two units and was used to pulverize the concrete rubble and remove/segregate rebar from the concrete. During the wrecking process, demolition debris were segregated according to material type and method of disposal as follows:

- Non-hazardous (non-contaminated) brick and concrete eligible for reuse – delivered to a local construction site for use as clean fill

- Concrete rubble (flooring and pillars) classified as PCB special waste – transported to a local municipal landfill
- Other non-hazardous demolition debris – transported to a local municipal landfill
- Scrap iron and steel – shipped to a local recycler

All demolition debris was temporarily stockpiled on the first floor or in the basement area prior to being loaded into end-dumps or tandems for off-site disposal (refer to Section 4.6). Excavators and loaders were used to manage the stockpiles, load out the haul trucks, and clean an area once the stockpile was removed.

The demolition operation was sequenced such that several bays of the second floor (including the roof) were wrecked prior to the underlying bays of the first floor. In this way, debris from the second floor was managed (stockpiled, processed, and loaded) from the first floor level. Upon further advancement of second floor demolition activities, the first floor was wrecked up to a point that stopped prior to reaching the point of progress on the second floor. Thus, the second floor demolition was always ahead of the first floor. Debris from the first floor that collected in the basement was stockpiled and loaded as discussed above. After load-out in a particular area of the basement, the basement floor was cleaned, and the outer foundation wall was demolished and removed. Concrete footers and flooring in the basement were not removed during demolition.

The process described above was repeated iteratively until the entire building structure (above the basement floor level) had been wrecked, removed, and disposed. This required approximately 12 weeks. Ancillary activities that occurred during demolition included the removal of three catwalks connecting Building 3 with adjacent buildings and the construction of poured concrete walls at the entrance to Building 3 from three underground tunnels.

Rather than demolish the windows containing ACM putty, the windows were extracted (using an excavator equipped with a grappler) during demolition. A plastic drop cloth was placed below the point of extraction to capture any falling debris, and the windows were wetted during the extraction process. Following extraction, the windows were loaded into a 30-CY roll-off container for shipment off-site. The windows were then transported off-site to a local municipal landfill for disposal as ACM.

A portion of the foundation wall approximately 100 feet in length along the north side of the building (between Rows 15 and 20), as well as the walls on the east and west sides of the Chip Chute area, were not initially demolished. These walls were located adjacent to the PCB-

contaminated materials outside the Chip Chute area (refer to Figures 1-4 and 1-5). They remained in place until the PCB-contaminated materials were removed as discussed in Section 4.3.4.

4.3 Removal of TSCA and PCB Special Wastes

Activities associated with the removal of the remaining TSCA wastes and PCB special wastes began once the building demolition operation had progressed past Row 22, the east boundary of the basement concrete flooring. Except for the materials outside the building and concrete flooring (first and second floors) yet to be removed as part of the building demolition, the remaining PCB contamination within the building limits at this time was located below grade (ranging from 5 to10 ft. below the surrounding ground surface), at or beneath the basement floor level. The removal of these materials is described in the following subsections.

The primary heavy equipment used during remediation efforts included two excavators, a skid-steer loader, and dozer. One excavator was equipped with a breaker and was used to hammer and remove the basement concrete flooring, concrete footers, and concrete walls. The second excavator was used for excavating contaminated soil, managing stockpiles, and loading out end-dump trucks for off-site T&D. The skid-steer loader and dozer assisted in moving materials from the point of generation to the stockpile areas. Equipment decontamination procedures were implemented to prevent cross-contamination when heavy equipment was moved from contaminated areas into clean areas. This generally involved spraying the tracks and buckets using a high-pressure steam sprayer and, as necessary, manually removing loose material with scrub brushes. Decontamination activities were performed within contaminated areas to avoid the need to collect and treat the rinse water.

To facilitate the loadout of PCB-contaminated materials, a gravel haul road was constructed along the north end of the building excavation within Row A, approximately between Rows 1 and 15. The gravel was placed over approximately two feet of compacted, clean backfill soil (refer to Section 4.7). The haul road allowed end-dump trucks to enter the limits of the building excavation for load-out. As discussed below, TSCA waste materials were temporarily stockpiled on the northwest portion of the basement concrete floor prior to being loaded out for off-site disposal. Later in the removal effort, after PCB contaminated soil was removed in the area south of the basement concrete flooring, a second gravel haul road was constructed. This haul road was used primarily for the delivery of clean backfill to remediated areas (refer to Section 4.7).

4.3.1 Underground Sewer Lines

The sewer lines removed during Phase 1 and as part of pre-demolition activities during Phase 2 (refer to Sections 3.4.1 and 4.2.2) were lines located above the basement floor level. Select sewer lines penetrated the basement floor and ran underground prior to crossing the outer limits of the building (beneath the building foundation wall). Five of these lines were connected to systems where PCBs were detected above the subsurface cleanup level of 7.6 ppm (refer to Figures 1-6 and 4-1). The lines were removed using an excavator. If oil staining was observed in the soil beneath the line, the stained soil was also excavated and removed. Excavation of stained soil continued until clean soil was encountered, based on visual observation. Where stained soils were present, the excavations generally extended less than 2 ft. beneath the pipe, with a total width of approximately two feet. The piping, sediment inside the line, and stained soil were temporarily stockpiled on-site and combined with other PCB wastes prior to being shipped off-site for disposal (refer to Section 4.6). These materials were disposed as either TSCA waste or PCB special waste, depending on the contents (waste classification) of the lines that connected to the underground line. Soil confirmation samples were collected from the base of the pipe trench as discussed in Section 4.4.

4.3.2 Basement Soil Flooring

During the initial phase of the RA, soil classified as TSCA waste was excavated from areas south and west of the concrete flooring in the basement. The results from two confirmation samples collected during Phase 1 indicated the presence of residual PCBs greater than the 43.5 ppm action level. The corresponding areas were located adjacent to the concrete flooring near Sectors H16 and H9. These areas were excavated to an additional one foot (approximate) and transferred to the stockpile area on the northwest side of the basement concrete floor. This completed the removal TSCA waste soil located outside the limits of the basement concrete floor. Following the removal of TSCA wastes, excavation efforts outside the limits of the basement concrete flooring focused on the removal of PCB special wastes, including the following areas and depths:

- Along the south and west sides of the basement concrete flooring – approximately 8,800 ft^2, excavated to a depth of 1 ft. bgs in most areas; however, select areas (approximately 400 ft^2)were excavated to 5 ft. bgs.
- Sector E28 – approximately 400 ft^2 excavated to a depth of 1 ft. bgs
- Between Sectors C22 and D22 - approximately 1,000 ft^2 excavated to a depth of 1 ft. bgs
- Sector E38 – approximately 400 ft^2 excavated to a depth of 1 ft. bgs

These areas (refer to Figure 1-4) were identified for remediation based on the results of prior investigations (FI, Site-Specific EBS, and Phase I/II EBS) and the results of soil confirmation sample results collected during Phase 1. Excavated soils generated west of Row 22, in the vicinity of the basement concrete flooring, were stockpiled on the northwest side of the concrete flooring prior to being loaded out for disposal. Soils excavated from the areas east of Row 22 were temporarily stockpiled on the north side of the building excavation near Row A. These materials were eventually combined with other PCB special wastes (including underground sewer piping, stained soil beneath the sewer piping, and concrete rubble from the demolition of the footer at G25) prior to being loaded out for disposal. Transportation and disposal of waste materials are discussed in Section 4.6.

4.3.3 Basement Concrete Flooring and Underlying Contamination

The following summarizes the general approach for removing the basement concrete flooring and underlying materials between Rows 9 and 20. These materials were classified as TSCA wastes. The area between Rows 9 and 20 encompassed 30,000 ft^2.

- To initiate the process, berms consisting of clean (uncontaminated) soil were constructed along the south and west perimeter of the basement concrete floor. The purpose of the berms was to prevent stormwater runoff from exposed, contaminated areas to the clean areas surrounding the floor in the event that rainfall occurred during removal. (The north and east sides were protected via the building excavation wall and concrete wall along Row 20, respectively.)

- Beginning at the southeast end of the concrete floor, the flooring and footers were broken into manageable pieces using the excavator/breaker unit. Concurrent with the breaking operation, the concrete rubble was removed by the other excavator and transferred to the stockpile area on the northwest side of the pad using skid-steer loaders. As mentioned previously, due to the inability to distinguish clean concrete rubble from PCB-contaminated rubble, and since the underside of the concrete flooring was contaminated with PCBs due to contact with the underlying contamination, all of the concrete flooring was considered TSCA waste for purposes of disposal.

- Steel reinforcement in the concrete flooring was segregated from the concrete rubble and, as necessary, cut into manageable size pieces using hydraulic shears attached to a mini-excavator. The rebar was also transferred to the north side of the pad for temporary stockpiling, prior to being placed into a 40-CY roll-off container.

- Once approximately 5,000 – 7,500 ft^2 of concrete flooring was removed to the extent that the underlying materials were exposed, PCB-contaminated gravel and soil beneath the flooring were excavated. Soil was excavated to the depth required for non-contaminated soil to be encountered. The gravel layer and upper portion of the soil were noticeably contaminated, appearing dark black and highly oil-stained. The staining gradually diminished with depth. Thus, it was possible by visual means to determine the required depth of excavation. Except as noted below, the approximate depth of excavation in the area between Rows 9 and 20 was one to two feet beneath the floor.

- Contaminated materials were loaded from the stockpiles directly into end-dump trucks for off-site T&D (refer to Section 4.6). As necessary, trucks entered the building excavation using the gravel road previously constructed along the north edge of the concrete floor.

- Upon completing removal activities in a particular area (5,000 – 7,000 ft^2), the area was isolated by constructing new berms along the interface of the remediated area and the adjoining, contaminated area (yet to be remediated). Soil confirmation samples were then collected in the remediated area as discussed in Section 4.4.

- The process of isolating a particular area with berms, breaking and removing the concrete flooring, excavating the underlying contamination, and soil confirmation sampling was repeated until the entire area between Rows 9 and 20 was remediated. Since the berms were in direct contact with PCB-contaminated materials, soil used to construct the berms was removed and disposed as TSCA waste as work progressed.

- Removal activities were performed from southeast to northwest, towards the temporary stockpile area. The contamination beneath the temporary stockpile area and north of the basement concrete floor (beneath the haul road) was removed last.

The following field conditions represented deviations from the process described above and contributed to the actual quantity of TSCA waste exceeding the initial estimate (refer to Section 4.6 for a discussion of waste quantities). These conditions were documented in a field work variance (FWV) as discussed in Section 7.3.

- Significant oil-staining was observed along the west face of the 200-ft. long concrete wall at Row 20. Accordingly, the wall was demolished, removed, and disposed as TSCA waste.

- Contaminated soil and gravel adjacent to the concrete wall at Row 20 extended to approximately five feet below floor level, to the depth of the wall's footing. Contamination was also encountered in the gravel beneath the footing.

- PCB contamination was particularly concentrated in the soil within a 40-ft. radius of the Chip Chute. The contamination extended approximately five feet below the concrete floor surface. This area included 800 ft^2 of concrete flooring and underlying soil on the east and west sides of the Chip Chute. The concrete flooring was demolished and disposed as TSCA waste.

- PCB soil contamination extended beyond the limits of the basement concrete flooring in a 3,000 ft^2 area within Row A (formerly beneath the haul road). The depth of contamination was approximately two feet bgs.

In summary, the overall limits of excavation in this area comprised approximately 33,000 ft^2 between Rows 9 and 20, and included the additional materials associated with the concrete wall along Row 20, contamination more extensive than anticipated in the vicinity of the Chip Chute area, and contaminated soil encountered north of the basement concrete floor in Row A. The depth of contamination averaged one to two feet. beneath the majority of the flooring, but extended significantly deeper near the Chip Chute area and along the wall at Row 20. A summary of the quantity of TSCA waste removed during RA Phase 2 is presented in Section 4.6.

4.3.4 Chip Chute Area and Area Outside the Building

Once TSCA wastes beneath the basement concrete flooring were removed, the focus of remediation turned to the Chip Chute area and area outside the building in the vicinity of the former Chip Chute loading dock. This effort began by removing the concrete walls that were left in place following demolition. As discussed in Section 4.2.6, approximately 100 feet of concrete foundation wall along this area, including the walls surrounding the Chip Chute area, were left in place due to their proximity to PCB contamination. These walls were demolished using the excavator/breaker, and the concrete debris was loaded directly into end-dump trucks for off-site T&D as PCB special waste. Next, the railroad tracks (steel rails) traversing the area were removed and placed into a 40-CY roll-off container for subsequent scrap recycling. After the

tracks were removed, the asphalt outside the building was demolished and removed to the approximate limits of contamination. The broken pieces of asphalt were stockpiled adjacent to the excavation area and subsequently loaded out into dump trucks for disposal as TSCA waste. Excavation activities began at the Chip Chute area and progressed northward. During the operation, waste materials were not stockpiled; rather, they were live-loaded into end-dump trucks for off-site T&D. Excavation continued vertically and horizontally until non-contaminated soil was encountered. Soil confirmation samples were then collected from the base and sidewalls of the excavation as discussed in Section 4.4.

The PCB contamination outside the building was characterized as layered and intermittent, with significant oil-staining in pockets of gravel fill or surrounding sewer piping. In addition, the PCB contamination extended significantly deeper and wider than originally estimated. The depth of contamination in select areas reached as deep as 10 feet. bgs, and the areal extent of contamination in this area exceeded the original estimate by nearly 1,000 ft^2. Overall, TSCA wastes were excavated from an area covering 4,000 ft^2, including the Chip Chute area. A summary of the quantity of TSCA waste removed during RA Phase 2 is presented in Section 4.6.

4.3.5 Miscellaneous PCB Special Wastes

The concrete footer at Column G25 was contaminated with PCBs above the subsurface cleanup level, based on the sample results from the FI. This column was demolished and disposed as PCB special waste concurrent with the excavation of PCB-contaminated flooring east of Row 22 (refer to Section 4.3.2.)

According to the results of the FI, the basement catch basin (refer to Figure 1-4), contained materials (primarily soil) contaminated with PCBs greater than the subsurface cleanup level. The catch basin and materials were removed and disposed as PCB special waste concurrent with the excavation of other PCB contamination north of the basement concrete flooring.

4.4 Soil Confirmation Sampling

This subsection discusses the collection and analysis of soil confirmation samples from remediated areas to verify/confirm that the site PCB cleanup goal was successfully attained. As discussed in Section 1.2.8, the cleanup goal for the Building 3 site was 7.6 ppm for materials in the subsurface (i.e., below the surrounding ground surface). This value and was based on a risk assessment conducted pursuant to 40 CFR 761.61(c). The confirmation sampling protocol differed depending on the classification of the contamination removed. In areas where TSCA wastes were removed, soil confirmation samples were collected from the base of the excavations

in accordance with 40 CFR 761.289 (Compositing Samples), Subpart O [*Sampling to Verify Completion of Self-Implementing Cleanup and On-Site Disposal of Bulk PCB Remediation Waste and Porous Surfaces in Accordance with 40 CFR 761.61(a)(6)*]. In non-TSCA regulated areas, where PCB special wastes were removed, soil confirmation samples were collected in accordance with the protocol developed during RA Phase 1 (refer to the RAWP). Soil confirmation samples were also collected beneath the buried sewer lines removed from the basement area. The locations and sample identification for all soil confirmation samples collected during RA Phase 2 are presented in Figure 4-1. (Note: Soil confirmation samples collected during RA Phase 1 are discussed in Section 3-5. The corresponding sample results were not relevant to the determination of final site cleanup, since the areas associated with the samples were further remediated during Phase 2.)

Confirmation samples were collected from the base (floor) and sidewalls of each area of excavation and beneath the buried sewer lines as discussed below. The floor and sidewall samples were designed to ensure that the vertical and horizontal extent of PCB contamination, respectively, had been successfully removed.

- **Floor (TSCA waste)** – Composite samples were collected in accordance with the single point source procedure outlined in 40 CFR 761.289. This scheme involved the collection of composite samples from an "initial compositing area" and from "subsequent compositing areas" situated around the initial compositing area. Each composite sample consisted of soil from eight or nine aliquots collected from a maximum depth of three inches (7.5 cm per Subpart O). During Phase 2 of the RA, 36 composite confirmation samples were collected from the floor of areas where TSCA wastes were excavated. These samples are identified on Figure 4-1as RA-SF017 through RA-SF025, RA-SF030 through RA-SF038, and RA-SF047 through RA-SF064. On Figure 4-1, the general location of the individual aliquots comprising the composite sample are identified with letters. For example, the aliquots from composite sample RA-SF017 are represented by the letter "P." The "initial compositing area" is represented by the letter "A." The remaining composite samples correspond to the "subsequent compositing areas" as defined in TSCA.

- **Floor (PCB special waste)** – Discrete confirmation samples were distributed evenly across the floor of the excavated areas at approximately 20-ft. intervals. Each sample was comprised of soil collected from the surface to a maximum depth of three inches. During Phase 2 of the RA, 28 discrete confirmation samples were collected from the floor of areas

where PCB special wastes were excavated. These samples are identified on Figure 4-1 as RA-SF001 through RA-SF016, RA-SF026 through RA-SF-29, and RA-SF039 through RA-SF046.

- **Sidewalls** – Discrete confirmation samples were collected from the sidewalls of each excavation at a frequency of one sample for every 20 LF. The samples were distributed evenly along the perimeter of the excavated area. Each sample was comprised of soil collected from the surface to a maximum depth of three inches below the surface. During Phase 2 of the RA, 49 discrete samples were collected from the sidewalls of PCB excavation areas. These samples are identified as RA-SW001 through RA-SW049 on Figure 4-1.

- **Beneath underground sewer lines** – One discrete confirmation sample was collected for every 50 LF of underground piping. Samples were collected from the pipe trench to a depth of three inches beneath the pipe. Five sewer line confirmation samples were collected during RA Phase 2. These samples are identified as RA-PS001 through RA-PS005 on Figure 4-1.

All samples and aliquots were collected with a stainless steel garden trowel. Composite samples were prepared by combining the soil from each aliquot into a Ziploc bag and blending/mixing the soil within the bag. A portion of the blended soil was then removed and placed into a 4-ounce glass jar. Samples were submitted to an off-site laboratory for PCB analysis using SW-846 Method 8082. Quality Assurance/Quality Control (QA/QC) samples (i.e., duplicates, splits, MS/MSD, rinsates) were also collected and analyzed at the frequencies specified in the SAP.

Soil confirmation samples were collected continuously as excavation activities progressed. Once an area of 5,000 – 7,500 ft^2 was excavated to the extent that it was believed (based on visual observation) that non-contaminated soil had been reached, the area was isolated with berms and cleared for sampling. The approach of sampling on a continuous basis facilitated timely backfilling in the remediated areas (refer to Section 4-7), thereby minimizing the total time excavated areas were open and exposed to rainfall. Accordingly, a 24-hour turnaround time was required for all soil confirmation samples.

In accordance with Addendum No. 1 to the RAWP, if the PCB levels exceeded the subsurface cleanup standard, additional soil would be excavated from the area(s) associated with the sample(s) that failed confirmation analysis. Of the 118 confirmation samples collected, only one

sample result (RA-SF063, a composite sample from the excavation of TSCA waste located outside the building) exceeded 7.6 ppm. In accordance with the aforementioned procedure, the area represented by RA-SF063 was excavated further (approximately one foot.) and re-sampled. The PCB result from the second sample (RA-SF063-2) was non-detect, indicating that further remediation efforts would not be required. The results of all soil confirmation samples with respect to verifying the final cleanup of the site are discussed in Section 5.0.

4.5 Miscellaneous Waste Management

Miscellaneous wastes encountered during Phase 2 included water found inside the basement concrete vaults at K14 and K24, waste oil from the former distribution lines in the basement, and stormwater that collected within the limits of the PCB remediation areas. Management of the water from the concrete vaults and the waste oil was discussed in detail in Sections 4.1.4 and 4.1.5, respectively. Stormwater that accumulated in excavation areas was pumped into a 20,000-gallon Baker tank for temporary storage. During RA Phase 2, the Baker tank was filled to near capacity. A sample of the tank contents was collected and analyzed to determine the proper method for disposal. Table 3-5 presents a summary of the waste characterization sample parameters and results. Based on the results, the stormwater did not contain PCBs and was determined to be eligible for discharge to the sanitary sewer system. Under a written permit from the St. Louis Metropolitan Sewer District (Appendix G), approximately 20,000 gallons of the stormwater was discharged to a sanitary sewer manhole near Building 4.

4.6 Transportation and Disposal

This subsection discusses the T&D methods and presents the final waste quantities for each type of waste. A chronological listing of all off-site shipments of TSCA and other wastes that occurred during RA Phase 2 is presented in Table 4-2. A complete roll-up of waste quantities for the project (RA Phases 1 and 2) is provided in Table 3-7. Copies of all waste shipment manifests were provided to AMCOM under separate cover.

4.6.1 TSCA Wastes

All TSCA wastes were shipped to EQ's RCRA/TSCA disposal facility, Wayne Disposal, Inc., located in Wayne, Michigan. Sewer piping from the basement was loaded into a 23-CY roll-off container. Concrete rubble and soil were loaded into end-dump trucks. As necessary, trucks approached the stockpile area using the gravel haul road constructed along the north side of the building excavation. During the latter stages of the removal effort, such as the Chip Chute area and area outside the building limits, TSCA waste materials were live-loaded into end-dump trucks. To comply with DOT gross weight limits, each truck was loaded with approximately 25

tons of material. Overall, there were 412 loads totaling 10,580 tons of TSCA waste that were shipped and disposed off-site during Phase 2.

4.6.2 PCB Special Wastes

All PCB special wastes were shipped to the Waste Management Milam Landfill in East St. Louis, Illinois. As discussed in Section 4.2.6, PCB special waste concrete flooring from the first and second floors (refer to Figures 1-2 and 1-3) was removed as part of the building demolition. The concrete rubble classified as PCB special waste (including concrete flooring and intermediate concrete pillars in the basement) was segregated during demolition and processed separately from brick, concrete block, and other non-contaminated building materials. Following segregation and processing, the concrete rubble was loaded into end-dump trucks or tandems for off-site T&D. Concrete, soil, and underground sewer pipe generated during remediation activities in the former basement area were also loaded into end-dump trucks for off-site T&D. Soil generated west of Row 22 was temporarily stockpiled on the northwest side of the basement concrete flooring prior to load-out. Concrete, soil, and underground sewer piping generated east of Row 22 were temporarily stockpiled on the north side of the building excavation. Concrete rubble from the Chip Chute walls and the 100-ft. section of outer foundation wall was temporarily staged near the Chip Chute prior to being loaded into end-dump trucks. The above-ground sewer piping from the basement was the only PCB special waste not shipped by end-dump truck; rather, the piping was loaded into 20-CY roll-off containers. To comply with DOT gross weight limits, each end-dump truck was loaded with a maximum of 25 tons of material. During the demolition operation, 1,107 loads totaling approximately 17,000 tons of PCB special waste (concrete flooring) shipped to the Milam Landfill. In addition, there were 38 loads totaling 861 tons of PCB special waste (soils, concrete, and sewer pipe) that were shipped and disposed off-site during the basement area remediation. The following is the breakdown of PCB special wastes that were removed by area and media:

- Concrete flooring from first and second floors (removed as part of the building demolition) – 17,000 tons (estimated)
- Concrete pillars from basement (removed as part of the building demolition) – 700 tons (estimated)
- Soil and concrete from west side of basement area – 643 tons
- Soil, concrete, and underground sewer pipe from east side of basement area – 202 tons
- Above-ground sewer piping from basement – 16 tons

4.6.3 Other PCB Wastes

The petroleum- and PCB-contaminated water in the basement concrete vault at K24 (refer to Section 4.1.4) was pumped out by vacuum truck and transported to EQ's Wayne Disposal site. A total of 2,192 gallons of wastewater was removed and disposed. The PCB-contaminated waste oil recovered from the basement distribution lines was also shipped to EQ for disposal. Approximately 150 gallons (3 x 55-gallon drums) of oil was recovered. The drums were shipped by semi-trailer.

4.6.4 ACM Waste

The following summarizes the T&D associated with the different types of ACM that were removed (abated) during Phase 2, prior to commencing building demolition:

- Asbestos piping and insulation from the basement were double-bagged or wrapped and loaded into 40-CY, closed roll-off containers for shipment and disposal at the Roxana Landfill. During Phase 2, there were eight shipments (30 tons) of ACM that were removed and disposed.

- Transite debris from inside and outside the building was placed into 20- or 30-CY open roll-off containers. Transite from inside the building was shipped to the Roxana Landfill, while transite from the exterior of the building was shipped to the Milam landfill. Seven loads of transite totaling approximately 32 tons were shipped and disposed.

- Asbestos floor tiling was placed into a 20-CY open roll-off container and shipped to the Roxana Landfill. Approximately two tons of floor tile was removed and disposed.

- Windows containing ACM putty material were extracted in-tact (to the extent possible) during demolition and placed into 30-CY roll-off containers. The windows were shipped to the Milam Landfill for disposal. Four loads of windows were shipped and disposed during Phase 2.

All roll-off containers were double-lined with poly sheeting. Asbestos-containing materials placed in open roll-offs were "burrito-wrapped" prior to shipment.

4.6.5 Non-Hazardous Waste

The following summarizes the T&D associated with non-hazardous (non-PCB) waste generated during the building demolition:

- Brick and concrete coated with lead-based paint were loaded into end-dump trucks for shipment to one of two facilities – Chain-of-Rocks Landfill in Granite City, Illinois or Waste Management Milam Landfill in East St. Louis, Illinois. During the demolition phase, 69 loads (approximately 1,700 tons) of lead-based painted debris were shipped to these landfills.

- Non-hazardous (i.e. no PCBs or lead-based paint) brick, concrete, and concrete block generated during demolition were loaded into tandems for delivery to a clean fill construction site at 4600 Goodfellow Boulevard, St. Louis, Missouri. There were 445 loads of non-hazardous demolition debris (approximately 6,600 tons) delivered to this site during the building demolition.

- Scrap iron and steel were loaded into end-dump trucks for delivery to Grossman Recycling Company. During demolition, 240 loads of scrap iron and steel were hauled off-site for recycling.

- Fluorescent light bulbs and ballasts generated during demolition were packaged on pallets and shipped to the Luminaire Recycling Company in St. Paul, Minnesota.

4.7 Site Restoration

Site restoration activities began with backfilling the building footprint excavation. In non-TSCA areas, the floor of the building excavation (former basement floor) was backfilled to the top of the concrete footers with 1-in. minus granular material. The granular backfill was spread over the base of the excavation to a level consistent with the top of the footers and traffic-compacted with a dozer. Following placement and compaction of the gravel, the remainder of the vertical profile (top of the footers to grade) was backfilled with clean soil (silty clay) from off-site borrow sources. Areas where TSCA wastes were removed (approximately Rows 7-22) were backfilled with silty clay only. The backfill material was obtained from two local, off-site borrow sources:

- Commuter parking lot at I-70 and Hanley – minor source of backfill (approximately bank 2,000 yards)
- Highway construction project at I-70 and Florissant Road, managed by Fred Weber, Inc. – provided the majority of backfill material (approximately 66,000 bank CY).

In accordance with Specification 02315, representative soil samples were collected from both sources to confirm the acceptability of the soil for use as backfill. Samples were analyzed for several chemical parameters, including PCBs, metals, petroleum hydrocarbons, and benzene, toluene, ethylbenzene, and xylene (BTEX). All samples results were either non-detect or within acceptable limits, including soil target concentration values published in Cleanup Action Levels for Missouri (CALM) (MDNR, 2001). The backfill sample results are provided in Appendix H.

Placement of backfill at the west end of the building (in non-remediation areas between the west wall and Row 6) began during the demolition operation. During remediation activities, backfill was placed within excavated areas following receipt of the confirmation sample results indicating that PCBs were successfully reduced to the subsurface cleanup standard. As discussed in Section 4.3.3, soil confirmation samples were collected once an area of 5,000 – 7,500 ft^2 had been excavated and isolated with berms. This approach ensured that backfill could be placed continuously, thereby minimizing the total time excavations were open and exposed to rainfall. To facilitate delivery of backfill to remediated areas west of Row 22, a gravel road was constructed along the south face of the building excavation, approximately between Row 1 and Row 17. After demolition operations were completed, backfilling within the east half of the building footprint commenced.

Backfilling was accomplished with the use of two dozers, a vibratory sheepsfoot roller, and a tractor equipped with a disc. When the backfill soil moisture content was too excessive for achieving suitable compaction, the soil was conditioned by mixing/tilling and air-drying. As necessary, lime was incorporated with the soil to facilitate drying. The lime was incorporated using the tractor and disc attachment. Following moisture conditioning, backfill was placed in 12-in. loose lifts and compacted to achieve a minimum of 95% of the maximum dry density and within 3% of the optimum moisture content based on the Standard Proctor test (ASTM D 698). Samples of the backfill soil were periodically collected and submitted to a local geotechnical testing laboratory for Standard Proctor testing. Technicians from this same firm also provided in-situ field testing for compaction (density and moisture). In-situ compaction tests were performed for each lift placed within a continuous area being backfilled. The results of each Standard Proctor test and in-situ field compaction test are provided in Appendix I.

Backfill material was delivered in tandem or end-dump trucks. Typically, there were 15 trucks in circuit, with each truck averaging 14 deliveries during an 8-hour shift. The average quantity of loose backfill delivered per day was 3,000 CY. It is estimated that a total of 68,000 bank CY of backfill materials (gravel and soil) were placed and compacted.

After the building footprint excavation was backfilled, the disturbed area was graded to match the existing topography and promote area drainage (i.e., to avoid ponding). The upper two inches of the area was covered with soil from the upper profile of the I-70 borrow site. This layer was tilled and leveled in preparation for seeding using a tractor with a rake attachment. Seed consisting of 95% fescue and 5% rye was then placed at a rate of four pounds per 1000 ft^2 using a broadcast spreader, followed by placement of 13-13-13 fertilizer. Straw was blown over the seeded area as the final step in the site restoration process. The pavement removed in the area outside the limits the building was not restored.

5.0 Confirmation of Site Cleanup

The activities conducted during RA Phase 1 and the demolition of the building structure during RA Phase 2 mitigated the PCB contamination in building materials located above the basement floor level. Thus, once the building demolition was complete, the remaining PCB contamination within the building limits was restricted to the subsurface at or below the elevation of the basement floor (excluding portions of the concrete walls and foundation wall in the vicinity of the Chip Chute). This elevation was determined to be 528 feet above mean sea level (AMSL) (refer to Section 6.1), and corresponded to the top of the concrete footers in the former basement. Additionally, PCB contamination remained in the area outside the building, in the vicinity of the former Chip Chute loading dock. Using the risk-based cleanup approach under 40 CFR 761.61(c) of TSCA, the cleanup standard for PCBs in the subsurface was determined to be 7.6 ppm. The limits of excavation for remediation in the building footprint were established based on this standard.

A sampling program was developed to confirm that remediation activities were successful in attaining the subsurface cleanup standard (refer to Section 4.4). The program involved the collection of composite and discrete samples from the floors and sidewalls of excavated areas. In areas where TSCA wastes were removed, samples were collected in accordance with TSCA Subpart O. During RA Phase 2, 64 floor samples and 49 sidewall samples were collected. The soil confirmation sample results are presented on Figure 4-1. As the results demonstrate, the subsurface cleanup standard was achieved in all areas where PCB contamination was removed from the former basement floor and the area outside the building. The data further demonstrates that residual PCB contamination, where present, is well below the subsurface cleanup standard. Only 15 of the 113 soil confirmation samples contained PCBs at detectable concentrations. The maximum PCB detection from any samples was 2.05 ppm. One initial confirmation sample result, RA-SF063, failed the acceptance criteria. Accordingly, the area represented by this sample was re-excavated and a second confirmation sample, RA-SF063-2, was collected. The PCB result from the second sample was non-detect.

Five soil confirmation samples were also collected beneath buried sewer lines that were removed during RA Phase 2. The PCB result for each sample was non-detect. The MDNR also required that the samples be analyzed for metals, SVOCs, VOCs, and TPH. Appendix J contains the letter submitted by AMCOM to MDNR discussing the results associated with the extra analytes. The results indicated that VOCs, SVOCs, and TPH were non-detect in all samples. Metals, when

detected, were below commercial CALM and C_{LEACH} values. Accordingly, no further action was taken with respect to the soils beneath the buried sewer lines.

Confirmation sampling of concrete surfaces was not incorporated in the work plan for RA Phase 2 for the following reasons:

- Most of the PCB-contaminated concrete surfaces were completely removed, including the basement flooring and footers between Rows 9 and 20, wall at Row 20, outer foundation wall, Chip Chute walls, intermediate pillars, and concrete footer at G25.

- The basement concrete flooring in the basement hallway between Rows 20 and 22 was left in-place. However, this area was remediated during RA Phase 1. Concrete confirmation samples collected during RA Phase 1 (refer to Section 3.6 and Figure 3-3) verified that residual PCBs (where present) were below the subsurface cleanup standard.

- For the remaining concrete footers, the sample results from the FI were considered confirmatory, and a duplication of the FI effort was not undertaken.

A discussion of the residual subsurface PCB contamination at the site is presented in Section 6.0.

6.0 Final Status of Site Conditions

This section presents a discussion of the final status of the site conditions following remediation, including the final surface topography and residual contamination left in the subsurface.

6.1 Land Survey Data

The following features were surveyed (location and elevation, using State planar coordinates) to record the final conditions at the site following completion of remediation and site restoration activities. The surveyor was registered in the State of Missouri.

- **Location/limits of former Building 3** – Various points along the perimeter of the building footprint were surveyed to establish a permanent record of the location/limits of former Building 3. In addition, this data was combined with the surveyed elevation of the basement floor (see below) and used to estimate the quantity of backfill material placed within the building footprint. The surveyed limits of former Building 3 are depicted on Figure 4-2.

- **Surface elevation contours** – After final grade was established as part of the site restoration (refer to Section 4-7), the surface of the soil (backfill) was surveyed to provide the final topographic contours. A topographic map is presented as Figure 4-2.

- **Elevation of the top of the basement concrete footers** – The elevation of the top of the concrete footers coincides with the elevation at or below which residual PCB contamination (less than 7.6 PPM) remains in the subsurface. Prior to covering all of the basement concrete footers with backfill, the top of one of the footers was surveyed. The elevation of the top of the concrete footers was determined to be 528 feet AMSL. Accordingly, this elevation will need to be referenced in future deed documents for transfer of the property to a new owner, as it represents the elevation below which residual PCBs are present.

6.2 Residual Subsurface Contamination

The results of soil and concrete confirmation sampling are discussed in Section 5.0, referencing Figures 3-2 (concrete) and 4-1 (soil). These results clearly demonstrate that the subsurface cleanup standard of 7.6 ppm was achieved in all areas where PCB contamination was removed from the former basement floor and the area outside the building. Nevertheless, residual PCB contamination remains in concrete and soil in select areas at or below an elevation of 528 feet.

AMSL, the elevation of the top of the basement concrete footers. Figure 4-3 presents a map showing the locations of soil and concrete samples that are known to contain detectable levels PCBs less than 7.6 ppm. The sample locations shown on Figure 4-3 represent the final subsurface conditions with respect to residual PCB contamination. The results are based on the comprehensive set of data obtained during the project, including the FI, RA Phase 1, and RA Phase 2. Figure 4-3 also shows the locations of concrete footers and flooring that remain in the subsurface.

7.0 Quality Control

The field QC activities performed during the RA were defined in the *Removal Action Work Plan, PCB TSCA Waste, Building 3, St. Louis Army Ammunition Plant* (Arrowhead, 2001c) and *Addendum No. 1, Removal Action Work Plan, PCB TSCA Waste, Building 3, St. Louis Army Ammunition Plant* (Arrowhead, 2002a). Chemical quality control activities were defined in the *Sampling and Analysis Plan, Determination of PCB TSCA Waste Quantities, Building 3, St. Louis Army Ammunition Plant* (Arrowhead, 2001d).

7.1 QC Inspections

During the RA, the Arrowhead Quality Control Manager implemented the three-phase inspection process, consistent with USACE requirements. The process involved preparatory, initial, and daily follow-up inspections for each definable feature of work (DFW). The DFWs were broadly defined to include the major work elements, such as concrete flooring removal, soil excavation, building demolition, and asbestos abatement. The inspection checklists for each type of inspection were completed at the required frequency (i.e. daily for follow-up inspections) and submitted to the USAC field representative as part of the Daily Quality Control Report (DQCR).

7.2 Daily Quality Control Reports

Daily Quality Control Reports were be prepared by the Quality Control Manager to document the progress of field activities. The DQCRs presented the following information:

- Weather information
- A list of heavy equipment onsite
- Work completed by Arrowhead and subcontractors
- Results of field measurement or testing
- Results of chemical analyses
- Verbal instructions received from CENWK or AMCOM personnel
- Problems encountered during field work (as necessary)
- Corrective actions implemented (as necessary)
- Health and safety issues
- Visitors, including personnel from regulatory agencies

The following additional information was submitted to the USACE field representative as attachments to the DQCR:

- DFW inspection checklists
- Site entry log
- Health and safety inspection checklists
- Daily tailgate safety meeting record
- Subcontractor daily tracking logs
- Field testing/measurement logs
- Analytical data reports
- Waste shipment manifests
- Backfill delivery receipts
- Backfill testing reports
- Correspondence with regulatory authorities
- Wastewater discharge permit documentation
- Correspondence with AMCOM

7.3 Field Work Variances

During the course of RA field activities, unanticipated field conditions were encountered, or improved methods/procedures were identified. This resulted in several changes or modifications to planned procedures. Changes to the work plans were implanted through FWVs. Ten FWVs, identified as FWV-RA01 through FWV-RA10, were prepared and submitted to the CENWK Contracting Officer Representative (COR) for approval. These FWVs are summarized in Table 7-1.

8.0 Health and Safety

All work activities were performed in accordance with the *Safety Health and Emergency Response Plan, PCB TSCA Waste, Building 3, St. Louis Army Ammunition Plant* (Arrowhead, 2001e) and *Addendum No. 1, Safety Health and Emergency Response Plan, PCB TSCA Waste, Building 3, St. Louis Army Ammunition Plant* (Arrowhead, 2002b). The Arrowhead Site Safety and Health Officer (SSHO) was present onsite for each day that field work was performed. Activities conducted by the SSHO included, among other things, daily safety inspections, air and noise monitoring, air sampling, inventory of PPE, equipment safety checks, and general safety oversight. The SSHO also directed site-specific safety orientations, health and safety training sessions, and daily "tailgate" safety meetings. The tailgate safety meeting, attended by all field personnel, occurred in the morning prior to commencing field work for the day. Topics discussed at this daily "tailgate" safety meetings included safety and health considerations for the day's activities, pertinent aspects of hazard assessments, necessary PPE, problems encountered, and new operations. Attendance records and meeting notes were recorded on a Tailgate Safety Meeting Log and submitted to the USACE field representative as part of the DQCR (refer to Section 7.2).

Numerous health and safety hazards were encountered during the RA. These hazards were controlled through the use of engineering controls and/or PPE. The following is a list of some of the primary site hazards and a brief statement with regard to how each hazard was controlled:

- **Fall protection** – During RA Phase 1, it was necessary for field personnel to work adjacent to large, open holes in the floor while saw cutting and hoisting concrete slabs. As a result of this fall hazard, personnel were required to utilize a harness and self-retracting lifeline. The lifeline was affixed securely to overhead I-beams.

- **Asbestos** – All asbestos work was performed in Level C with half-face air-purifying respirators (APRs) equipped with HEPA filters. During abatement activities, poly containment barriers were erected and negative air machines were placed at the point of removal. Personnel were required to enter/exit the abatement area through a wet decontamination station, including a shower. Asbestos air sampling was conducted inside and outside the containment area.

- **Noise** – Noise levels inside the building routinely exceeded the OSHA permissible exposure limit (PEL) of 90 dB, particularly during saw cutting activities. An aggressive hearing conservation program was implemented that included continuous noise monitoring and the use of hearing protection devices (ear muffs and ear plugs).

- **Carbon monoxide** – The operation of heavy construction equipment inside the building created carbon monoxide (CO) emissions. Due to concerns that a hazardous atmosphere could develop, field personnel were given real-time CO monitors. Work was discontinued when CO levels became elevated. To the extent possible, dilution ventilation was provided by opening outside doors and using fans.

- **Dust** – The generation of respirable dust laden with PCBs and silica was a concern throughout the RA. The SSHO collected several air samples to ensure that field personnel were not overexposed. In addition, real-time dust (aerosol) monitoring was conducted. Based on readings observed using real-time aerosol monitors, work practices were adjusted, water suppression was implemented, or PPE was upgraded as necessary.

- **Heavy equipment** – Numerous pieces of heavy equipment were consistently operated in the same general area and in close proximity to obstructions and personnel. This significant physical hazard was controlled through continuous inspection of operations, daily equipment safety inspections, operator training, and sequencing of activities.

Despite the above listed hazards, over 30,000 man-hours were worked during the RA with no lost-workday injuries.

9.0 Summary of RA Costs

The following is an itemization of costs associated with the SLAAP Building 3 RA, including contractor costs and costs for U.S. Army Corps of Engineers supervision and administration (S&A).

Phase/Activity Description	Contractor Costs
Contractor: Remedial Action Work Plan, Reports, Closeout, Meetings, Document Review, and Project Management	$311,310
Contractor: Supplemental Site Characterization	$329,280
Contractor: Site Cleanup and Restoration – Phases 1 and 2 (including Demolition and Asbestos Abatement)	$5,545,776
U.S. Army Corps of Engineers: S&A (all phases)	$383,941
Total RA Costs	**$6,570,307**

10.0 References

Arrowhead Contracting, Inc. 2001a. *Alternatives Evaluation for Removal of PCBs. St. Louis Army Ammunition Plant, St. Louis, Missouri.* March.

Arrowhead Contracting, Inc. 2001b. *Field Investigation Report, Determination of PCB TSCA Waste Quantities, Building 3. St. Louis Army Ammunition Plant, St. Louis, Missouri.* November.

Arrowhead Contracting, Inc. 2001c. *Removal Action Work Plan, PCB TSCA Wastes, Building 3, St. Louis Army Ammunition Plant, St. Louis, Missouri.* November.

Arrowhead Contracting, Inc. 2001d. *Sampling and Analysis Plan. Determination of PCB TSCA Waste Quantities, Building 3, St. Louis Army Ammunition Plant, St. Louis, Missouri.* June.

Arrowhead Contracting, Inc. 2001e. *Safety, Health, and Emergency Response Plan, PCB TSCA Waste, Building 3, St. Louis Army Ammunition Plant.* November.

Arrowhead Contracting, Inc. 2002a. *Addendum No. 1, Removal Action Work Plan, PCB TSCA Wastes, Building 3, St. Louis Army Ammunition Plant, St. Louis, Missouri.* June.

Arrowhead Contracting, Inc. 2002b. *Addendum No. 1, Safety, Health, and Emergency Response Plan, PCB TSCA Waste, Building 3, St. Louis Army Ammunition Plant.* June.

Missouri Department of Natural Resources. 2002. *Cleanup Action Levels for Missouri (CALM) Appendix B. Tier 1 Soil and Groundwater Cleanup Standards.* June.

Tetra Tech EM. Inc. 2000. *Final Environmental Baseline Survey Report, Saint Louis Army Ammunition Plant, St. Louis, Missouri.* December.

United States Aviation and Missile Command. 2000. *Final Environmental Baseline Survey Report, Saint Louis Army Ammunition Plant, St. Louis, Missouri.* December.

TABLES

Table 1-1

Construction Characteristics of Former Building 3

Building Characteristics	
Area	• Basement - 37,000 ft^2 of concrete floor, 131,000 ft^2 soil floor • First Floor – 168,000 ft^2 • Second Floor – 155,000 ft^2 • Penthouses – 5 @ 1,600 ft^2
Height	Foundation to roof: 30 ft
Style	Two stories, basement, and five penthouses; three catwalks to adjacent buildings
Construction Materials	Steel frame and roof beams on reinforced concrete piers and spread footing; masonry walls; and a prefabricated concrete roof. Eastside addition has the same structure, but also is covered with transite siding.
Construction Date	Built in 1941, retooled (including eastside addition) in 1944. Renovated to create office space in 1984 and 1985.

Table 1-2

Historical Uses, Operations, and Hazardous Materials at Building 3

Historical Uses	
Occupants/Lessees	1941 to 1944: SLOP (0.30-caliber munitions production) 1944 to 1984: SLAAP (105-millimeter (mm) Howitzer shell production, intermittent production) 1985 to 1996: SLAAP (AVSCOM office space)
Operational Periods	1941 to 1944: 0.30-caliber munitions production 1944 to 1945: 105-mm Howitzer shell production 1952 to 1954: 105-mm Howitzer shell production 1966 to 1969: 105-mm Howitzer shell production 1985 to 1996: Office space
Historical Operations	
Process Description	Processes completed in Building 3 consisted of shell shaping, heat tracing, cleaning, painting, and packaging for shipment. Metal chips and fragments produced as a result of the shell machining processes were collected on the first and second floors and disposed in the chip chute. The chip chute is an open chute along the north wall that opened to the basement in Building 3. From the basement, the metal chips were transferred to a railcar via conveyor for off-site disposal.
Process Machinery	Process machinery included lathes, drill presses, milling machines, grinders, heat-treating furnaces, wash racks, welders, shapers, shot-blasting equipment, paint spray booths, transformers, air compressors, and auxiliary equipment (dust collection devices, elevators, and conveyors).
Process Utilities	Process utilities included water, steam, compressed air, soluble oil, quench oil, paint, natural gas, telephone service, and electricity.
Hazardous Materials	
Possible Hazardous Materials Used/Stored	Cutting oils containing PCBs, quench oil (No. 6 fuel oil), hydraulic oil, solvents (toluene), asbestos, lead-based paint, and pesticides.
Hazardous Material Storage and Usage Areas	Basement: Chip chute 6-inch-diameter quench oil lines to sludge tank Transformer vaults Quench oil pump station First Floor: Cutting (soluble) oil distribution system Soluble oil and mixing room 14 quench oil tanks Paint storage room (including tanks and drums) Hydraulic oil reclaiming unit Five wash racks Five paint spray booths Paint stripping room Second Floor: Cutting oil distribution system Heat treating quench oil

Table 1-3
Summary of the Nature and Extent of PCB Contamination

Description of PCB Contamination	General PCB Levels	General Location and Extent of Contamination	Source of Data	Figure(s) Reference
Materials containing PCBs > 43.5 ppm (TSCA wastes):				
Select portions of concrete flooring on first and second floors	43.5 ppm – 178 ppm	Approximately 15,000 ft2 of concrete flooring on the first and second floors was contaminated with PCBs > 43.5 ppm. The depth of contamination ranged from the upper 1 in. of flooring to approximately 8 in. below the flooring surface. The flooring thickness ranged from 7 in. to 18 in.	Field Investigation, RA Phase 1 Confirmation Sampling	Figures 1-2, 1-3, 3-1, and 3-2
Basement concrete flooring between Rows 20 and 22	43.5 ppm – 90 ppm	The contaminated flooring between Rows 20 and 22 (referred to has the basement hallway) covered approximately 5,000 ft2. The contamination was restricted to the upper 2 in. of flooring in this area.	Field Investigation	Figures 1-4 and 3-3
Basement concrete flooring and footers between Rows 9 and 20	43.5 ppm – 728 ppm	The basement concrete flooring was 17 in. thick and covered an area of 30,000 ft2. Select areas of this flooring was contaminated with PCBs > 43.5 ppm. The depth of contamination was generally from the flooring surface to a depth of 2 in. Since the contaminated and non-contaminated portions of this flooring could not be adequately segregated during removal, the entire slab was considered TSCA waste for purposes of remediation and disposal.	Field Investigation	Figures 1-4, 1-7, and 4-1
Chip Chute waste pile (metal cuttings/shavings)	43.5 ppm – 610 ppm	The chip chute waste pile covered an area of approximately 400 ft2. The depth of material ranged from 2 to 4 ft.	Field Investigation	Figure 1-4
Soil flooring in the Chip Chute area	43.5 ppm – 133 ppm	Approximately 400 ft2 of soil flooring in the chip chute area was contaminated to a depth of approximately 5 ft. bgs.	Field Investigation	Figure 1-4

Description of PCB Contamination	General PCB Levels	General Location and Extent of Contamination	Source of Data	Figure(s) Reference
Oil-stained concrete pillars/footers in basement	43.5 ppm – 147 ppm	The footers or pillars to be decontaminated include those at B13, B18, C18, F12, H14 and H15. The total oil-stained surface area associated with these pillars/footers was approximately 225 ft^2. Contamination was generally surficial (i.e. < 1 in below the surface).	Field Investigation	Figure 1-4
Various cast-iron sewer lines in basement containing	43.5 ppm – 8,279 ppm	Approximately 700 linear ft. of sewer piping contained sediments that were contaminated with PCBs > 43.5.	RA Phases 1 and 2 Sewer Line Conf. Sampling	Figure 1-6
Select portions of basement soil flooring, primarily along the south and west sides of basement concrete flooring	43.5 ppm – 576 ppm	Isolated areas of soil contamination totaling approximately 2,000 ft2 (identified as Areas A through E in FI Report). General depth of contamination was 1 – 2 ft. bgs.	Field Investigation, RA Phase 1 Confirmation Sampling,	Figures 1-4, 3-3, and 4-1
Gravel and soil beneath basement concrete flooring between Rows 9 and 20	43.5 ppm – 7,700 ppm	Contaminated gravel and soil beneath the basement concrete flooring covered an area of 30,000 ft2. An additional 4,000 ft2 of contamination was encountered along the north side of the flooring (east and west of the Chip Chute) while excavating during Phase 2. The general depth of contamination was 1 – 2 ft. beneath the concrete floor. However, contaminated soil and gravel along the concrete wall (at Row 20) extended to approximately 5 ft. beneath the floor, and contaminated gravel was encountered beneath the wall's footing.	RA Phase 1 Investigation, RA Phase 2 (visual observation during excavation)	Figures 1-4, 1-7, and 4-1
Soil and other materials outside Building 3, in the vicinity of the former Chip Chute load-out area	43.5 ppm – 517 ppm	Contaminated media outside the building included gravel (beneath the asphalt), metal cuttings (similar to material found in chip chute), and soil. The contamination covered a total area of approximately 3,500 ft2, approximately 1,000 ft2 greater than originally estimated based on the results of the FI.	Field Investigation	Figures 1-5 and 4-1

Description of PCB Contamination	General PCB Levels	General Location and Extent of Contamination	Source of Data	Figure(s) Reference
		The depth of contamination ranged from 5 ft. bgs to 10 ft. bgs in some areas.		
Materials containing PCBs < 43.5 ppm (PCB special wastes):				
Select portions of concrete flooring on first and second floors	< 43.5 ppm	Random areas of PCB contamination less than 43.5 ppm were spread across approximately 230,000 ft2 of concrete flooring on the first and second floors. (Note: The limits of PCB-contaminated flooring were conservatively drawn to facilitate the segregation of contaminated and non-contaminated concrete flooring during demolition of the building in Phase 2. The actual area of flooring containing PCBs was less than 230,000 ft2, based on non-detect results from flooring samples collected during the FI.) The contamination ranged from the upper 1 in. of the original flooring to as deep as 8 in. The flooring thickness ranged from 7 in. to 18 in.	Field Investigation	Figures 1-2, 1-3, 3-1, and 3-2
Select portions of basement soil flooring *	7. 6 ppm – 43.5 ppm	The areas of soil contamination totaled approximately 9,000 ft2. The majority of contamination was located from 0 – 2 ft bgs. However, contamination in two small areas extended to approximately 5 ft bgs.	RA Phase 1 Conf. Sampling, Field Investigation Phase I EBS, Site-Specific EBS	Figures 1-4, 3-3, and 4-1
Intermediate concrete support pillars in the basement between Rows 9 and 22	< 43.5 ppm	There were 372 intermediate support pillars in the basement. The vertical surface of many of the pillars were oil-stained and PCB-contaminated. (Pillars determined to be contaminated > 43.5 ppm were decontaminated during Phase 1).	Field Investigation	Figure 1-4
Oil-stained concrete footer at G25	< 19 ppm	The concrete footer at G25 was heavily oil-stained on the horizontal and vertical surfaces. The dimensions of the footer were approximately 10 ft. x 10 ft. with a depth of 2.5 ft.	Field Investigation	Figure 1-4

Description of PCB Contamination	General PCB Levels	General Location and Extent of Contamination	Source of Data	Figure(s) Reference
Concrete foundation wall adjacent to Chip Chute and load-out area	< 21 ppm	Approximately 100 LF of the building's northern foundation wall (10 ft. high) was oil-stained due to being in direct contact with PCB-contaminated soil outside the building (near the former Chip Chute load-out area). Oil-staining was also present on the interior (south) face this wall, which formed the north wall of the Chip Chute. Contamination was generally surficial (i.e. < 1 in. beneath the wall surface).	Field Investigation	Figure 1-4
Interior concrete walls around Chip Chute area	< 21 ppm	Oil-staining was present on the east and west walls of the Chip Chute area. Contamination was generally surficial (i.e. < 1 in. beneath the wall surface) and covered an area of approximately 400 ft2.	Field Investigation	Figure 1-4
Material inside basement catch basin	< 34 ppm	Approximately 3 ft. of soil and waste materials were found inside the basement catch basin over an area of approximately 75 ft2.	Field Investigation	Figure 1-4
Various cast iron sewer lines in basement containing	< 43.5 ppm	Approximately2,000 linear ft. of sewer piping contained sediments that were contaminated with PCBs < 43.5.	RA Phases 1 and 2 Sewer Line Conf. Sampling	Figure 1-6

* Includes the following areas:

- Areas south and west of basement concrete flooring remediated during Phase 1, but residual PCB contamination remained greater than 7.6 ppm (based on Phase 1 confirmation sample results)
- Areas south and west of the basement concrete flooring containing PCBs between 7.6 ppm and 46.5 ppm, identified during the FI
- Oil-stained areas near Sectors K9 and C8 that contained PCBs > 7.6 ppm, identified during the Site-Specific EBS
- Oil-stained area near Sectors C22 and D22 that contained PCBs > 7.6 ppm, identified during the FI
- Oil-stained area near Sector E28 that contained PCBs > 7.6 ppm, identified during the FI
- Area near Sector E38 referenced in Phase I EBS Report (Tetra Tech, 2000)

Table 1-4

Summary of Removal Action Objectives

RA Objective	Areas and Materials	Cleanup Criteria
Remove materials classified TSCA waste (with concentrations exceeding modified action level of 43.5 ppm).	Concrete flooring on first and second floors, concrete flooring in basement, waste material from Chip Chute area, cast iron sewer piping in basement, soil flooring in basement and Chip Chute, soil and other materials outside the building adjacent to the former Chip Chute load-out area, gravel and soil beneath basement concrete flooring. Select concrete columns in the basement will be decontaminated rather than removed.	Dispose materials in a chemical/hazardous waste landfill permitted to accept PCBs above 50 ppm (TSCA wastes).
Remove building materials contaminated with PCBs (less than 50 ppm).	Concrete flooring (first and second floors), cast iron sewer piping, concrete intermediate support columns, concrete walls in the Chip Chute area, concrete foundation wall adjacent to PCB soil contamination outside the building, materials inside the basement catch basin	Dispose materials in a municipal or demolition landfill permitted to accept low-level PCBs (.e. PCB special wastes).
Remediate PCB-contaminated materials that will remain in building excavation (footprint).	Basement soil flooring and concrete footers.	Remediate (excavate) materials to 7.6 ppm, the health-based PCB cleanup level established through a risk assessment in accordance with 40 CFR 761.61(c).

Table 3-1

Summary of the Removal and Disposal PCB Contamination

Description of PCB Contamination	Approx. Quantity Removed	Phase of RA when Removal Occurred	Disposal Site	Comments and Text Reference
Materials containing PCBs > 43.5 ppm (TSCA wastes):				
Select portions of concrete flooring on first and second floors	843 tons	RA Phase 1	EQ, Wayne Disposal, Inc., Belleville, MI	Flooring was saw-cut into manageable slabs and loaded out onto flatbed trucks for T&D. In some areas, it was necessary to overcut into non-TSCA areas due to structural requirements. Select portions of flooring on the second floor were pulverized in lieu of saw-cutting. The pulverized concrete was loaded into roll-off containers for T&D. Refer to Section 3.4.4.
Basement concrete flooring between Rows 20 and 22	40 tons	RA Phase 1	EQ, Wayne Disposal, Inc., Belleville, MI Q	During RA Phase 1, the upper 2 inches of the flooring between Rows 20 and 22 was scabbled and removed. The pulverized concrete was loaded into roll-off containers for T&D. Concrete below 2 in. remained in the subsurface. (This area was the only basement concrete flooring that remained onsite). Confirmation sample results indicated that residual PCBs, where present, were less than site cleanup level. Refer to Section 3.4.5.
Basement concrete flooring and footers between Rows 9 and 20	Refer to Note 1	RA Phase 2	EQ, Wayne Disposal, Inc., Belleville, MI	Even though PCB contamination, where present, was generally restricted to the upper 2 in. of concrete, all of the concrete flooring was removed and disposed along with the underlying soil and gravel during Phase 2. The flooring was demolished for removal; therefore, it was not possible to segregate contaminated from non-contaminated material. Concrete rubble was loaded-out into end-dump trucks for T&D. Refer to Section 4.3.3.

Description of PCB Contamination	Approx. Quantity Removed	Phase of RA when Removal Occurred	Disposal Site	Comments and Text Reference
Chip Chute waste pile (metal cuttings/shavings)	43 tons (RA Phase 1)	RA Phase 1	EQ, Wayne Disposal, Inc., Belleville, MI	The waste pile was excavated and loaded-out into roll-off containers for T&D. Refer to Section 3.4.2.
Soil flooring in the Chip Chute area	Refer to Note 1	RA Phases 1 & 2	EQ, Wayne Disposal, Inc., Belleville, MI	The upper 2 ft. of soil was excavated during Phase 1. The remaining contaminated soil (approximately 3 ft) was excavated during Phase 2. Materials were loaded into roll-off containers and end-dump trucks for T&D. Refer to Sections 3.4.2 and 4.3.4.
Oil-stained concrete pillars/footers in basement	N/A	RA Phases 1 & 2	Oil residue – EQ, Wayne Disposal, Inc., Belleville, MI Pillars – Waste Management, Milam Landfill, East St. Louis, IL	The oil-staining was decontaminated using TECHXTRACT during Phase 1. The oil residue generated during the process was captured on plastic sheeting and disposed as TSCA waste. The decontaminated pillars were demolished and disposed as PCB special waste during Phase 2. Refer to Section 3.4.6.
Various cast-iron sewer lines in basement containing	650 LF (16 tons)	RA Phases 1 & 2	EQ, Wayne Disposal, Inc., Belleville, MI	Sewer lines containing TSCA materials were identified through confirmation samples collected during Phases 1 and 2. The sewer lines were saw cut into manageable lengths, and the open ends were wrapped. Sections of pipe were loaded into roll-off containers for T&D. Underground portions of the lines were removed by excavation during Phase 2. Refer to Sections 3.4.1 and 4.2.2.
Select portions of basement soil flooring, primarily along the south and west sides of basement concrete flooring	161 tons (RA Phase 1)	RA Phases 1 & 2	EQ, Wayne Disposal, Inc., Belleville, MI	During RA Phase 1, areas of TSCA soil identified during the FI (Areas A through E) were excavated and disposed. Confirmation samples were collected from the excavated areas to verify cleanup below 43.5 ppm. Two of the confirmation samples results were above the threshold. The areas associated to the failed sample results were deferred to Phase 2 for removal. During Phase 1, soil was removed

Description of PCB Contamination	Approx. Quantity Removed	Phase of RA when Removal Occurred	Disposal Site	Comments and Text Reference
				using walk-behind excavators (due to basement ceiling clearance limits) and loaded into roll-off containers for T&D. During Phase 2, the soil was excavated and loaded into end-dump trucks for T&D. The excavations were performed after demolition activities progressed to the point where the work could proceed safely. Refer to Sections 3.4.3 and 4.3.2.
Gravel and soil beneath basement concrete flooring between Rows 9 and 20	Refer to Note 1	RA Phase 2	EQ, Wayne Disposal, Inc., Belleville, MI	The contamination associated with this area was discovered during Phase 1, and the materials were removed during Phase 2. Contaminated soil and gravel were excavated in phases and loaded into end-dump trucks for T&D. The vertical and horizontal limits of contamination exceeded the original estimates due to the following factors: • The 200-ft long concrete wall at Row 20 was removed due to significant oil-staining on the west face of the wall. • Contaminated soil and gravel adjacent to the concrete wall at Row 19 extended to approximately 5 ft. below floor level, to the depth of the wall's footing. Contamination was also encountered in the gravel beneath the footing. • In numerous areas throughout the limits of the 30,000 ft^2 of basement concrete flooring, the depth of contamination exceeded 1 ft. below the flooring. • PCB contamination was particularly concentrated in the soil within a 40-ft radius of the chip chute. The contamination extended approximately 5 ft. below ground/flooring surface, and included concrete flooring

Description of PCB Contamination	Approx. Quantity Removed	Phase of RA when Removal Occurred	Disposal Site	Comments and Text Reference
				(800 ft^2) and underlying contamination on the east and west sides of the chip chute. • PCB soil contamination extended beyond the limits of the basement concrete flooring to a depth of approximately 2 ft bgs in a 3,000 ft^2 along the north side of the flooring. Refer to Section 4.3.3.
Soil and other materials outside Building 3, in the vicinity of the former Chip Chute load-out area	Refer to Note 1	RA Phase 2	EQ, Wayne Disposal, Inc., Belleville, MI	PCB contaminated materials (gravel, metal cuttings, and soil) in this area extended significantly deeper and wider than originally estimated. The depth of contamination in select areas reached as deep as 10 ft. bgs. The areal extent of contamination in this area exceeded the original estimate (2,500 ft^2) by nearly 1,000 ft^2. Materials were excavated and loaded into end-dump trucks for T&D. Refer to Section 4.3.4.
Materials containing PCBs < 50 ppm (PCB special wastes):				
Select portions of concrete flooring on first and second floors	17,000 tons	RA Phase 2 (Demolition)	Waste Management, Milam Landfill, East St. Louis, IL	Contaminated concrete flooring was removed concurrent with the demolition of the building structure. (Note: The limits of PCB-contaminated flooring were conservatively drawn to facilitate the segregation of contaminated and non-contaminated concrete flooring during demolition. Refer to Figures 1-2 and 1-3.) The flooring was pulverized and loaded into end-dump trucks for T&D. Refer to Section 4.2.6.
Select portions of basement soil flooring *	721 tons	RA Phase 2	Waste Management, Milam Landfill, East St. Louis, IL	Soil flooring was excavated and loaded into end-dump trucks for T&D. The excavations were performed after demolition activities progressed to the point where the work could proceed safely. Refer to Section 4.3.2.

Description of PCB Contamination	Approx. Quantity Removed	Phase of RA when Removal Occurred	Disposal Site	Comments and Text Reference
Intermediate concrete support pillars in the basement between Rows 9 and 22	623 tons	RA Phase 2 (Demolition)	Waste Management, Milam Landfill, East St. Louis, IL	All intermediate support pillars were removed concurrent with the demolition of the building structure. The pillars were pulverized and loaded into end-dump trucks for T&D. Refer to Section 4.2.6.
Oil-stained concrete footer at G25	5 tons	RA Phase 2	Waste Management, Milam Landfill, East St. Louis, IL	The concrete footer was pulverized with an excavator and loaded into end-dump trucks for T&D. Refer to Section 4.3.5.
Concrete foundation wall adjacent to Chip Chute and load-out area	100 LF (75 tons)	RA Phase 2	Waste Management, Milam Landfill, East St. Louis, IL	A 100-ft section of the north foundation wall initially left in-place during demolition. The wall was eventually demolished concurrent with the removal of PCB-contaminated materials outside the building (see above). The wall was pulverized using an excavator, and the materials were loaded into end-dump trucks for T&D. Refer to Section 4.3.4.
Interior concrete walls around Chip Chute area	40 LF (30 tons)	RA Phase 2	Waste Management, Milam Landfill, East St. Louis, IL	The interior concrete walls on the east and west sides of the Chip Chute area were initially left in-place during demolition. The wall was eventually demolished concurrent with the removal of PCB-contaminated materials outside the building (see above). The wall was pulverized using an excavator, and the materials were loaded into end-dump trucks for T&D. Refer to Section 4.3.4.
Material inside basement catch basin	14 tons	RA Phase 2	Waste Management, Milam Landfill, East St. Louis, IL	Materials (soil and waste) found inside the basement catch basin were excavated and loaded into end-dump trucks during Phase 2. Refer to Section 4.3.5.
Various cast iron sewer lines in basement containing	2,000 LF (16 tons)	RA Phase 2	Allied Waste, Bridgeton Landfill, Bridgeton, MO	Sewer lines containing PCBs < 43.5 ppm were identified through confirmation samples collected during Phases 1 and 2. The sewer lines were saw cut into manageable lengths,

Description of PCB Contamination	Approx. Quantity Removed	Phase of RA when Removal Occurred	Disposal Site	Comments and Text Reference
				and the open ends were wrapped. Sections of pipe were loaded into roll-off containers for T&D. Underground portions of the lines were removed by excavation. Refer to Section 4.2.2.

* Includes the following areas:

- Areas south and west of basement concrete flooring remediated during Phase 1, but residual PCB contamination remained greater than 7.6 ppm (based on Phase 1 confirmation sample results)
- Areas south and west of the basement concrete flooring containing PCBs between 7.6 ppm and 46.5 ppm, identified during the FI
- Oil-stained areas near Sectors K9 and C8 that contained PCBs > 7.6 ppm, identified during the Site-Specific EBS
- Oil-stained area near Sectors C22 and D22 that contained PCBs > 7.6 ppm, identified during the FI
- Oil-stained area near Sector E28 that contained PCBs > 7.6 ppm, identified during the FI
- Area near Sector E38 referenced in Phase I EBS Report (Tetra Tech, 2000)

Note 1 – Overall, 10,580 tons of TSCA waste were removed and disposed during RA Phase 2, including the basement concrete flooring, soil and gravel beneath and adjacent to the basement concrete flooring, soil flooring in Chip Chute area, and soil and gravel outside the building.

Table 3-2

Chronology of Field Activities During RA Phase 1

Week/Date	Activities
Week 1 (11/12/01 – 11/18/01)	• Mobilization • Asbestos floor cleaning in basement • Asbestos piping removal in basement • Demolition for access to Chip Chute • Interior demolition in preparation for concrete floor removal • Concrete floor confirmation sampling on first and second floors • Layout for concrete flooring removal
Week 2 (11/19/01 – 11/21/01)	• Asbestos piping removal in basement • Sewer line confirmation sampling • Layout for concrete flooring removal
Week 3 (11/26/01 – 12/2/01)	• Asbestos piping and ACM removal in basement • Concrete floor confirmation sampling in basement • Layout for concrete flooring removal • Sewer line confirmation sampling • Removal of PCB-contaminated sewer lines • Excavation and load-out of PCB-contaminated soil in basement • Soil confirmation sampling in basement
Week 4 (12/3/01 – 12/6/01)	• Removal of PCB-contaminated sewer lines in basement • Layout for concrete flooring removal • Interior demolition in preparation for concrete floor removal • Load-out of PCB-contaminated soil in basement • Concrete floor confirmation sampling in basement
Week 5 (12/10/01 – 12/16/01)	• Concrete flooring removal on second floor • Layout for concrete flooring removal • Concrete flooring removal on first floor • Load-out of pulverized concrete • Load-out of concrete slabs
Week 6 (12/17/01 – 12/20/01)	• Layout for concrete flooring removal • Concrete flooring removal on first floor • Load-out of concrete slabs
Week 7 (1/2/02 – 1/6/02)	• Layout for concrete flooring removal • Concrete flooring removal on first floor • Removal of residual concrete from I-beams

Week/Date	Activities
	• Load-out of concrete slabs • Installation of chain-link fencing around open flooring
Week 8 (1/7/02 – 1/10/02)	• Layout for concrete flooring removal • Concrete flooring removal on first floor • Concrete floor removal (scabbling) in basement hallway • Load-out of concrete slabs • Installation of chain-link fencing around open flooring
Week 9 (1/14/02 – 1/20/02)	• Concrete flooring removal (scabbling) in basement hallway • Load-out of pulverized concrete • Removal of concrete slurry from basement floor • Load-out of concrete slabs • Installation of chain-link fencing around open flooring • Investigation of oil-stained gravel beneath basement concrete flooring • Confirmation sampling of concrete from horizontal I-beams
Week 10 (1/21/02 – 1/24/02)	• Vacuuming and collection of concrete debris from scabbling operation in basement hallway • Collection of ACM bulk samples • Concrete floor confirmation sampling in basement hallway
Week 11 (1/28/02 – 1/31/02)	• Concrete pillar/footer decontamination in basement • Removal and load-out of soil from Chip Chute
Week 12 (2/11/02 – 2/17/02)	• Layout for asbestos abatement activities • Asbestos abatement in basement
Week 13 (2/18/02 – 2/21/02)	• Asbestos abatement in basement
Week 14 (2/25/02 – 3/3/02)	• Asbestos abatement in basement • Load-out of ACM debris • EBS soil sampling in basement
Week 15 (3/4/02 – 3/7/02)	• Asbestos abatement in basement • Load-out of ACM debris • EBS soil sampling in basement • Demobilization

Table 3-3
Sewer Line TCLP Sample Results

Sample ID	Media	Type	Analysis	Date Collected	Ar	Ba	Cd	Cr	Pb	Se	Ag	Hg	SVOCs
PS-B15A	Sediment	Sewer	TCLP Metals	11/28/01	ND	0.10	0.06	ND	ND	ND	ND	ND	---
PS-B15A	Sediment	Sewer	TCLP SVOCs	11/28/01	---	---	---	---	---	---	---	---	All ND
PS-G28A	Sediment	Sewer	TCLP Metals	11/28/01	ND	0.96	0.05	ND	ND	ND	ND	ND	---
PS-G28A	Sediment	Sewer	TCLP SVOCs	11/28/01	---	---	---	---	---	---	---	---	All ND
PS-H12A	Sediment	Sewer	TCLP Metals	11/19/01	ND	1.57	0.09	ND	0.39	0.20	ND	ND	---
PS-H12A	Sediment	Sewer	TCLP SVOCs	11/19/01	---	---	---	---	---	---	---	---	All ND
PS-B15B	Sediment	Sewer	TCLP Metals	11/19/01	ND	0.79	0.08	ND	ND	0.17	ND	ND	---
PS-B15B	Sediment	Sewer	TCLP SVOCs	11/19/01	---	---	---	---	---	---	---	---	All ND

All units are mg/L

ND = Not detected above detection limit

Table 3-4
Data Gap PCB Sample Results for Basement Concrete Flooring

Sample ID	Date Collected	Media	Type	Analysis	PCBs Conc. (mg/kg)
CFB23-01	11/26/01	Concrete Floor	Data Gap	PCBs	77.50
CFB24-01	11/26/01	Concrete Floor	Data Gap	PCBs	73.69
CFB25-01	11/26/01	Concrete Floor	Data Gap	PCBs	166.47
CFB26-01	11/26/01	Concrete Floor	Data Gap	PCBs	31.30
CFB526-01	11/26/01	Duplicate of CFB26-01	Data Gap	PCBs	30.35
CFB27-01	11/26/01	Concrete Floor	Data Gap	PCBs	56.97
CFB28-01	11/26/01	Concrete Floor	Data Gap	PCBs	37.80
CFB29-01	11/26/01	Concrete Floor	Data Gap	PCBs	25.47
CFB30-01	11/26/01	Concrete Floor	Data Gap	PCBs	51.23
CFB530-01	11/26/01	Duplicate of CFB30-01	Data Gap	PCBs	50.66
CFB31-01	11/26/01	Concrete Floor	Data Gap	PCBs	30.94
CFB32-01	11/26/01	Concrete Floor	Data Gap	PCBs	69.87
CFB33-01	11/26/01	Concrete Floor	Data Gap	PCBs	39.03
CFB34-01	11/26/01	Concrete Floor	Data Gap	PCBs	24.31
CFB35-01	11/26/01	Concrete Floor	Data Gap	PCBs	17.64
CFB36-01	11/26/01	Concrete Floor	Data Gap	PCBs	18.38
CFB37-01	11/26/01	Concrete Floor	Data Gap	PCBs	12.55
CFB38-01	11/26/01	Concrete Floor	Data Gap	PCBs	105.09
CFB39-01	11/26/01	Concrete Floor	Data Gap	PCBs	56.34
CFB40-01	11/26/01	Concrete Floor	Data Gap	PCBs	47.04
CFB41-01	12/6/01	Concrete Floor	Data Gap	PCBs	0.31
CFB541-01	12/6/01	Duplicate of CFB41-01	Data Gap	PCBs	ND
CFB42-01	12/6/01	Concrete Floor	Data Gap	PCBs	8.96
CFB43-01	12/6/01	Concrete Floor	Data Gap	PCBs	3.93
CFB44-01	12/6/01	Concrete Floor	Data Gap	PCBs	ND
CFB45-01	12/6/01	Concrete Floor	Data Gap	PCBs	3.35
CFB46-01	12/6/01	Concrete Floor	Data Gap	PCBs	0.29
CFB47-01	12/6/01	Concrete Floor	Data Gap	PCBs	0.64
CFB48-01	12/6/01	Concrete Floor	Data Gap	PCBs	ND
CFB49-01	12/6/01	Concrete Floor	Data Gap	PCBs	1.77
CFB50-01	12/6/01	Concrete Floor	Data Gap	PCBs	12.61
CFB51-01	12/6/01	Concrete Floor	Data Gap	PCBs	1.46
CFB52-01	12/6/01	Concrete Floor	Data Gap	PCBs	4.43

ND = Not detected above detection limit

Table 4-1

Chronology of Field Activities During RA Phase 2

Week/Date	Activities
Week 1 (7/8/02 – 7/14/02)	• Mobilization • Asbestos abatement in basement • Collection of ACM bulk samples • Sewer line confirmation sampling in basement
Week 2 (7/15/02 – 7/17/02)	• Asbestos abatement in basement
Week 3 (7/22/02 – 7/28/02)	• Asbestos abatement in basement • Load-out of ACM debris
Week 4 (7/29/02 – 7/31/02)	• Asbestos abatement in basement • Removal of ACM floor tiles on first and second floors • Load-out of ACM debris
Week 5 (8/5/02 – 8/11/02)	• Completed asbestos abatement in basement • Clearance air sampling for asbestos abatement in basement • Removal of transite inside building • Removal of transite on exterior of building • Load-out of ACM debris • Interior demolition for access to ACM inside crawl spaces • Removal of ACM from crawl spaces on first and second floors • Removal and load-out of PCB-contaminated sewer lines
Week 6 (8/12/02 – 8/15/02)	• Removal of transite inside the building • Removal of transite on exterior of building • Removal and load-out of PCB-contaminated sewer lines in basement • Collection of interior paint samples for heavy metals analysis
Week 7 (8/19/02 – 8/23/02)	• Interior gutting/demolition in preparation for building demolition • Removal of transite on exterior of building • Removal of fluorescent light bulbs/ballasts from building • Capping of sewer line in basement • Recovery of refrigerant from air conditioning units on roof
Week 8 (8/26/02 – 8/30/02)	• Interior gutting/demolition in preparation for building demolition

Week/Date	Activities
	• Removal of transite on exterior of building • Capping of sewer lines in basement • Capping of water supply lines • Removal of transformers and panels • Miscellaneous salvage operations
Week 9 (9/3/02 – 9/6/02)	• Interior gutting/demolition in preparation for building demolition • Building demolition • Selective demolition of lead-based painted interior walls • Removal of ACM windows • Removal of transite on exterior of building • Removal of transformers and panels • Miscellaneous salvage operations
Week 10 (9/9/02 – 9/13/02)	• Building demolition • Processing and load-out of demolition debris • Selective demolition of lead-based painted interior walls • Removal of ACM windows
Week 11 (9/16/02 – 9/20/02)	• Building demolition • Removal of PCB special waste concrete flooring during demolition • Processing and load-out of demolition debris • Removal of ACM windows
Week 12 (9/23/02 – 9/27/02)	• Building demolition • Removal of PCB special waste concrete flooring during demolition • Processing and load-out of demolition debris • Removal of ACM windows
Week 13 (9/30/02 – 10/4/02)	• Building demolition • Removal of PCB special waste concrete flooring during demolition • Processing and load-out of demolition debris
Week 14 (10/7/02 – 10/11/02)	• Building demolition • Removal of PCB special waste concrete flooring during demolition • Processing and load-out of demolition debris
Week 15 (10/14/02 – 10/18/02)	• Building demolition • Removal of PCB special waste concrete flooring during demolition • Processing and load-out of demolition debris • Backfill placement

Week/Date	Activities
Week 16 (10/21/02 – 10/25/02)	• Building demolition • Removal of PCB special waste concrete flooring during demolition • Processing and load-out of demolition debris • Backfill placement
Week 17 (10/28/02 – 11/1/02)	• Building demolition • Removal of PCB special waste concrete flooring during demolition • Processing and load-out of demolition debris • Backfill placement
Week 18 (11/4/02 – 11/10/02)	• Building demolition • Removal of PCB special waste concrete flooring during demolition • Processing and load-out of demolition debris • Backfill placement • Demolition, stockpiling, and load-out of basement concrete flooring • Excavation, stockpiling, and load-out of PCB-contaminated soil adjacent to basement concrete flooring • Excavation, stockpiling, and load-out of PCB-contaminated soil and gravel beneath basement concrete flooring • Removal of PCB-contaminated underground sewer line near H9 • Soil confirmation sampling
Week 19 (11/11/02 – 11/15/02)	• Building demolition • Removal of PCB special waste concrete flooring during demolition • Processing and load-out of demolition debris • Backfill placement • Demolition, stockpiling, and load-out of basement concrete flooring • Excavation, stockpiling, and load-out of PCB-contaminated soil and gravel beneath basement concrete flooring • Soil confirmation sampling
Week 20 (11/18/02 – 11/24/02)	• Completed building demolition • Demolition, stockpiling, and load-out of basement concrete flooring • Excavation and load-out of PCB-contaminated soil east of Row 22 • Removal of PCB-contaminated underground sewer

Week/Date	Activities
	lines east of Row 22 • Demolition and removal of concrete footer at G25 • Excavation, stockpiling, and load-out of PCB-contaminated soil and gravel beneath basement concrete flooring • Soil confirmation sampling • Backfill placement
Week 21 (11/25/02 – 11/27/02)	• Demolition, stockpiling, and load-out of basement concrete flooring • Excavation, stockpiling, and load-out of PCB-contaminated soil and gravel beneath basement concrete flooring • Soil confirmation sampling • Backfill placement
Week 22 (12/2/02 – 12/8/02)	• Completed demolition, stockpiling, and load-out of basement concrete flooring • Demolition and removal of concrete wall at Row 20 • Excavation, stockpiling, and load-out of PCB-contaminated soil and gravel beneath basement concrete flooring • Excavation, stockpiling, and load-out of PCB-contaminated soil adjacent to basement concrete flooring • Soil confirmation sampling • Backfill placement
Week 23 (12/9/02 – 12/11/02)	• Excavation, stockpiling, and load-out of PCB-contaminated soil and gravel beneath basement concrete flooring • Excavation, stockpiling, and load-out of PCB-contaminated soil adjacent to basement concrete flooring • Demolition, stockpiling, and load-out of concrete flooring adjacent to Chip Chute • Load-out of PCB-contaminated soil and concrete • Soil confirmation sampling • Backfill placement
Week 24 (12/16/02 – 12/22/02)	• Load-out of PCB-contaminated soil and concrete • Excavation, stockpiling, and load-out of PCB-contaminated materials from the Chip Chute area • Excavation, stockpiling, and load-out of PCB-contaminated materials from the area outside the building, adjacent to the Chip Chute

Week/Date	Activities
	• Soil confirmation sampling
Week 25 (12/23/02)	• Load-out of PCB-contaminated soil and concrete • Excavation, stockpiling, and load-out of PCB-contaminated materials from the area outside the Chip Chute
Week 26 (1/6/03 – 1/10/03)	• Completed load-out of PCB-contaminated soil and concrete • Completed excavation and load-out of PCB-contaminated materials from the area outside the Chip Chute • Completed soil confirmation sampling
Week 27 (1/13/03 – 1/15/03)	• Backfill placement • Demobilization
Week 28	• Completed backfill placement
Week 29	• Completed topsoil placement and seeding

Table 3-5
Miscellaneous Waste Sample Results and Disposal Methods

Source	Sample ID(s)	Media	Date(s) Collected	Analysis	Findings	Quantity	Disposal Method
Cooling water from concrete coring and saw cutting	RADW-121301 RADW-122001A	Water	12/20/2001 12/20/01	Oil & Grease	Detected at 50.1 mg/l	3,000 gallons (60 drums)	Discharged to sanitary sewer system under permit from St. Louis Metropolitan Sewer District.
				Total SVOCs	Low levels of various analytes		
				PCBs	Non-detect for all analytes		
				Total Metals	Low levels of various metals detected		
Slurry from concrete coring and saw cutting (from drum storage)	RADW-122001B RADW-010702	Slurry/ Sediment	12/20/2001 1/7/02	PCBs	PCB's detected at 0.43 mg/kg and 26.3 mg/kg	24 drums (5.4 tons)	Shipped to EQ - The Environmental Quality Company, Wayne Disposal, Inc. (RCRA/TSCA disposal facility) for disposal as PCB waste.
				Total Metals	Moderate levels of various metals detected		
				TCLP Metals	Various metals detected at low levels		
				TCLP SVOCs	Low level of Di-n-butylphthalate detected		
Water from concrete vault in basement at K14	RADW-072602A	Water	7/26/02	VOCs	Non-detect for all analytes	2,000 gallons	No action. Water was left in place.
				SVOCs	Non-detect for all analytes		
				Oil & Grease	Oil and Grease detected at 2.5 mg/l		
				PCBs	Non-detect for all analytes		
				Total Metals	Low levels of various metals detected		

Table 3-5
Miscellaneous Waste Sample Results and Disposal Methods

Source	Sample ID(s)	Media	Date(s) Collected	Analysis	Findings	Quantity	Disposal Method
Water from concrete vault in basement at K24	RADW-072602B	Water	7/26/02	VOCs	Non-detect for all analytes	2,192 gallons	Shipped to EQ - The Environmental Quality Company, Wayne Disposal, Inc. (RCRA/TSCA disposal facility) for disposal as PCB waste.
				SVOCs	Non-detect for all analytes		
				Oil & Grease	Oil and Grease detected at 7,250 mg/l		
				PCBs	PCBs detected at 3.37 mg/l		
				Total Metals	Low levels of various metals detected		
Storm water from TSCA remediation area - Baker Tank	RADW-112102	Water	11/21/02	VOCs	Low levels of various analytes	20,000 gallons	Discharged to sanitary sewer system under permit from St. Louis Metropolitan Sewer District.
				SVOCs	Low levels of various analytes		
				Oil & Grease	Non-detect		
				PCBs	Non-detect for all analytes		
				Total Metals	Low levels of various metals detected		
				TSS	Non-detect		
				COD	Detected at 217 mg/L		
				Total Cyanide	Non-detect		

Table 3-5
Miscellaneous Waste Sample Results and Disposal Methods

Source	Sample ID(s)	Media	Date(s) Collected	Analysis	Findings	Quantity	Disposal Method
Oil drained from distribution lines in basement	OIL LINES	Oil	11/21/02	PCBs	PCBs detected at 46.3 mg/kg	150 gallons (3 drums)	Shipped to EQ - The Environmental Quality Company, Wayne Disposal, Inc. (RCRA/TSCA disposal facility) for disposal as PCB waste.

Table 3-6
Summary of Off-Site Waste Shipments During RA Phase 1

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
11/19/01	20-yard roll-off	N/A	Debris from demolition of outside wall of Chip Chute, non-TSCA piping from basement	Allied Waste, Bridgeton Landfill	NA	16.5
11/21/01	20-yard roll-off	N/A	Asbestos bladder bag containing debris from basement floor cleaning (vacuuming) operation	Waste Management, Roxana Landfill	NA	3.1
11/28/01	40-yard roll-off	N/A	139 asbestos disposal bags containing pipe insulation; 150 x 10 ft steel pipe with asbestos insulation	Waste Management, Roxana Landfill	NA	8.4
12/1/01	23-yard roll-off	1	PCB soil removed from basement	EQ, Wayne Disposal Inc.	18.3	
12/1/01	23-yard roll-off	2	PCB soil removed from basement	EQ, Wayne Disposal Inc.	18.5	
12/4/01	23-yard roll-off	3	PCB soil removed from basement	EQ, Wayne Disposal Inc.	16.6	
12/4/01	23-yard roll-off	4	PCB soil (4 tons) and TSCA sewer piping removed from basement	EQ, Wayne Disposal Inc.	15.6	
12/5/01	20-yard roll-off	N/A	Debris from wall demolitions near CF1G30, fencing from second floor	Allied Waste, Bridgeton Landfill	NA	9.2
12/5/01	20-yard roll-off	N/A	Non-TSCA sewer piping from basement, debris from office demolition near CF1H9	Allied Waste, Bridgeton Landfill	NA	8.5
12/5/01	14 drums	5	PCB-contaminated soil from floor cleaning operation, including ACM debris	EQ, Wayne Disposal Inc.	5.2	
12/5/01	23-yard roll-off	6	PCB soil removed from basement	EQ, Wayne Disposal Inc.	17.3	
12/6/01	23-yard roll-off	7	PCB soil removed from basement	EQ, Wayne Disposal Inc.	25.1	
12/14/01	23-yard roll-off	8	PCB concrete rubble (primarily cap material) removed from second floor	EQ, Wayne Disposal Inc.	11.8	
12/14/01	Flatbed	9	PCB concrete slabs	EQ, Wayne Disposal Inc.	20.2	
12/15/01	Flatbed	10	PCB concrete slabs	EQ, Wayne Disposal Inc.	19.1	
12/16/01	Flatbed	11	PCB concrete slabs	EQ, Wayne Disposal Inc.	20.4	
12/17/01	20-yard roll-off	N/A	Debris from demolition of offices near CF1A19	Allied Waste, Bridgeton Landfill	NA	5.9
12/19/01	Flatbed	12	PCB concrete slabs	EQ, Wayne Disposal Inc.	21.8	
12/19/01	Flatbed	13	PCB concrete slabs	EQ, Wayne Disposal Inc.	24.4	
12/19/01	Flatbed	14	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.3	
12/19/01	Flatbed	15	PCB concrete slabs	EQ, Wayne Disposal Inc.	18.0	
12/19/01	Flatbed	16	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.3	
12/19/01	Flatbed	17	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.4	

Table 3-6
Summary of Off-Site Waste Shipments During RA Phase 1

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
12/19/01	23-yard roll-off	18	Concrete rubble from breaking operation on second floor	EQ, Wayne Disposal Inc.	10.8	
12/19/01	Flatbed	19	PCB concrete slabs	EQ, Wayne Disposal Inc.	22.0	
12/19/01	Flatbed	20	PCB concrete slabs	EQ, Wayne Disposal Inc.	22.9	
12/19/01	23-yard roll-off	21	Concrete rubble from breaking operation on second floor	EQ, Wayne Disposal Inc.	12.0	
12/20/01	23-yard roll-off	22	Concrete rubble from breaking operation on second floor	EQ, Wayne Disposal Inc.	13.7	
1/3/02	Flatbed	23	PCB concrete slabs	EQ, Wayne Disposal Inc.	22.8	
1/3/02	Flatbed	24	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.8	
1/3/02	Flatbed	25	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.3	
1/3/02	Flatbed	26	PCB concrete slabs	EQ, Wayne Disposal Inc.	22.4	
1/3/02	Flatbed	27	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.1	
1/3/02	Flatbed	28	PCB concrete slabs	EQ, Wayne Disposal Inc.	22.7	
1/3/02	Flatbed	29	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.6	
1/3/02	Flatbed	30	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.9	
1/4/02	23-yard roll-off	31	PCB concrete rubble from breaking operation on second floor	EQ, Wayne Disposal Inc.	8.7	
1/4/02	Flatbed	32	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.7	
1/4/02	Flatbed	33	PCB concrete slabs	EQ, Wayne Disposal Inc.	24.2	
1/6/02	Flatbed	34	PCB concrete slabs	EQ, Wayne Disposal Inc.	27.2	
1/7/02	Flatbed	35	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.9	
1/7/02	Flatbed	36	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.3	
1/8/02	Flatbed	37	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.6	
1/8/02	Flatbed	38	PCB concrete slabs	EQ, Wayne Disposal Inc.	24.0	
1/8/02	Flatbed	39	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.9	
1/9/02	Flatbed	40	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.6	
1/9/02	Flatbed	41	PCB concrete slabs	EQ, Wayne Disposal Inc.	24.0	
1/9/02	Flatbed	42	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.4	
1/9/02	Flatbed	43	PCB concrete slabs	EQ, Wayne Disposal Inc.	23.4	
1/10/02	Flatbed	44	PCB concrete slabs	EQ, Wayne Disposal Inc.	22.6	
1/10/02	Flatbed	45	PCB concrete slabs	EQ, Wayne Disposal Inc.	21.4	
1/14/02	Flatbed	46	PCB concrete slabs	EQ, Wayne Disposal Inc.	17.4	
1/15/02	23-yard roll-off	47	PCB concrete	EQ, Wayne Disposal Inc.	12.1	
1/15/02	23-yard roll-off	48	PCB soil	EQ, Wayne Disposal Inc.	15.1	

Table 3-6
Summary of Off-Site Waste Shipments During RA Phase 1

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
1/15/02	23-yard roll-off	49	PCB soil	EQ, Wayne Disposal Inc.	15.9	
1/18/02	23-yard roll-off	50	PCB soil	EQ, Wayne Disposal Inc.	16.0	
1/18/02	23-yard roll-off	51	PCB soil	EQ, Wayne Disposal Inc.	17.7	
1/23/02	23-yard roll-off	52	PCB concrete	EQ, Wayne Disposal Inc.	13.0	
1/23/02	23-yard roll-off	53	PCB concrete	EQ, Wayne Disposal Inc.	14.6	
1/23/02	23-yard roll-off	54	PCB concrete	EQ, Wayne Disposal Inc.	12.6	
1/30/02	23-yard roll-off	55	PCB soil - Chip Chute	EQ, Wayne Disposal Inc.	10.3	
1/30/02	23-yard roll-off	56	PCB soil - Chip Chute	EQ, Wayne Disposal Inc.	18.1	
1/30/02	23-yard roll-off	57	PCB soil - Chip Chute	EQ, Wayne Disposal Inc.	14.0	
3/1/02	20-yard roll-off	NA	Special waste - PPE, absorbents, plastic, other debris	Allied Waste, Bridgeton Landfill	NA	2.6
3/1/02	40-yard roll-off	NA	342 asbestos disposal bags containing pipe insulation from basement	Waste Management, Roxana Landfill	NA	5.3
3/1/02	40-yard roll-off	NA	311 asbestos disposal bags containing pipe insulation from basement	Waste Management, Roxana Landfill	NA	5.2
3/1/02	40-yard roll-off	NA	275 asbestos disposal bags containing pipe insulation from basement	Waste Management, Roxana Landfill	NA	3.9
3/6/02	40-yard roll-off	NA	300 asbestos disposal bags containing pipe insulation from basement	Waste Management, Roxana Landfill	NA	3.2
3/6/02	24 drums	58	Concrete slurry/sediment containing PCBs	EQ, Wayne Disposal Inc., Wayne Disposal Inc.	NA	5.4
3/6/02	36 drums	59	PCB-contaminated empty drums	EQ, Wayne Disposal Inc., Wayne Disposal Inc.	NA	0.9
TOTAL					**1,107**	**78**

Table 3-7

Final Estimate of RA Waste Quantities

Waste Stream	Waste Classification	Disposal Facility and Location	Number of Loads	Quantity
Soil, concrete rubble, concrete slabs, sewer piping, and metal shavings (generated during RA)	TSCA waste	EQ, Wayne Disposal, Inc, Belleville, MI	469 loads	11,687 tons
PCB-contaminated water, concrete slurry, empty drums, and waste oil (generated during RA)	TSCA and PCB special waste	EQ, Wayne Disposal, Inc, Belleville, MI	4 loads	16 tons
Concrete rubble and soil (generated during RA)	PCB special waste	Waste Management, Milam Landfill, East St. Louis, IL	35 loads	845 tons
Concrete rubble (generated during demolition)	PCB special waste	Waste Management, Milam Landfill, East St. Louis, IL	1,107 loads	18,000 tons (est.)
Brick coated with lead-based paint (generated during demolition)	Non-hazardous (lead-based paint)	Chain-of-Rocks Landfill, Granite City, IL and Waste Management, Milam Landfill, East St. Louis, IL	69 loads	1,700 tons (est.)
Asbestos-containing window caulk, transite from the outside of the building (generated during demolition)	Asbestos	Waste Management, Milam Landfill, East St. Louis, IL	5 loads - transite 4 loads – windows	40 tons (est.)
Asbestos-containing piping insulation, transite from the interior of the building, floor tile, and debris from basement floor (generated during RA)	Asbestos	Allied Waste, Roxana Landfill, Roxana, IL	16 loads	65 tons

Waste Stream	Waste Classification	Disposal Facility and Location	Number of Loads	Quantity
PCB special waste sewer piping (generated during RA)	PCB special waste	Allied Waste, Bridgeton Landfill, Bridgeton, MO	3 loads	15 tons
Non-contaminated building debris (generated during demolition)	Non-hazardous	Construction site at 4600 Goodfellow	445 loads	6,600 tons (est.)
Non-contaminated building debris (generated during RA)	Non-hazardous	Allied Waste, Bridgeton Landfill, Bridgeton, MO	5 loads	43 tons
PPE, absorbents, and plastic (generated during FI and RA)	Non-hazardous	Allied Waste, Bridgeton Landfill, Bridgeton, MO	1 load	3 tons

The following materials are not included in the table:

- Scrap iron and steel generated during demolition, shipped to Grossman Recycling Co. – 240 loads
- Fluorescent light bulbs and ballasts generated during demolition, shipped to Luminaire Recycling Co. – 1 shipment
- Miscellaneous equipment and materials scrapped or recycled during demolition (i.e. transformers, electrical equipment, freon from AC units)

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
7/24/02	40-yard roll-off	NA	334 asbestos disposal bags containing pipe insulation from basement	Waste Management, Roxana Landfill	NA	5.1
7/24/02	40-yard roll-off	NA	340 asbestos disposal bags containing pipe insulation from basement	Waste Management, Roxana Landfill	NA	4.6
7/24/02	40-yard roll-off	NA	326 asbestos disposal bags containing pipe insulation from basement	Waste Management, Roxana Landfill	NA	4.1
7/29/02	40-yard roll-off	NA	176 asbestos disposal bags containing pipe insulation from basement, 65 sections of asbestos piping	Waste Management, Roxana Landfill	NA	4.1
7/30/02	20-yard roll-off	NA	ACM floor tile from first and second floors	Waste Management, Roxana Landfill	NA	1.1
7/31/02	40-yard roll-off	NA	226 asbestos disposal bags containing pipe insulation from basement, 35 sections of asbestos piping	Waste Management, Roxana Landfill	NA	4.9
8/9/02	20-yard roll-off	NA	ACM transite from first floor ceiling	Waste Management, Roxana Landfill	NA	4.6
8/12/02	40-yard roll-off	NA	227 asbestos disposal bags containing pipe insulation from basement, 4 sections of asbestos piping	Waste Management, Roxana Landfill	NA	4.0
8/13/02	20-yard roll-off	NA	ACM transite from first floor ceiling, walls, and office	Waste Management, Roxana Landfill	NA	2.6
8/13/02	20-yard roll-off	NA	Cast-iron sewer piping from basement (PCBs < 50 ppm)	Allied Waste, Bridgeton Landfill	NA	7.2
8/13/02	20-yard roll-off	NA	Cast-iron sewer piping from basement (PCBs < 50 ppm)	Allied Waste, Bridgeton Landfill	NA	5.4
8/14/02	20-yard roll-off	NA	Cast-iron sewer piping from basement (PCBs < 50 ppm)	Allied Waste, Bridgeton Landfill	NA	2.6
9/17/02	23-yard roll-off	60	TSCA sewer piping from basement	EQ, Wayne Disposal Inc.	1.6	
10/1/02	Vacuum Truck	61	PCB-contaminated water from concrete room in basement (@ K24)	EQ, Wayne Disposal Inc.	NA	9.1
11/12/02	End-Dump Truck	62	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	21.8	
11/12/02	End-Dump Truck	63	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	23.5	
11/12/02	End-Dump Truck	64	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	24.3	
11/12/02	End-Dump Truck	65	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	23.0	
11/12/02	End-Dump Truck	66	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	25.0	
11/12/02	End-Dump Truck	67	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	24.4	

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
11/12/02	End-Dump Truck	68	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.8	
11/12/02	End-Dump Truck	69	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.5	
11/12/02	End-Dump Truck	70	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.5	
11/12/02	End-Dump Truck	71	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.4	
11/12/02	End-Dump Truck	72	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.9	
11/12/02	End-Dump Truck	73	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.2	
11/12/02	End-Dump Truck	74	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.7	
11/12/02	End-Dump Truck	75	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.7	
11/12/02	End-Dump Truck	76	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.6	
11/12/02	End-Dump Truck	77	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.5	
11/12/02	End-Dump Truck	78	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	27.4	
11/13/02	End-Dump Truck	79	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.3	
11/13/02	End-Dump Truck	80	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.0	
11/13/02	End-Dump Truck	81	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.1	
11/13/02	End-Dump Truck	82	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.3	
11/13/02	End-Dump Truck	83	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.6	
11/13/02	End-Dump Truck	84	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.5	
11/13/02	End-Dump Truck	85	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.8	
11/13/02	End-Dump Truck	86	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.5	
11/13/02	End-Dump Truck	87	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	27.1	
11/13/02	End-Dump Truck	88	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.5	
11/13/02	End-Dump Truck	89	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.6	
11/14/02	End-Dump Truck	90	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.3	
11/14/02	End-Dump Truck	91	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.1	
11/14/02	End-Dump Truck	92	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	20.9	
11/14/02	End-Dump Truck	93	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	23.9	
11/14/02	End-Dump Truck	94	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	24.7	
11/14/02	End-Dump Truck	95	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	25.1	
11/14/02	End-Dump Truck	96	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	25.0	
11/14/02	End-Dump Truck	97	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.4	
11/14/02	End-Dump Truck	98	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.1	
11/14/02	End-Dump Truck	99	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.1	
11/18/02	End-Dump Truck	100	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	24.7	

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
11/18/02	End-Dump Truck	101	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.5	
11/18/02	End-Dump Truck	102	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	24.7	
11/18/02	End-Dump Truck	103	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	20.8	
11/18/02	End-Dump Truck	104	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	24.5	
11/18/02	End-Dump Truck	105	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.3	
11/18/02	End-Dump Truck	106	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.0	
11/18/02	End-Dump Truck	107	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.8	
11/18/02	End-Dump Truck	108	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.9	
11/18/02	End-Dump Truck	109	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	25.7	
11/18/02	End-Dump Truck	110	TSCA waste soil	EQ, Wayne Disposal Inc.	24.8	
11/18/02	End-Dump Truck	111	TSCA waste soil	EQ, Wayne Disposal Inc.	24.4	
11/18/02	End-Dump Truck	112	TSCA waste soil	EQ, Wayne Disposal Inc.	25.1	
11/18/02	End-Dump Truck	113	TSCA waste soil	EQ, Wayne Disposal Inc.	25.3	
11/18/02	End-Dump Truck	114	TSCA waste soil	EQ, Wayne Disposal Inc.	26.6	
11/18/02	End-Dump Truck	115	TSCA waste soil	EQ, Wayne Disposal Inc.	22.3	
11/18/02	End-Dump Truck	116	TSCA waste soil	EQ, Wayne Disposal Inc.	24.0	
11/18/02	End-Dump Truck	117	TSCA waste soil	EQ, Wayne Disposal Inc.	25.4	
11/18/02	End-Dump Truck	118	TSCA waste soil	EQ, Wayne Disposal Inc.	24.9	
11/18/02	End-Dump Truck	119	TSCA waste soil	EQ, Wayne Disposal Inc.	24.6	
11/19/02	End-Dump Truck	120	TSCA waste soil	EQ, Wayne Disposal Inc.	26.7	
11/19/02	End-Dump Truck	121	TSCA waste soil	EQ, Wayne Disposal Inc.	26.3	
11/19/02	End-Dump Truck	122	TSCA waste soil	EQ, Wayne Disposal Inc.	26.6	
11/19/02	End-Dump Truck	123	TSCA waste soil	EQ, Wayne Disposal Inc.	25.9	
11/19/02	End-Dump Truck	124	TSCA waste soil	EQ, Wayne Disposal Inc.	26.0	
11/19/02	End-Dump Truck	125	TSCA waste soil	EQ, Wayne Disposal Inc.	25.8	
11/19/02	End-Dump Truck	126	TSCA waste soil	EQ, Wayne Disposal Inc.	26.3	
11/19/02	End-Dump Truck	127	TSCA waste soil	EQ, Wayne Disposal Inc.	25.6	
11/19/02	End-Dump Truck	128	TSCA waste soil	EQ, Wayne Disposal Inc.	23.6	
11/19/02	End-Dump Truck	129	TSCA waste soil	EQ, Wayne Disposal Inc.	25.9	
11/19/02	End-Dump Truck	130	TSCA waste soil	EQ, Wayne Disposal Inc.	25.9	
11/19/02	End-Dump Truck	131	TSCA waste soil	EQ, Wayne Disposal Inc.	26.0	
11/19/02	End-Dump Truck	132	TSCA waste soil	EQ, Wayne Disposal Inc.	25.4	
11/20/02	End-Dump Truck	133	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	26.0	

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
11/20/02	End-Dump Truck	134	TSCA waste soil	EQ, Wayne Disposal Inc.	24.2	
11/20/02	End-Dump Truck	135	TSCA waste soil	EQ, Wayne Disposal Inc.	25.6	
11/20/02	End-Dump Truck	136	TSCA waste soil	EQ, Wayne Disposal Inc.	25.2	
11/20/02	End-Dump Truck	137	TSCA waste soil	EQ, Wayne Disposal Inc.	25.1	
11/20/02	End-Dump Truck	138	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	24.1	
11/20/02	End-Dump Truck	139	TSCA waste soil	EQ, Wayne Disposal Inc.	25.7	
11/20/02	End-Dump Truck	140	TSCA waste soil	EQ, Wayne Disposal Inc.	25.9	
11/20/02	End-Dump Truck	141	TSCA waste soil	EQ, Wayne Disposal Inc.	25.6	
11/20/02	End-Dump Truck	142	TSCA waste soil	EQ, Wayne Disposal Inc.	25.6	
11/20/02	End-Dump Truck	143	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	24.7	
11/20/02	End-Dump Truck	144	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	24.8	
11/20/02	End-Dump Truck	145	TSCA waste soil	EQ, Wayne Disposal Inc.	23.7	
11/20/02	End-Dump Truck	146	TSCA waste soil	EQ, Wayne Disposal Inc.	25.5	
11/20/02	End-Dump Truck	147	TSCA waste soil	EQ, Wayne Disposal Inc.	23.3	
11/20/02	End-Dump Truck	148	TSCA waste soil	EQ, Wayne Disposal Inc.	22.7	
11/20/02	End-Dump Truck	149	TSCA waste soil	EQ, Wayne Disposal Inc.	25.1	
11/20/02	End-Dump Truck	150	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.1	
11/20/02	End-Dump Truck	151	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.4	
11/20/02	End-Dump Truck	152	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.8	
11/21/02	End-Dump Truck	153	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.9	
11/21/02	End-Dump Truck	154	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.6	
11/21/02	End-Dump Truck	155	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.3	
11/21/02	End-Dump Truck	156	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.0	
11/21/02	End-Dump Truck	157	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.7	
11/21/02	End-Dump Truck	158	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.5	
11/21/02	End-Dump Truck	159	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	23.9	
11/21/02	End-Dump Truck	160	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.7	
11/21/02	End-Dump Truck	161	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.2	
11/22/02	End-Dump Truck	162	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.7	
11/22/02	End-Dump Truck	163	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.7	
11/22/02	End-Dump Truck	164	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.4	
11/22/02	End-Dump Truck	NA	PCB special waste soil, concrete, and sewer piping	Waste Management, Milam Landfill	NA	23.9

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
11/22/02	End-Dump Truck	NA	PCB special waste soil, concrete, and sewer piping	Waste Management, Milam Landfill	NA	23.9
11/22/02	End-Dump Truck	165	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.0	
11/22/02	End-Dump Truck	166	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	23.8	
11/22/02	End-Dump Truck	167	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	23.8	
11/22/02	End-Dump Truck	168	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.1	
11/22/02	End-Dump Truck	169	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.1	
11/22/02	End-Dump Truck	NA	PCB special waste soil, concrete, and sewer piping	Waste Management, Milam Landfill	NA	25.9
11/22/02	End-Dump Truck	NA	PCB special waste soil, concrete, and sewer piping	Waste Management, Milam Landfill	NA	27.9
11/22/02	End-Dump Truck	170	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.1	
11/22/02	End-Dump Truck	171	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.9	
11/22/02	End-Dump Truck	172	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.7	
11/22/02	End-Dump Truck	173	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.1	
11/22/02	End-Dump Truck	174	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.7	
11/22/02	End-Dump Truck	175	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.3	
11/22/02	End-Dump Truck	NA	PCB special waste soil, concrete, and sewer piping	Waste Management, Milam Landfill	NA	25.5
11/22/02	End-Dump Truck	NA	PCB special waste soil, concrete, and sewer piping	Waste Management, Milam Landfill	NA	24.9
11/22/02	End-Dump Truck	176	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.3	
11/22/02	End-Dump Truck	177	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.6	
11/22/02	End-Dump Truck	178	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.7	
11/22/02	End-Dump Truck	179	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	22.6	
11/22/02	End-Dump Truck	180	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.9	
11/22/02	End-Dump Truck	181	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.0	
11/22/02	End-Dump Truck	182	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.2	
11/22/02	End-Dump Truck	183	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.0	
11/22/02	End-Dump Truck	184	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.3	
11/25/02	End-Dump Truck	185	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.6	
11/25/02	End-Dump Truck	186	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.8	
11/25/02	End-Dump Truck	187	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.9	

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
11/25/02	End-Dump Truck	188	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	28.5	
11/25/02	End-Dump Truck	189	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.3	
11/25/02	End-Dump Truck	190	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	28.3	
11/25/02	End-Dump Truck	191	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.4	
11/25/02	End-Dump Truck	NA	PCB special waste soil, concrete, and sewer piping	Waste Management, Milam Landfill	NA	24.9
11/25/02	End-Dump Truck	192	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	27.3	
11/25/02	End-Dump Truck	193	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.0	
11/25/02	End-Dump Truck	194	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	27.2	
11/25/02	End-Dump Truck	195	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	27.4	
11/25/02	End-Dump Truck	196	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.5	
11/25/02	End-Dump Truck	197	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.2	
11/25/02	End-Dump Truck	198	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.2	
11/25/02	End-Dump Truck	199	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.9	
11/26/02	End-Dump Truck	200	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.5	
11/26/02	End-Dump Truck	201	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.7	
11/26/02	End-Dump Truck	202	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.7	
11/26/02	End-Dump Truck	203	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	25.9	
11/26/02	End-Dump Truck	204	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.0	
11/26/02	End-Dump Truck	205	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.1	
11/26/02	End-Dump Truck	206	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.8	
11/26/02	End-Dump Truck	207	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.7	
11/26/02	End-Dump Truck	208	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	28.2	
11/26/02	End-Dump Truck	209	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	24.5	
11/26/02	End-Dump Truck	210	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.0	
11/26/02	End-Dump Truck	211	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.3	
11/26/02	End-Dump Truck	NA	PCB special waste soil, concrete, and sewer piping	Waste Management, Milam Landfill	NA	25.0
11/26/02	End-Dump Truck	212	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.8	
11/26/02	End-Dump Truck	213	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.8	
11/26/02	End-Dump Truck	214	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	22.8	
11/26/02	End-Dump Truck	215	TSCA waste concrete rubble	EQ, Wayne Disposal Inc.	24.0	
11/26/02	End-Dump Truck	216	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.7	

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
11/26/02	End-Dump Truck	217	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.7	
11/26/02	End-Dump Truck	218	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.7	
11/26/02	End-Dump Truck	219	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.3	
11/26/02	End-Dump Truck	220	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.1	
11/27/02	End-Dump Truck	221	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.8	
11/27/02	End-Dump Truck	222	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.5	
11/27/02	End-Dump Truck	223	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	23.4	
11/27/02	End-Dump Truck	224	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.4	
11/27/02	End-Dump Truck	225	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	28.2	
11/27/02	End-Dump Truck	226	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.0	
11/27/02	End-Dump Truck	227	TSCA waste soil	EQ, Wayne Disposal Inc.	25.0	
11/27/02	End-Dump Truck	228	TSCA waste soil	EQ, Wayne Disposal Inc.	25.6	
12/3/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	28.2
12/3/02	End-Dump Truck	229	TSCA waste soil	EQ, Wayne Disposal Inc.	26.0	
12/3/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	31.0
12/3/02	End-Dump Truck	230	TSCA waste soil	EQ, Wayne Disposal Inc.	25.2	
12/3/02	End-Dump Truck	231	TSCA waste soil	EQ, Wayne Disposal Inc.	25.7	
12/3/02	End-Dump Truck	232	TSCA waste soil	EQ, Wayne Disposal Inc.	25.2	
12/3/02	End-Dump Truck	233	TSCA waste soil	EQ, Wayne Disposal Inc.	25.3	
12/3/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	26.9
12/3/02	End-Dump Truck	234	TSCA waste soil	EQ, Wayne Disposal Inc.	25.8	
12/3/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	28.7
12/3/02	End-Dump Truck	235	TSCA waste soil	EQ, Wayne Disposal Inc.	24.9	
12/3/02	End-Dump Truck	236	TSCA waste soil	EQ, Wayne Disposal Inc.	25.8	
12/3/02	End-Dump Truck	237	TSCA waste soil	EQ, Wayne Disposal Inc.	27.9	
12/3/02	End-Dump Truck	238	TSCA waste soil	EQ, Wayne Disposal Inc.	26.4	
12/3/02	End-Dump Truck	239	TSCA waste soil	EQ, Wayne Disposal Inc.	27.1	
12/3/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	28.0

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
12/3/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	29.9
12/3/02	End-Dump Truck	240	TSCA waste soil	EQ, Wayne Disposal Inc.	26.0	
12/3/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	26.2
12/3/02	End-Dump Truck	241	TSCA waste soil	EQ, Wayne Disposal Inc.	24.1	
12/3/02	End-Dump Truck	242	TSCA waste soil	EQ, Wayne Disposal Inc.	26.4	
12/3/02	End-Dump Truck	243	TSCA waste soil	EQ, Wayne Disposal Inc.	25.8	
12/3/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	29.2
12/3/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	26.0
12/3/02	End-Dump Truck	244	TSCA waste soil	EQ, Wayne Disposal Inc.	28.2	
12/3/02	End-Dump Truck	245	TSCA waste soil	EQ, Wayne Disposal Inc.	26.0	
12/3/02	End-Dump Truck	246	TSCA waste soil	EQ, Wayne Disposal Inc.	26.3	
12/3/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	29.1
12/3/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	25.3
12/3/02	End-Dump Truck	247	TSCA waste soil	EQ, Wayne Disposal Inc.	24.7	
12/3/02	End-Dump Truck	248	TSCA waste soil	EQ, Wayne Disposal Inc.	25.9	
12/4/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	23.0
12/4/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	23.3
12/4/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	26.6
12/4/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	26.4
12/4/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	25.8
12/4/02	End-Dump Truck	249	TSCA waste soil	EQ, Wayne Disposal Inc.	26.1	
12/4/02	End-Dump Truck	250	TSCA waste concrete	EQ, Wayne Disposal Inc.	25.0	

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
12/4/02	End-Dump Truck	251	TSCA waste concrete	EQ, Wayne Disposal Inc.	25.5	
12/5/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	24.9
12/5/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	26.8
12/5/02	End-Dump Truck	NA	PCB special waste soil	Waste Management, Milam Landfill	NA	27.2
12/5/02	End-Dump Truck	252	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.3	
12/5/02	End-Dump Truck	253	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.7	
12/5/02	End-Dump Truck	254	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.9	
12/5/02	End-Dump Truck	255	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.4	
12/5/02	End-Dump Truck	256	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.1	
12/5/02	End-Dump Truck	257	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.4	
12/5/02	End-Dump Truck	258	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.1	
12/5/02	End-Dump Truck	259	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	27.5	
12/5/02	End-Dump Truck	260	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.9	
12/5/02	End-Dump Truck	261	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.9	
12/5/02	End-Dump Truck	262	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.9	
12/5/02	End-Dump Truck	263	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	27.4	
12/5/02	End-Dump Truck	264	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.4	
12/5/02	End-Dump Truck	265	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.5	
12/5/02	End-Dump Truck	266	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.1	
12/6/02	40-yard roll-off	NA	ACM piping and insulation	Waste Management, Roxana Landfill	NA	1.2
12/6/02	End-Dump Truck	267	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.9	
12/6/02	End-Dump Truck	268	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.4	
12/6/02	End-Dump Truck	269	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.0	
12/6/02	End-Dump Truck	270	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.6	
12/6/02	End-Dump Truck	271	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.4	
12/6/02	End-Dump Truck	272	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.1	
12/6/02	End-Dump Truck	273	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.2	
12/6/02	End-Dump Truck	274	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.4	
12/6/02	End-Dump Truck	275	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.7	

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
12/6/02	End-Dump Truck	276	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.4	
12/7/02	End-Dump Truck	277	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	27.3	
12/7/02	End-Dump Truck	278	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.0	
12/7/02	End-Dump Truck	279	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.6	
12/7/02	End-Dump Truck	280	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	28.6	
12/7/02	End-Dump Truck	281	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.1	
12/7/02	End-Dump Truck	282	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.8	
12/7/02	End-Dump Truck	283	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.1	
12/7/02	End-Dump Truck	284	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.6	
12/7/02	End-Dump Truck	285	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.3	
12/7/02	End-Dump Truck	286	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.3	
12/9/02	End-Dump Truck	287	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	27.0	
12/9/02	End-Dump Truck	288	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.5	
12/9/02	End-Dump Truck	289	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	27.1	
12/9/02	End-Dump Truck	290	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.7	
12/9/02	End-Dump Truck	291	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.6	
12/9/02	End-Dump Truck	292	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.8	
12/9/02	End-Dump Truck	293	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.2	
12/9/02	End-Dump Truck	294	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.3	
12/9/02	End-Dump Truck	295	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.7	
12/9/02	End-Dump Truck	296	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.0	
12/9/02	End-Dump Truck	297	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.8	
12/9/02	End-Dump Truck	298	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.4	
12/9/02	End-Dump Truck	299	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.2	
12/9/02	End-Dump Truck	300	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.6	
12/9/02	End-Dump Truck	301	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.2	
12/9/02	End-Dump Truck	302	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.6	
12/9/02	End-Dump Truck	303	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.8	
12/9/02	End-Dump Truck	304	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.6	
12/9/02	End-Dump Truck	305	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	24.6	
12/9/02	End-Dump Truck	306	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.6	
12/10/02	End-Dump Truck	307	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.6	
12/10/02	End-Dump Truck	308	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.4	

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
12/10/02	End-Dump Truck	309	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.2	
12/10/02	End-Dump Truck	310	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.6	
12/10/02	End-Dump Truck	311	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	27.0	
12/10/02	End-Dump Truck	312	TSCA waste soil	EQ, Wayne Disposal Inc.	26.2	
12/10/02	End-Dump Truck	313	TSCA waste soil	EQ, Wayne Disposal Inc.	26.6	
12/10/02	End-Dump Truck	NA	PCB special waste concrete	Waste Management, Milam Landfill	NA	15.2
12/10/02	End-Dump Truck	NA	PCB special waste concrete	Waste Management, Milam Landfill	NA	16.0
12/10/02	End-Dump Truck	314	TSCA waste soil	EQ, Wayne Disposal Inc.	25.6	
12/10/02	End-Dump Truck	NA	PCB special waste concrete	Waste Management, Milam Landfill	NA	13.7
12/10/02	End-Dump Truck	NA	PCB special waste concrete	Waste Management, Milam Landfill	NA	13.8
12/10/02	End-Dump Truck	NA	PCB special waste concrete	Waste Management, Milam Landfill	NA	13.8
12/10/02	End-Dump Truck	NA	PCB special waste concrete	Waste Management, Milam Landfill	NA	18.0
12/10/02	End-Dump Truck	315	TSCA waste soil	EQ, Wayne Disposal Inc.	26.7	
12/10/02	End-Dump Truck	316	TSCA waste soil	EQ, Wayne Disposal Inc.	25.6	
12/10/02	End-Dump Truck	317	TSCA waste soil	EQ, Wayne Disposal Inc.	26.6	
12/10/02	End-Dump Truck	NA	PCB special waste concrete	Waste Management, Milam Landfill	NA	19.9
12/10/02	End-Dump Truck	NA	PCB special waste concrete	Waste Management, Milam Landfill	NA	19.5
12/10/02	End-Dump Truck	318	TSCA waste soil	EQ, Wayne Disposal Inc.	26.4	
12/11/02	End-Dump Truck	319	TSCA waste soil	EQ, Wayne Disposal Inc.	25.8	
12/11/02	End-Dump Truck	320	TSCA waste soil	EQ, Wayne Disposal Inc.	26.8	
12/11/02	End-Dump Truck	321	TSCA waste soil	EQ, Wayne Disposal Inc.	24.7	
12/11/02	End-Dump Truck	322	TSCA waste soil	EQ, Wayne Disposal Inc.	24.7	
12/11/02	End-Dump Truck	323	TSCA waste concrete	EQ, Wayne Disposal Inc.	26.1	
12/11/02	End-Dump Truck	324	TSCA waste soil	EQ, Wayne Disposal Inc.	25.9	
12/11/02	End-Dump Truck	325	TSCA waste soil	EQ, Wayne Disposal Inc.	25.2	

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
12/11/02	End-Dump Truck	326	TSCA waste soil	EQ, Wayne Disposal Inc.	24.9	
12/11/02	End-Dump Truck	327	TSCA waste soil	EQ, Wayne Disposal Inc.	23.2	
12/11/02	End-Dump Truck	328	TSCA waste soil	EQ, Wayne Disposal Inc.	26.0	
12/11/02	End-Dump Truck	329	TSCA waste concrete	EQ, Wayne Disposal Inc.	24.0	
12/11/02	End-Dump Truck	330	TSCA waste concrete	EQ, Wayne Disposal Inc.	24.9	
12/11/02	End-Dump Truck	331	TSCA waste soil	EQ, Wayne Disposal Inc.	26.3	
12/11/02	End-Dump Truck	332	TSCA waste soil	EQ, Wayne Disposal Inc.	26.1	
12/11/02	End-Dump Truck	333	TSCA waste soil	EQ, Wayne Disposal Inc.	23.5	
12/16/02	End-Dump Truck	334	TSCA waste soil	EQ, Wayne Disposal Inc.	27.7	
12/16/02	End-Dump Truck	335	TSCA waste soil	EQ, Wayne Disposal Inc.	28.1	
12/16/02	End-Dump Truck	336	TSCA waste concrete	EQ, Wayne Disposal Inc.	22.2	
12/16/02	End-Dump Truck	337	TSCA waste soil	EQ, Wayne Disposal Inc.	25.1	
12/16/02	End-Dump Truck	338	TSCA waste soil	EQ, Wayne Disposal Inc.	25.3	
12/16/02	End-Dump Truck	339	TSCA waste soil	EQ, Wayne Disposal Inc.	24.5	
12/16/02	End-Dump Truck	340	TSCA waste soil	EQ, Wayne Disposal Inc.	25.3	
12/16/02	End-Dump Truck	341	TSCA waste soil	EQ, Wayne Disposal Inc.	27.0	
12/16/02	End-Dump Truck	342	TSCA waste soil	EQ, Wayne Disposal Inc.	25.2	
12/16/02	End-Dump Truck	343	TSCA waste soil	EQ, Wayne Disposal Inc.	25.9	
12/16/02	End-Dump Truck	344	TSCA waste soil	EQ, Wayne Disposal Inc.	25.7	
12/16/02	End-Dump Truck	345	TSCA waste soil	EQ, Wayne Disposal Inc.	25.9	
12/16/02	End-Dump Truck	346	TSCA waste soil	EQ, Wayne Disposal Inc.	26.1	
12/16/02	End-Dump Truck	347	TSCA waste concrete	EQ, Wayne Disposal Inc.	24.5	
12/16/02	End-Dump Truck	348	TSCA waste concrete	EQ, Wayne Disposal Inc.	25.7	
12/16/02	End-Dump Truck	349	TSCA waste soil	EQ, Wayne Disposal Inc.	24.9	
12/16/02	End-Dump Truck	350	TSCA waste soil	EQ, Wayne Disposal Inc.	25.8	
12/16/02	End-Dump Truck	351	TSCA waste soil	EQ, Wayne Disposal Inc.	26.4	
12/16/02	End-Dump Truck	352	TSCA waste concrete	EQ, Wayne Disposal Inc.	22.5	
12/16/02	End-Dump Truck	353	TSCA waste soil	EQ, Wayne Disposal Inc.	27.7	
12/16/02	End-Dump Truck	354	TSCA waste soil	EQ, Wayne Disposal Inc.	26.6	
12/16/02	End-Dump Truck	355	TSCA waste soil	EQ, Wayne Disposal Inc.	24.6	
12/16/02	End-Dump Truck	356	TSCA waste soil	EQ, Wayne Disposal Inc.	26.5	
12/16/02	End-Dump Truck	357	TSCA waste soil	EQ, Wayne Disposal Inc.	27.1	
12/16/02	End-Dump Truck	358	TSCA waste soil	EQ, Wayne Disposal Inc.	26.3	

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
12/16/02	End-Dump Truck	359	TSCA waste soil	EQ, Wayne Disposal Inc.	24.5	
12/16/02	End-Dump Truck	360	TSCA waste soil	EQ, Wayne Disposal Inc.	26.4	
12/16/02	End-Dump Truck	361	TSCA waste soil	EQ, Wayne Disposal Inc.	26.2	
12/16/02	End-Dump Truck	362	TSCA waste soil	EQ, Wayne Disposal Inc.	28.2	
12/16/02	End-Dump Truck	363	TSCA waste soil	EQ, Wayne Disposal Inc.	25.7	
12/17/02	End-Dump Truck	364	TSCA waste soil	EQ, Wayne Disposal Inc.	28.4	
12/17/02	End-Dump Truck	365	TSCA waste soil	EQ, Wayne Disposal Inc.	24.8	
12/17/02	End-Dump Truck	366	TSCA waste soil	EQ, Wayne Disposal Inc.	25.9	
12/17/02	End-Dump Truck	367	TSCA waste soil	EQ, Wayne Disposal Inc.	27.6	
12/17/02	End-Dump Truck	368	TSCA waste soil	EQ, Wayne Disposal Inc.	26.4	
12/17/02	End-Dump Truck	369	TSCA waste soil	EQ, Wayne Disposal Inc.	23.1	
12/17/02	End-Dump Truck	370	TSCA waste soil	EQ, Wayne Disposal Inc.	26.5	
12/17/02	End-Dump Truck	371	TSCA waste soil	EQ, Wayne Disposal Inc.	23.6	
12/17/02	End-Dump Truck	372	TSCA waste soil	EQ, Wayne Disposal Inc.	25.4	
12/17/02	End-Dump Truck	373	TSCA waste soil	EQ, Wayne Disposal Inc.	24.8	
12/18/02	End-Dump Truck	374	TSCA waste soil	EQ, Wayne Disposal Inc.	26.6	
12/18/02	End-Dump Truck	375	TSCA waste soil	EQ, Wayne Disposal Inc.	25.7	
12/18/02	End-Dump Truck	376	TSCA waste soil	EQ, Wayne Disposal Inc.	25.1	
12/18/02	End-Dump Truck	377	TSCA waste soil	EQ, Wayne Disposal Inc.	27.7	
12/18/02	End-Dump Truck	378	TSCA waste soil	EQ, Wayne Disposal Inc.	26.6	
12/18/02	End-Dump Truck	379	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.0	
12/18/02	End-Dump Truck	380	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.8	
12/18/02	End-Dump Truck	381	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.7	
12/18/02	End-Dump Truck	382	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.0	
12/18/02	End-Dump Truck	383	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	26.4	
12/18/02	End-Dump Truck	384	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.7	
12/18/02	End-Dump Truck	385	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.3	
12/18/02	End-Dump Truck	386	TSCA waste concrete rubble and soil	EQ, Wayne Disposal Inc.	25.2	
12/18/02	End-Dump Truck	387	TSCA waste soil	EQ, Wayne Disposal Inc.	24.9	
12/18/02	End-Dump Truck	388	TSCA waste soil	EQ, Wayne Disposal Inc.	25.9	
12/18/02	End-Dump Truck	389	TSCA waste soil	EQ, Wayne Disposal Inc.	26.7	
12/18/02	End-Dump Truck	390	TSCA waste soil	EQ, Wayne Disposal Inc.	25.3	
12/18/02	End-Dump Truck	391	TSCA waste soil	EQ, Wayne Disposal Inc.	26.5	

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
12/18/02	End-Dump Truck	392	TSCA waste soil	EQ, Wayne Disposal Inc.	26.2	
12/18/02	End-Dump Truck	393	TSCA waste soil	EQ, Wayne Disposal Inc.	25.4	
12/18/02	End-Dump Truck	394	TSCA waste soil	EQ, Wayne Disposal Inc.	26.0	
12/18/02	End-Dump Truck	395	TSCA waste soil	EQ, Wayne Disposal Inc.	26.0	
12/18/02	End-Dump Truck	396	TSCA waste soil	EQ, Wayne Disposal Inc.	25.7	
12/18/02	End-Dump Truck	397	TSCA waste soil	EQ, Wayne Disposal Inc.	25.9	
12/18/02	End-Dump Truck	398	TSCA waste soil	EQ, Wayne Disposal Inc.	26.8	
12/18/02	End-Dump Truck	399	TSCA waste soil	EQ, Wayne Disposal Inc.	28.0	
12/18/02	End-Dump Truck	400	TSCA waste soil	EQ, Wayne Disposal Inc.	27.3	
12/18/02	End-Dump Truck	401	TSCA waste soil	EQ, Wayne Disposal Inc.	25.8	
12/18/02	End-Dump Truck	402	TSCA waste soil	EQ, Wayne Disposal Inc.	24.0	
12/18/02	End-Dump Truck	403	TSCA waste soil	EQ, Wayne Disposal Inc.	25.1	
12/19/02	End-Dump Truck	404	TSCA waste soil	EQ, Wayne Disposal Inc.	24.4	
12/19/02	End-Dump Truck	405	TSCA waste soil	EQ, Wayne Disposal Inc.	30.3	
12/19/02	End-Dump Truck	406	TSCA waste soil	EQ, Wayne Disposal Inc.	25.5	
12/19/02	End-Dump Truck	407	TSCA waste soil	EQ, Wayne Disposal Inc.	25.6	
12/19/02	End-Dump Truck	408	TSCA waste soil	EQ, Wayne Disposal Inc.	25.1	
12/19/02	End-Dump Truck	409	TSCA waste soil	EQ, Wayne Disposal Inc.	25.7	
12/19/02	End-Dump Truck	410	TSCA waste soil	EQ, Wayne Disposal Inc.	25.0	
12/19/02	End-Dump Truck	411	TSCA waste soil	EQ, Wayne Disposal Inc.	23.9	
12/19/02	End-Dump Truck	412	TSCA waste soil	EQ, Wayne Disposal Inc.	26.0	
12/19/02	End-Dump Truck	413	TSCA waste soil	EQ, Wayne Disposal Inc.	25.1	
12/20/02	End-Dump Truck	414	TSCA waste soil	EQ, Wayne Disposal Inc.	27.1	
12/20/02	End-Dump Truck	415	TSCA waste soil	EQ, Wayne Disposal Inc.	26.2	
12/20/02	End-Dump Truck	416	TSCA waste soil	EQ, Wayne Disposal Inc.	25.8	
12/20/02	End-Dump Truck	417	TSCA waste soil	EQ, Wayne Disposal Inc.	26.3	
12/20/02	End-Dump Truck	418	TSCA waste soil	EQ, Wayne Disposal Inc.	27.0	
12/20/02	End-Dump Truck	419	TSCA waste soil	EQ, Wayne Disposal Inc.	26.3	
12/20/02	End-Dump Truck	420	TSCA waste soil	EQ, Wayne Disposal Inc.	26.5	
12/20/02	End-Dump Truck	421	TSCA waste soil	EQ, Wayne Disposal Inc.	26.9	
12/20/02	End-Dump Truck	422	TSCA waste soil	EQ, Wayne Disposal Inc.	28.5	
12/20/02	End-Dump Truck	423	TSCA waste soil	EQ, Wayne Disposal Inc.	23.6	
12/20/02	End-Dump Truck	424	TSCA waste soil	EQ, Wayne Disposal Inc.	26.6	

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
12/20/02	End-Dump Truck	425	TSCA waste soil	EQ, Wayne Disposal Inc.	25.9	
12/20/02	End-Dump Truck	426	TSCA waste soil	EQ, Wayne Disposal Inc.	26.8	
12/20/02	End-Dump Truck	427	TSCA waste soil	EQ, Wayne Disposal Inc.	28.3	
12/20/02	End-Dump Truck	428	TSCA waste soil	EQ, Wayne Disposal Inc.	26.8	
12/20/02	End-Dump Truck	429	TSCA waste soil	EQ, Wayne Disposal Inc.	27.4	
12/20/02	End-Dump Truck	430	TSCA waste soil	EQ, Wayne Disposal Inc.	26.5	
12/20/02	End-Dump Truck	431	TSCA waste soil	EQ, Wayne Disposal Inc.	25.1	
12/20/02	End-Dump Truck	432	TSCA waste soil	EQ, Wayne Disposal Inc.	24.6	
12/20/02	End-Dump Truck	433	TSCA waste soil	EQ, Wayne Disposal Inc.	27.0	
12/20/02	End-Dump Truck	434	TSCA waste soil	EQ, Wayne Disposal Inc.	28.5	
12/20/02	End-Dump Truck	435	TSCA waste soil	EQ, Wayne Disposal Inc.	26.8	
12/20/02	End-Dump Truck	436	TSCA waste soil	EQ, Wayne Disposal Inc.	25.0	
12/20/02	End-Dump Truck	437	TSCA waste soil	EQ, Wayne Disposal Inc.	27.0	
12/20/02	End-Dump Truck	438	TSCA waste soil	EQ, Wayne Disposal Inc.	26.0	
12/20/02	End-Dump Truck	439	TSCA waste soil	EQ, Wayne Disposal Inc.	27.0	
12/20/02	End-Dump Truck	440	TSCA waste soil	EQ, Wayne Disposal Inc.	30.3	
12/20/02	End-Dump Truck	441	TSCA waste soil	EQ, Wayne Disposal Inc.	27.5	
12/20/02	End-Dump Truck	442	TSCA waste soil	EQ, Wayne Disposal Inc.	28.7	
12/20/02	End-Dump Truck	443	TSCA waste soil	EQ, Wayne Disposal Inc.	29.6	
12/21/02	End-Dump Truck	444	TSCA waste soil	EQ, Wayne Disposal Inc.	28.2	
12/21/02	End-Dump Truck	445	TSCA waste soil	EQ, Wayne Disposal Inc.	26.3	
12/21/02	End-Dump Truck	446	TSCA waste soil	EQ, Wayne Disposal Inc.	24.8	
12/21/02	End-Dump Truck	447	TSCA waste soil	EQ, Wayne Disposal Inc.	26.3	
12/21/02	End-Dump Truck	448	TSCA waste soil	EQ, Wayne Disposal Inc.	26.3	
12/21/02	End-Dump Truck	449	TSCA waste soil	EQ, Wayne Disposal Inc.	25.5	
12/21/02	End-Dump Truck	450	TSCA waste soil	EQ, Wayne Disposal Inc.	26.2	
12/21/02	End-Dump Truck	451	TSCA waste soil	EQ, Wayne Disposal Inc.	28.3	
12/21/02	End-Dump Truck	452	TSCA waste soil	EQ, Wayne Disposal Inc.	25.8	
12/21/02	End-Dump Truck	453	TSCA waste soil	EQ, Wayne Disposal Inc.	26.7	
12/21/02	End-Dump Truck	454	TSCA waste soil	EQ, Wayne Disposal Inc.	28.3	
12/21/02	End-Dump Truck	455	TSCA waste soil	EQ, Wayne Disposal Inc.	25.3	
12/21/02	End-Dump Truck	456	TSCA waste soil	EQ, Wayne Disposal Inc.	23.5	
12/22/02	End-Dump Truck	457	TSCA waste soil	EQ, Wayne Disposal Inc.	25.7	

Table 4-2
Summary of Off-Site Waste Shipments During RA Phase 2

Date Shipped	Container	Manifest No.	Waste Description	Disposal Facility	TSCA Waste (Tons)	Non-TSCA Waste (Tons)
12/22/02	End-Dump Truck	458	TSCA waste soil	EQ, Wayne Disposal Inc.	25.8	
12/22/02	End-Dump Truck	459	TSCA waste soil	EQ, Wayne Disposal Inc.	25.8	
12/22/02	End-Dump Truck	460	TSCA waste soil	EQ, Wayne Disposal Inc.	25.6	
12/22/02	End-Dump Truck	461	TSCA waste soil	EQ, Wayne Disposal Inc.	24.9	
12/22/02	End-Dump Truck	462	TSCA waste soil	EQ, Wayne Disposal Inc.	26.2	
12/22/02	End-Dump Truck	463	TSCA waste soil	EQ, Wayne Disposal Inc.	27.1	
12/22/02	End-Dump Truck	464	TSCA waste soil	EQ, Wayne Disposal Inc.	26.9	
12/22/02	End-Dump Truck	465	TSCA waste soil	EQ, Wayne Disposal Inc.	26.3	
12/22/02	End-Dump Truck	466	TSCA waste soil	EQ, Wayne Disposal Inc.	27.1	
12/22/02	End-Dump Truck	467	TSCA waste soil	EQ, Wayne Disposal Inc.	27.4	
12/22/02	End-Dump Truck	468	TSCA waste soil	EQ, Wayne Disposal Inc.	25.8	
12/22/02	End-Dump Truck	469	TSCA waste soil	EQ, Wayne Disposal Inc.	24.8	
12/23/02	End-Dump Truck	470	TSCA waste soil	EQ, Wayne Disposal Inc.	26.8	
12/23/02	End-Dump Truck	471	TSCA waste soil	EQ, Wayne Disposal Inc.	25.8	
1/7/03	End-Dump Truck	472	TSCA waste soil	EQ, Wayne Disposal Inc.	25.9	
1/9/03	3 drums	473	PCB-contaminated waste oil	EQ, Wayne Disposal Inc.	0.5	
TOTAL					**10,579**	**905**

Table 7-1
Summary of Field Work Variances

FWV No.	Description	Cost/Schedule Impact
FWV-RA01	Painted surfaces must be sampled to verify the concentrations of eight heavy metals, per Missouri Department of Natural Resources (MDNR) guidance dated May 2002. Interior and exterior brick and concrete block coated with lead-based paint (> 5,000 mg/kg) must be disposed at a municipal landfill and may not be used as clean fill material.	Costs associated with select demolition and disposal lead-based painted brick and concrete estimated to be $60,000. No change order requested. No impact to schedule.
FWV-RA02	Windows containing putty/glaze classified as asbestos-containing material (ACM) will be extracted during demolition and disposed as asbestos waste at a local landfill.	None.
FWV-RA03	The building footprint excavation will be backfilled to the top of the concrete footers using gravel.	None.
FWV-RA04	Soil backfill placed in the building footprint excavation will be compacted to a minimum of 95% maximum dry density based on the Standard Proctor Test (ASTM D 698).	None.
FWV-RA05	Soil to be used as backfill will be analyzed for Benzene, Ethylbenzene, Toluene, and Xylene (BTEX) using SW-846 Method 5035/8260 and Total Petroleum Hydrocarbons (TPH) using SW-846 Methods 8015-OA1 (gasoline range) and 8015-OA2 (diesel range).	None.
FWV-RA06	Geotechnical testing (i.e. Standard Proctor Test, ASTM D 698) of backfill soil will be performed at a frequency of one test per 10,000 cubic yards.	Estimated cost savings of $12,000. No schedule impact.
FWV-RA07	As needed, lime will be incorporated with the soil backfill to facilitate drying.	No cost impact. Ensured that schedule would not be prolonged due to wet conditions and cold temperatures.
FWV-RA08	In areas where soil contaminated with PCBs less than 50 PPM (i.e. "PCB special wastes") was removed for the purpose of achieving the site cleanup level (7.6 PPM), the sampling approach specified in Section 3.4.2 of the original RAWP will be used in lieu of the compositing scheme specified in Addendum No. 1. This approach included the collection of discrete soil confirmation samples from the floors and sidewalls of the excavated areas, with the samples distributed evenly at 20-ft intervals. The affected areas included all non-TSCA areas east of Row 22 and the non-TSCA areas along the south and west sides of the basement concrete flooring.	Approximately 10 extra soil samples would be required at a cost of $1,125. Approach provided increased confidence that excavation efforts were successful in achieving the subsurface cleanup level.
FWV-RA09	A land surveyor will survey the location (coordinates) and elevation of the following features:	Survey work was estimated to require 10 hours at $120/hour.

FWV No.	Description	Cost/Schedule Impact
	• Perimeter of the former Building 3 footprint • Surface of the soil (backfill) surface once final grade is established. • Top of one of the concrete footers in the basement.	
FWV-RA10	The actual quantity of TSCA waste varied significantly from the initial estimate due to the following conditions: • Significant oil-staining was observed along the west face of the 200-ft long concrete wall at Row 19. Accordingly, the wall required removal and disposal as TSCA waste. • Contaminated soil and gravel adjacent to the concrete wall at Row 19 extended to approximately 5 ft. below floor level, to the depth of the wall's footing. Contamination was also encountered in the gravel beneath the footing. • In numerous areas throughout the limits of the 30,000 ft^2 of basement concrete flooring, the depth of contamination exceeded 1 ft. below the flooring. • PCB contamination was particularly concentrated in the soil within a 40-ft radius of the chip chute. The contamination extended approximately 5 ft. below ground/flooring surface. This area included concrete flooring (800 ft^2) on the east and west sides of the chip chute. • PCB soil contamination extended beyond the limits of the basement concrete flooring in a 3,000 ft^2 area north of Row B. The depth of contamination was approximately 2 ft. bgs. • PCB contamination in the area outside Building 3 (in the area to the north and west of the chip chute) extended significantly deeper and wider than originally estimated. The depth of contamination in select areas reached as deep as 10 ft. bgs. The areal extent of contamination in this area exceeded the original estimate by nearly 1,000 ft^2. • During excavation, berms consisting of clean soil were constructed to isolate contaminated materials. The berms were used to prevent stormwater from contaminated areas from running-off into clean or remediated areas. Since the berms were in direct contact with	The additional 4,400 tons of TSCA waste resulted in an increase in transportation and disposal costs of $590,000, and an overall exceedance of the previously-authorized budget of $213,510. The project schedule was not impacted, and therefore labor and equipment costs did not contribute to the overrun. Additional funding was authorized in April 2003 to cover the costs of the overrun, including the funding required to complete site restoration, final report, and project closeout.

FWV No.	Description	Cost/Schedule Impact
	PCB-contaminated materials, it was necessary to remove and dispose of the berm material as excavation activities progressed. The conditions listed above were not included in the initial estimate of 6,200 tons, and resulted in an additional 4,400 tons of TSCA waste.	

FIGURES

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SCALE IN MILES

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Source: USGS Clayton, Missouri 7.5' x 15' Quadrangle
aerial photography, flight date 1998.

Final Report - Mitigation of PCB Contamination
Building 3, St. Louis Army Ammunition Plant
St. Louis, Missouri

Figure 1-1
Site Location Map

Arrowhead Contracting, Inc.

Date: 10 10/03	Project No.: 00-215 SLAAP Building 3	Checked By: GWW	Drawn By: DLR

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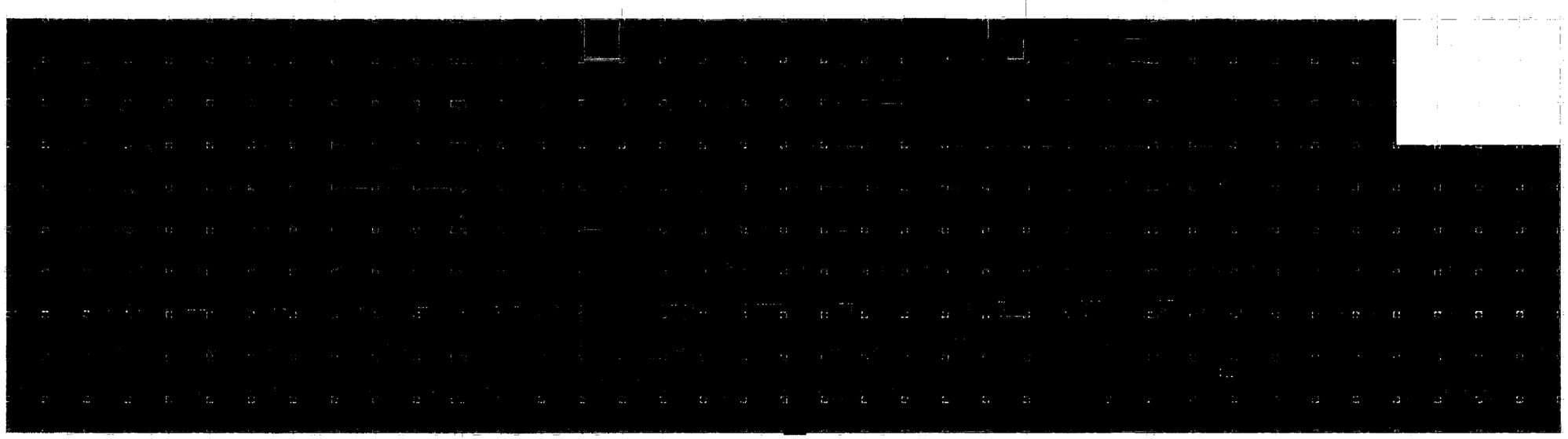

Legend:

- Approximate limits of concrete flooring contaminated with PCBs <43.5 (PCB special wastes).
- Approximate limits of concrete flooring contaminated with PCBs >43.5 ppm (TSCA waste).

Note:

Refer to Table 1-3 for descriptions of the contaminated materials.

0 40 80

SCALE IN FEET

Final Report - Mitigation of PCB Contamination
Building 3, St. Louis Army Ammunition Plant
St. Louis, Missouri

Figure 1-2
General Locations and Extent of PCB Contamination on First Floor

Arrowhead Contracting, Inc.

Date: 10/10/03	Project No: 00-215 SLAAP Building 3	Checked By: GWW	Drawn By: DLR

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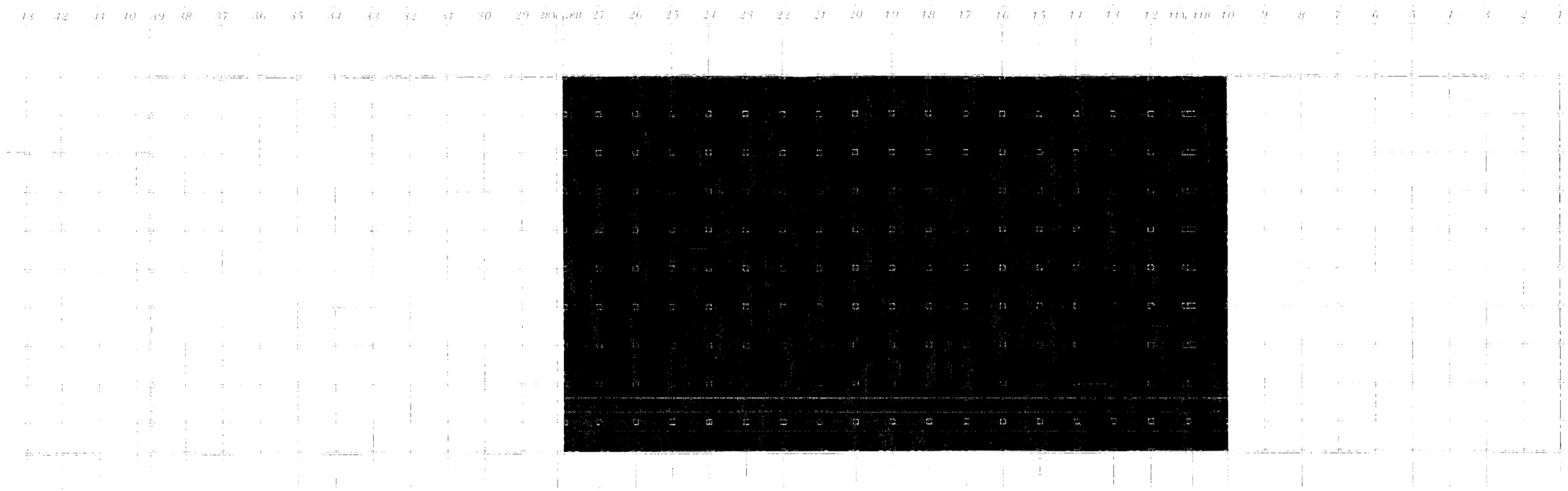

Legend:

- Approximate limits of concrete flooring contaminated with PCBs <43.5ppm (PCB special wastes).
- Approximate limits of concrete flooring contaminated with PCBs >43.5 ppm (TSCA waste).

Note:

Refer to Table 1-3 for descriptions of the contaminated materials.

0 40 80

SCALE IN FEET

Final Report - Mitigation of PCB Contamination
Building 3, St. Louis Army Ammunition Plant
St. Louis, Missouri

Figure 1-3
General Locations and Extent of PCB Contamination on Second Floor

Arrowhead Contracting, Inc.

Date: 10/10/03	Project No.: 00-215 SLAAP Building 3	Checked By: GWW	Drawn By: DLR

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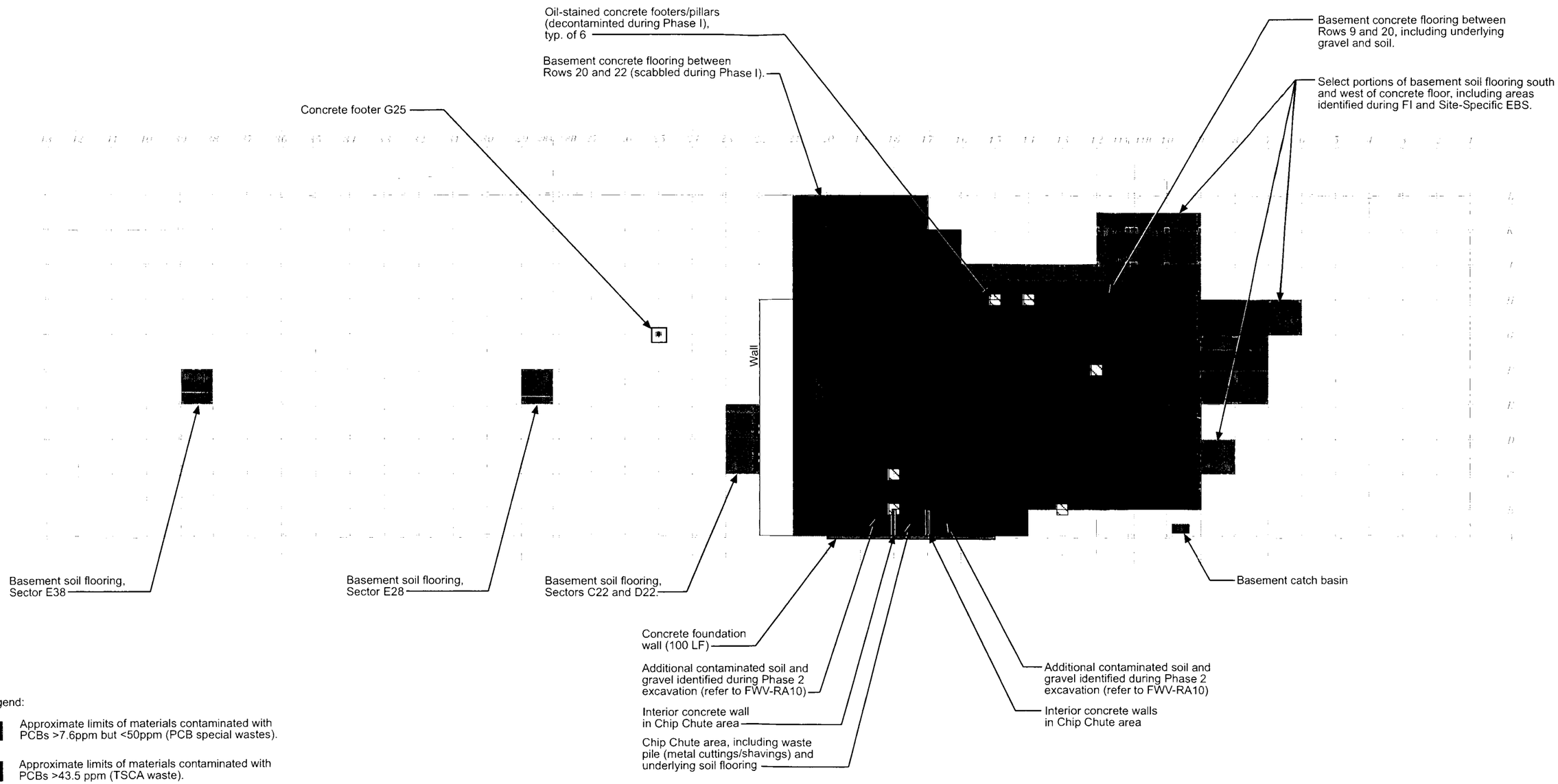

Legend:

Approximate limits of materials contaminated with PCBs >7.6ppm but <50ppm (PCB special wastes).

Approximate limits of materials contaminated with PCBs >43.5 ppm (TSCA waste).

Notes:

1. Refer to Table 1-3 for descriptions of the contaminated materials.
2. Refer to Figure 1-6 for locations of PCB-contaminted sewer lines.
3. Refer to Figure 1-5 for a general location of PCB contamination outside the building near the former Chip Chute loadout area.
4. Not shown - 372 concrete pillars located between Rows 9 and 22 within the limits of the concrete flooring.

Final Report - Mitigation of PCB Contamination
Building 3, St. Louis Army Ammunition Plant
St. Louis, Missouri

Figure 1-4
General Locations and Extent of PCB Contamination in Basement

Arrowhead Contracting, Inc.

Date: 10/10/03	Project No.: 00-215 SLAAP Building 3	Checked By: GWW	Drawn By: DLR

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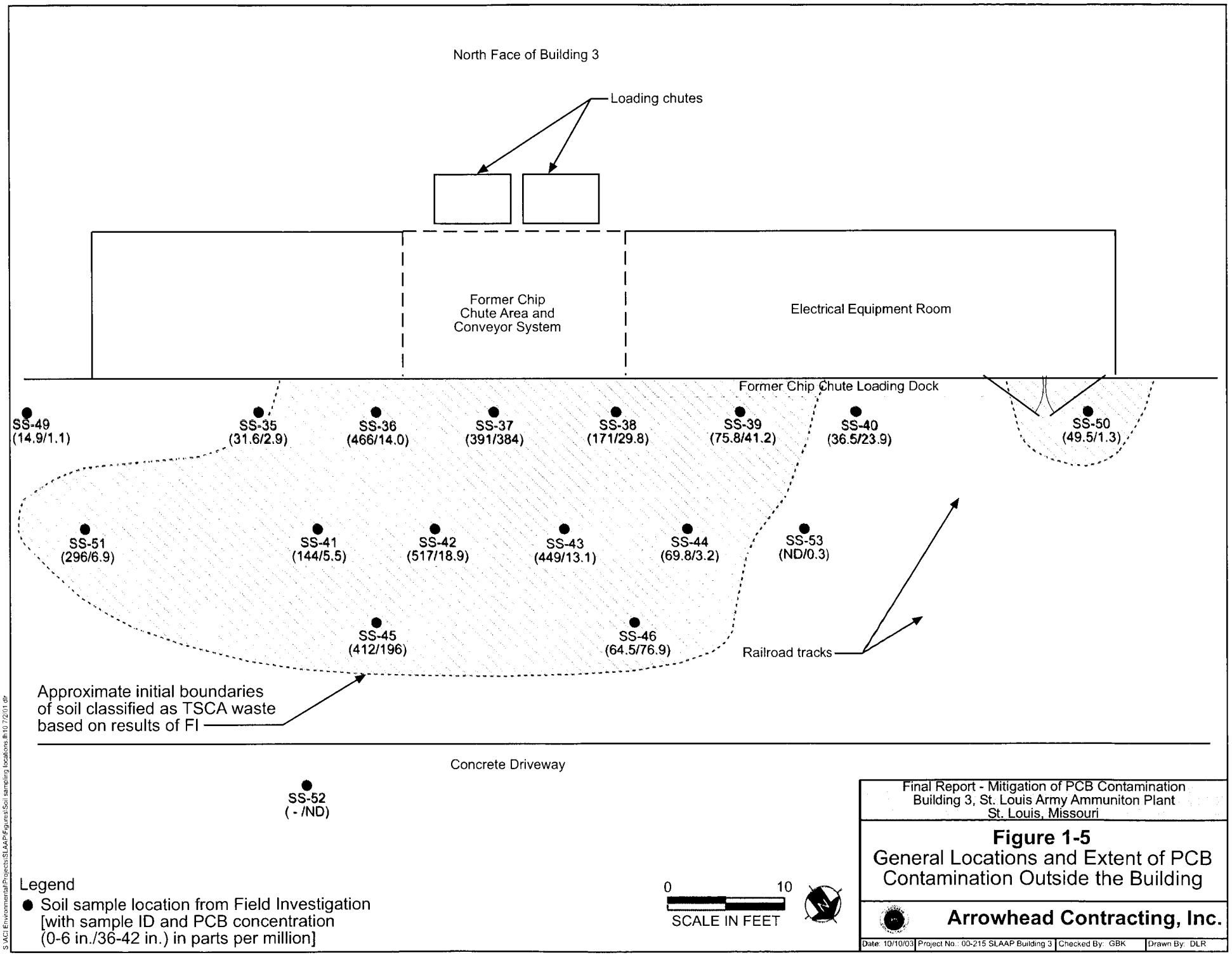
North Face of Building 3
Loading chutes
Former Chip Chute Area and Conveyor System
Electrical Equipment Room
Former Chip Chute Loading Dock
SS-49 (14.9/1.1)
SS-35 (31.6/2.9)
SS-36 (466/14.0)
SS-37 (391/384)
SS-38 (171/29.8)
SS-39 (75.8/41.2)
SS-40 (36.5/23.9)
SS-50 (49.5/1.3)
SS-51 (296/6.9)
SS-41 (144/5.5)
SS-42 (517/18.9)
SS-43 (449/13.1)
SS-44 (69.8/3.2)
SS-53 (ND/0.3)
SS-45 (412/196)
SS-46 (64.5/76.9)
Railroad tracks
Approximate initial boundaries of soil classified as TSCA waste based on results of FI
Concrete Driveway
SS-52 (- /ND)
Legend
● Soil sample location from Field Investigation [with sample ID and PCB concentration (0-6 in./36-42 in.) in parts per million]
0
10
SCALE IN FEET
Final Report - Mitigation of PCB Contamination
Building 3, St. Louis Army Ammuniton Plant
St. Louis, Missouri
Figure 1-5
General Locations and Extent of PCB Contamination Outside the Building
Arrowhead Contracting, Inc.
Date: 10/10/03
Project No.: 00-215 SLAAP Building 3
Checked By: GBK
Drawn By: DLR
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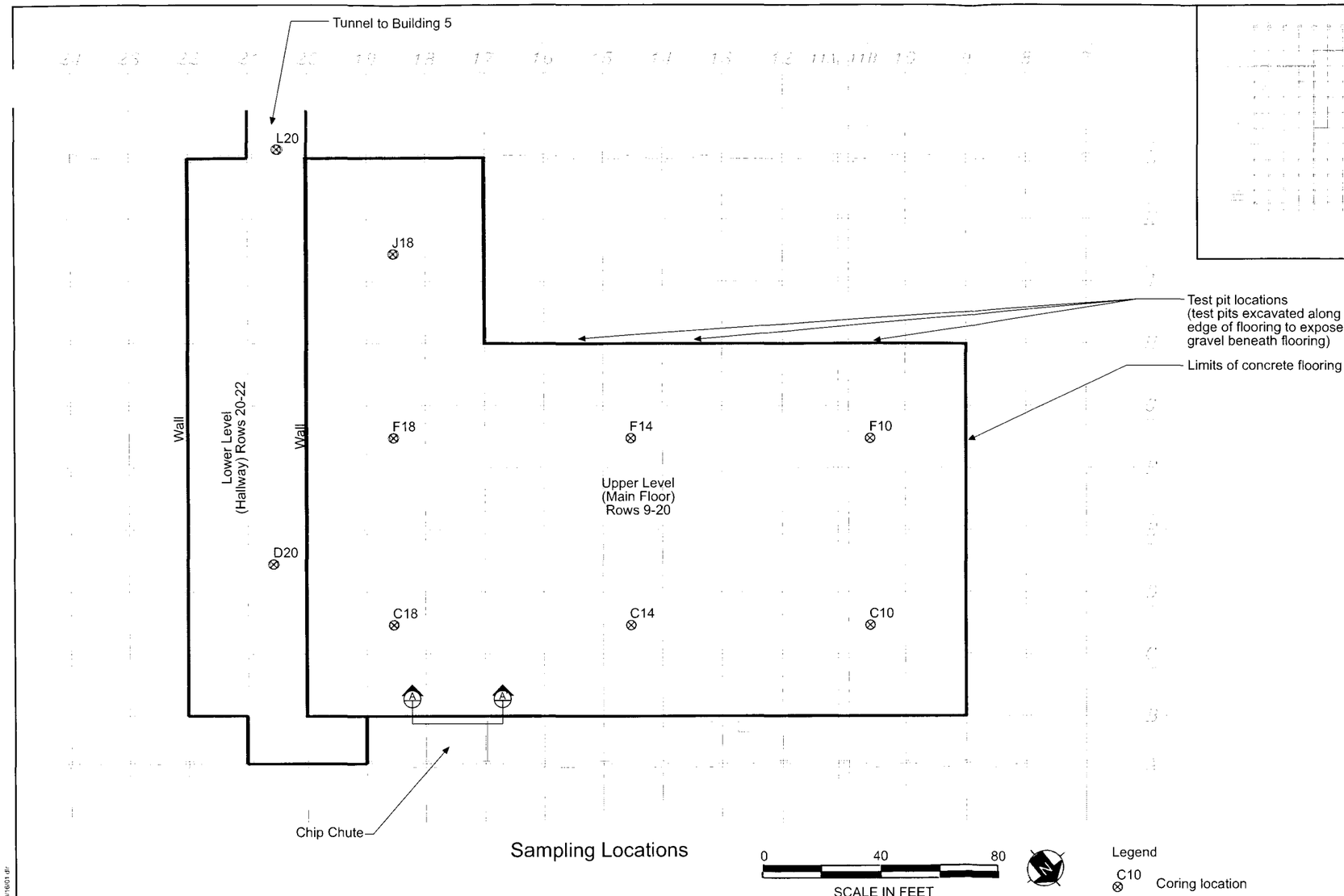
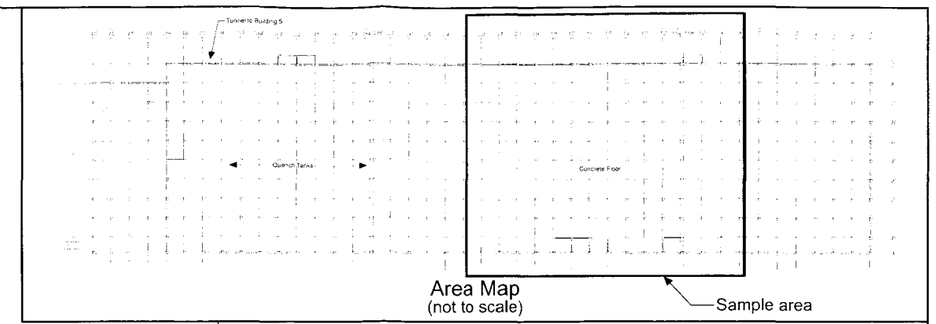
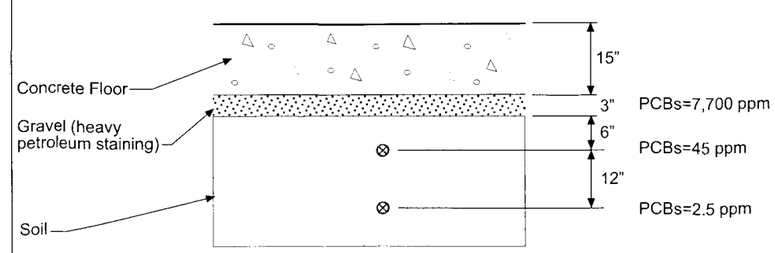


Sampling Locations



Core Hole Location/Sector	Material Beneath Flooring	Observation or Evidence of Contamination	PCB Concentration
D20	Soil (no gravel)	Grayish brown silty clay soil; no evidence of staining or contamination	Not Detected
L20	Soil (no gravel)	Grayish brown silty clay soil; no evidence of staining or contamination	Not Detected
C10	Gravel	Moderate black oil staining, moderate petroleum odor	-
C14	Gravel	Very heavy black oil staining, very strong petroleum odor	1,561ppm
C18	Gravel	Very heavy black oil staining, very strong petroleum odor	-
F10	Gravel	Moderate black oil staining, moderate petroleum odor	-
F14	Gravel	Minor black oil staining, weak to moderate petroleum odor	-
F18	Gravel	Very little to no oil staining, very weak petroleum odor	97ppm
J18	Gravel	Very heavy black oil staining, very strong petroleum odor	-

Note: Oil stained gravel was encountered beneath concrete flooring at each test pit location. Staining appeared black, petroleum-like, with strong odor.



Section A-A'
Not to Scale

Final Report - Mitigation of PCB Contamination
Building 3, St. Louis Army Ammunition Plant
St. Louis, Missouri

Figure 1-7
PCB Contamination
Beneath the Basement
Concrete Flooring

Arrowhead Contracting, Inc.

Date: 10/10/03 | Project No.: 00-215 SLAAP Building 3 | Checked By: GWW | Drawn By: DLR

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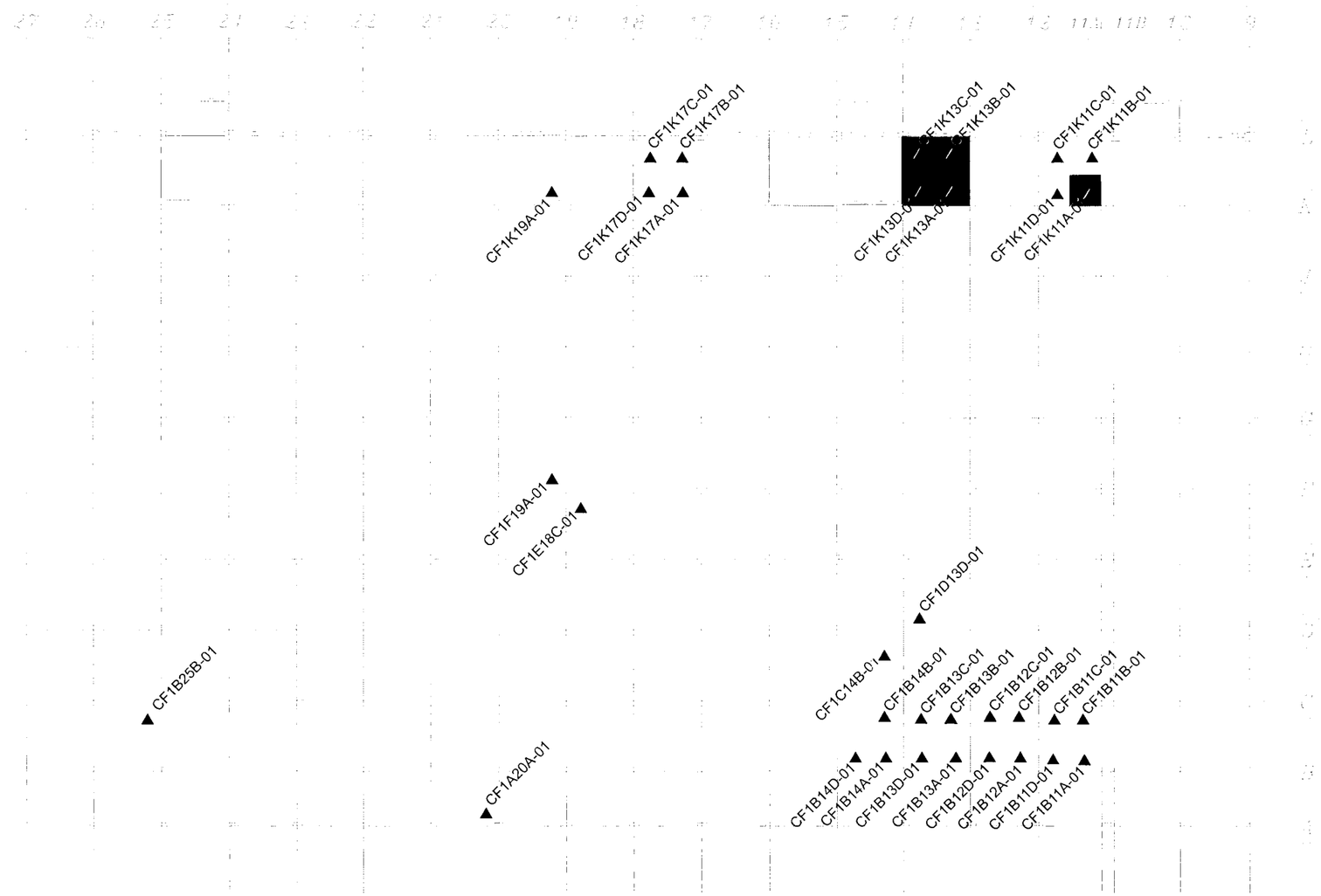
First Floor Concrete Data Gap Sample Results

Sample ID	Date Collected	Sample Type	Analysis	PCBs Conc. (mg/kg)
CF1A20A-01	11/16/2001	Concrete Floor	PCBs	5.40
CF1B11A-01	11/20/2001	Concrete Floor	PCBs	ND
CF1B11B-01	11/20/2001	Concrete Floor	PCBs	1.24
CF1B11C-01	11/20/2001	Concrete Floor	PCBs	ND
CF1B11D-01	11/20/2001	Concrete Floor	PCBs	ND
CF1B12A-01	11/20/2001	Concrete Floor	PCBs	0.19
CF1B12B-01	11/20/2001	Concrete Floor	PCBs	0.20
CF1B12C-01	11/20/2001	Concrete Floor	PCBs	ND
CF1B12D-01	11/20/2001	Concrete Floor	PCBs	ND
CF1B13A-01	11/20/2001	Concrete Floor	PCBs	0.51
CF1B13B-01	11/20/2001	Concrete Floor	PCBs	ND
CF1B513B0-01	11/20/2001	Duplicate of CF1B13B-01	PCBs	ND
CF1B13C-01	11/20/2001	Concrete Floor	PCBs	ND
CF1B13D-01	11/20/2001	Concrete Floor	PCBs	0.13
CF1B513D-01	11/20/2001	Duplicate of CF1B13D-01	PCBs	ND
CF1B14A-01	11/20/2001	Concrete Floor	PCBs	ND
CF1B14B-01	11/20/2001	Concrete Floor	PCBs	ND
CF1B14C-01	11/20/2001	Concrete Floor	PCBs	ND
CF1B14D-01	11/20/2001	Concrete Floor	PCBs	ND
CF1B25B-01	11/16/2001	Concrete Floor	PCBs	23.00
CF1C14B-01	11/16/2001	Concrete Floor	PCBs	6.47
CF1D13D-01	11/16/2001	Concrete Floor	PCBs	2.98
CF1E18C-01	11/16/2001	Concrete Floor	PCBs	2.34
CF1F19A-01	11/16/2001	Concrete Floor	PCBs	0.21
CF1K11A-01	11/16/2001	Concrete Floor	PCBs	52.91
CF1K11B-01	11/16/2001	Concrete Floor	PCBs	12.92
CF1K11C-01	11/16/2001	Concrete Floor	PCBs	30.55
CF1K11D-01	11/16/2001	Concrete Floor	PCBs	27.83
CF1K511D-01	11/16/2001	Duplicate of CF1K11D-01	PCBs	27.83
CF1K13A-01	11/16/2001	Concrete Floor	PCBs	69.06
CF1K13B-01	11/16/2001	Concrete Floor	PCBs	40.83
CF1K13C-01	11/16/2001	Concrete Floor	PCBs	56.05
CF1K13D-01	11/16/2001	Concrete Floor	PCBs	59.47
CF1K17A-01	11/16/2001	Concrete Floor	PCBs	0.65
CF1K17B-01	11/16/2001	Concrete Floor	PCBs	0.58
CF1K17C-01	11/16/2001	Concrete Floor	PCBs	0.34
CF1K17D-01	11/16/2001	Concrete Floor	PCBs	26.65
CF1K19A-01	11/16/2001	Concrete Floor	PCBs	0.22



Legend:

SW1▲ Concrete floor sample location with sample ID

mg/kg Milligrams per kilogram

■ Area identified as TSCA waste, based on concrete data gap sample result (PCBs >43.5ppm)

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Final Report - Mitigation of PCB Contamination
Building 3, St. Louis Army Ammunition Plant
St. Louis, Missouri

Figure 3-1
Concrete Data Gap Samples on First Floor

Arrowhead Contracting, Inc.

Date: 10/10/03 | Project No.: 00-215 SLAAP Building 3 | Checked By: GWW | Drawn By: DLR

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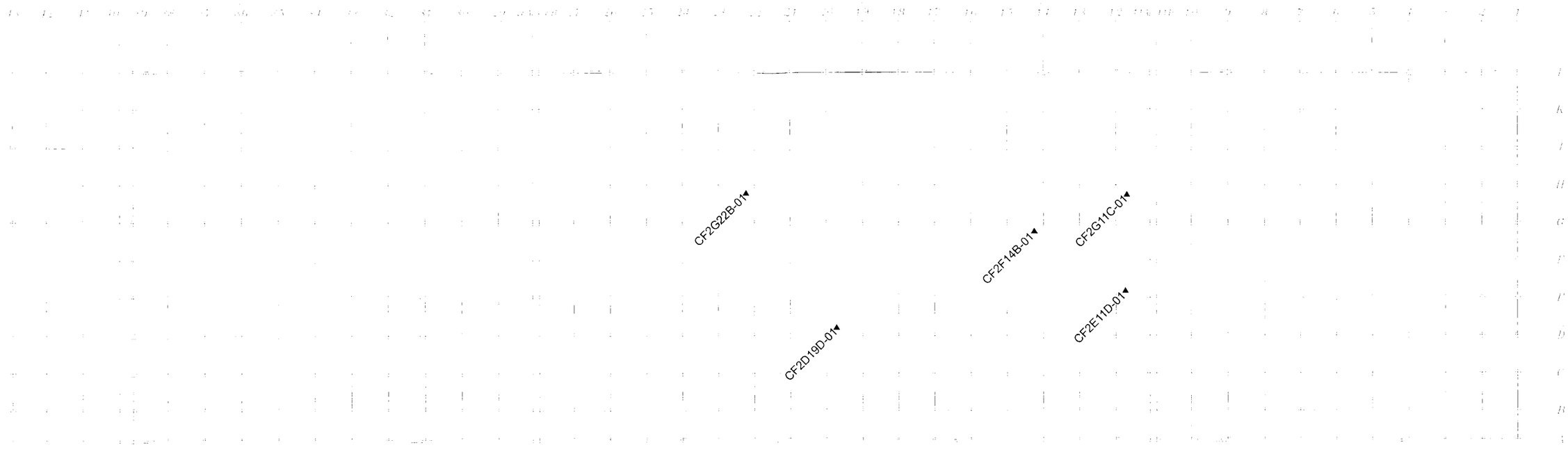

Second Floor Concrete Data Gap Sample Results

Sample ID	Date Collected	Sample Type	Analysis	PCBs Conc. (mg/kg)
CF2D19D-01	11/16/2001	Concrete Floor	PCBs	4..64
CF2E11D-01	11/16/2001	Concrete Floor	PCBs	3.00
CF2F14B-01	11/16/2001	Concrete Floor	PCBs	0.27
CF2F514B-01	11/16/2001	Duplicate of CF1F14B-01	PCBs	0.26
CF2F30-01	7/30/2002	Concrete	PCBs	0.3
CF2G11C-01	11/16/2001	Concrete Floor	PCBs	1.42
CF2G22B-01	11/16/2001	Concrete Floor	PCBs	0.63

Legend:

SW1▲ Concrete floor sample location with sample ID

mg/kg Milligram per kilogram

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Building 3, St. Louis Army Ammunition Plant
St. Louis, Missouri

Figure 3-2
Concrete Data Gap Samples on Second Floor

Arrowhead Contracting, Inc.

Date: 10/10/03 | Project No.: 00-215 SLAAP Building 3 | Checked By: GWW | Drawn By: DLR

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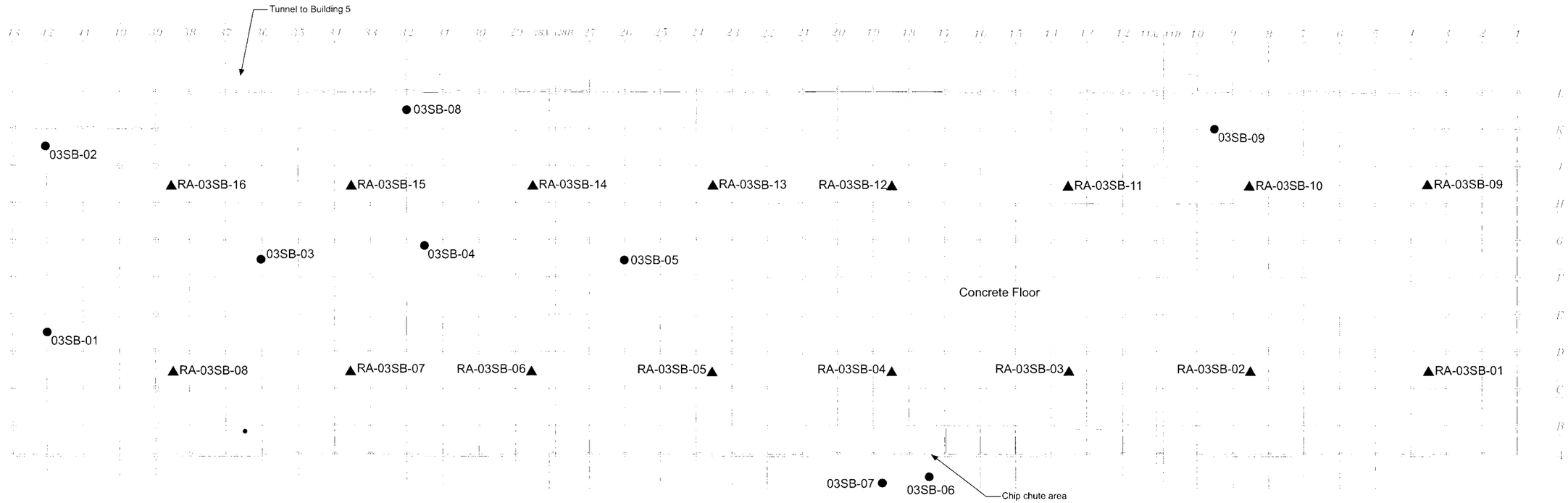

Building 3 Site-Specific
EBS Soil Sample Results

Sample ID	Depth (in inches below ground surface)	Date Collected	Sample Type	Analysis	PCBs Conc. (mg/kg)
03SB-01-0006	0 to 6	3/3/02	Characterization	PCB	ND
03SB-01-2436	24 to 36	3/3/02	Characterization	PCB	ND
03SB-02-0006	0 to 6	3/3/02	Characterization	PCB	0.368
03SB-02-2436	24 to 36	3/3/02	Characterization	PCB	0.0609
03SB-03-0006	0 to 6	3/3/02	Characterization	PCB	ND
03SB-03-2436	24 to 36	3/3/02	Characterization	PCB	ND
03SB-04-0006	0 to 6	3/3/02	Characterization	PCB	ND
03SB-04-2436	24 to 36	3/3/02	Characterization	PCB	ND
03SB-05-0006	0 to 6	3/3/02	Characterization	PCB	0.316
03SB-505-0006	0 to 6	3/3/02	Duplicate of 03SB-05-0006	PCB	2.856
03SB-05-2436	24 to 36	3/3/02	Characterization	PCB	1.079
03SB-06-6072	60 to 72	8/28/02	Characterization	PCB	ND
03SB-06-96120	96 to 120	8/28/02	Characterization	PCB	ND
03SB-07-6072	60 to 72	8/28/02	Characterization	PCB	ND
03SB-07-96120	96 to 120	8/28/02	Characterization	PCB	ND
03SB-08-0006	0 to 6	3/3/02	Characterization	PCB	ND
03SB-08-2436	24 to 36	3/3/02	Characterization	PCB	ND
03SB-09-0006	0 to 6	3/4/02	Characterization	PCB	18.721
03SB-09-2436	24 to 36	3/4/02	Characterization	PCB	23.98
RA-03SB-01-0006	0 to 6	3/5/02	Risk Assessment	PCB	ND
RA-03SB-01-2436	24 to 36	3/5/02	Risk Assessment	PCB	ND
RA-03SB-02-0006	0 to 6	3/5/02	Risk Assessment	PCB	10.747
RA-03SB-02-2436	24 to 36	3/5/02	Risk Assessment	PCB	23.881
RA-03SB-03-3238	32 to 38	3/5/02	Risk Assessment	PCB	ND
RA-03SB-03-5668	56 to 68	3/5/02	Risk Assessment	PCB	ND
RA-03SB-04-3238	32 to 38	3/5/02	Risk Assessment	PCB	ND
RA-03SB-04-5668	56 to 68	3/5/02	Risk Assessment	PCB	ND

Building 3 Site-Specific
EBS Soil Sample Results
(cont'd)

Sample ID	Depth (in inches below ground surface)	Date Collected	Sample Type	Analysis	PCBs Conc. (mg/kg)
RA-03SB-05-0006	0 to 6	3/4/02	Risk Assessment	PCB	ND
RA-03SB-05-2436	24 to 36	3/4/02	Risk Assessment	PCB	ND
RA-03SB-06-0006	0 to 6	3/4/02	Risk Assessment	PCB	ND
RA-03SB-06-2436	24 to 36	3/4/02	Risk Assessment	PCB	ND
RA-03SB-07-0006	0 to 6	3/4/02	Risk Assessment	PCB	ND
RA-03SB-07-2436	24 to 36	3/4/02	Risk Assessment	PCB	ND
RA-03SB-08-0006	0 to 6	3/4/02	Risk Assessment	PCB	ND
RA-03SB-08-2436	24 to 36	3/4/02	Risk Assessment	PCB	ND
RA-03SB-09-0006	0 to 6	3/5/02	Risk Assessment	PCB	ND
RA-03SB-09-2436	24 to 36	3/5/02	Risk Assessment	PCB	ND
RA-03SB-10-0006	0 to 6	3/5/02	Risk Assessment	PCB	0.28
RA-03SB-10-2436	24 to 36	3/5/02	Risk Assessment	PCB	ND
RA-03SB-11-0006	0 to 6	3/5/02	Risk Assessment	PCB	0.881
RA-03SB-11-2436	24 to 36	3/5/02	Risk Assessment	PCB	1.739
RA-03SB-12-3238	32 to 38	3/5/02	Risk Assessment	PCB	ND
RA-03SB-12-5668	56 to 68	3/5/02	Risk Assessment	PCB	ND
RA-03SB-13-0006	0 to 6	3/4/02	Risk Assessment	PCB	ND
RA-03SB-13-2436	24 to 36	3/4/02	Risk Assessment	PCB	ND
RA-03SB-14-0006	0 to 6	3/4/02	Risk Assessment	PCB	ND
RA-03SB-14-2436	24 to 36	3/4/02	Risk Assessment	PCB	ND
RA-03SB-15-0006	0 to 6	3/4/02	Risk Assessment	PCB	ND
RA-03SB-15-2436	24 to 36	3/4/02	Risk Assessment	PCB	ND
RA-03SB-16-0006	0 to 6	3/4/02	Risk Assessment	PCB	ND
RA-03SB-16-2436	24 to 36	3/4/02	Risk Assessment	PCB	ND

Legend:

▲ Risk assessment sample location

● Characterization sample location

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Final Report - Mitigation of PCB Contamination
Building 3, St. Louis Army Ammunition Plant
St. Louis, Missouri

Figure 3-4
Building 3 Site-Specific
EBS Samples

Arrowhead Contracting, Inc.

Date: 10/10/03 | Project No.: 00-215 SLAAP Building 3 | Checked By: GWW | Drawn By: DLR

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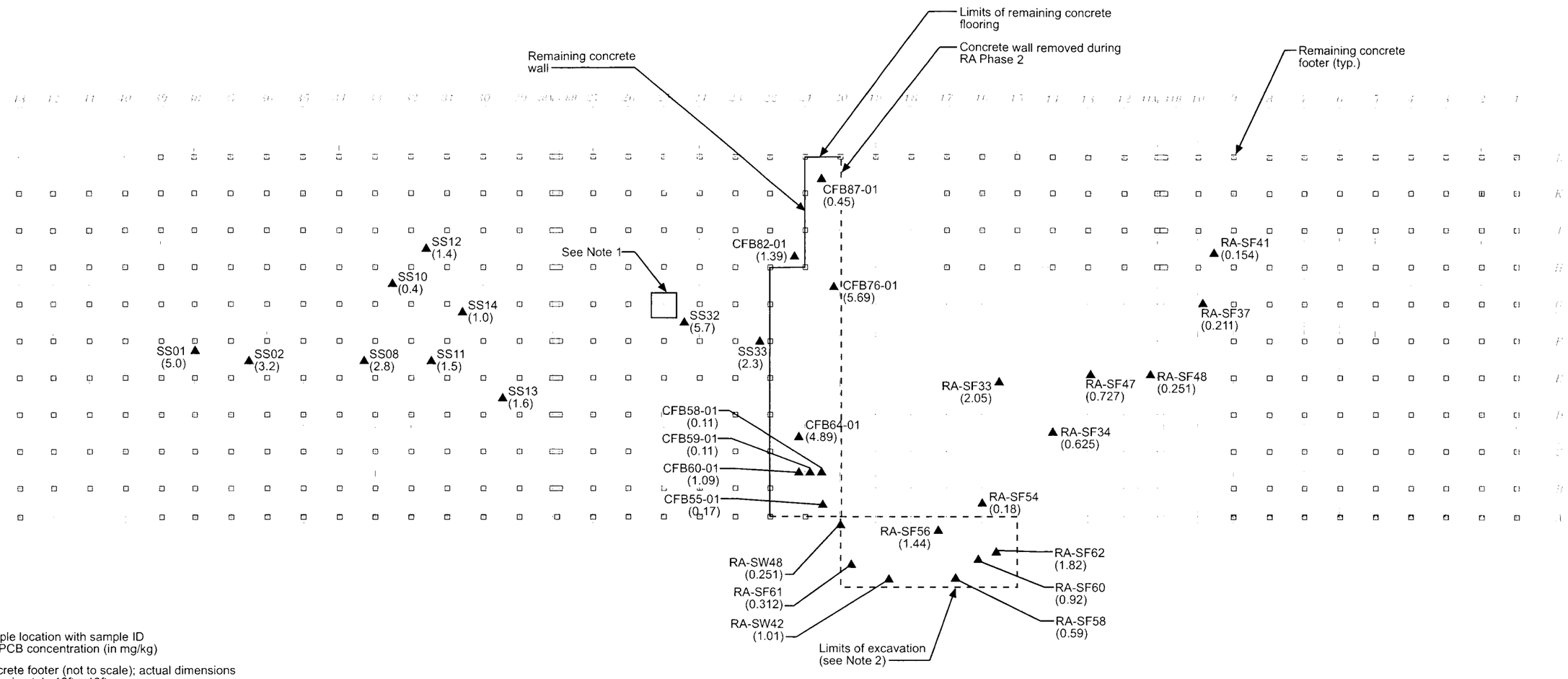

Legend:

▲ SS01 (5.0)	Sample location with sample ID and PCB concentration (in mg/kg)
□	Concrete footer (not to scale); actual dimensions approximately 12ft x 12ft.
SS	Soil sample collected during Field Investigation
CFB	Concrete floor confirmation sample collected during RA Phase I
RA-SW	Soil confirmation sample from sidewall of excavation, collected during RA Phase 2
RA-SF	Soil confirmation sample from floor of excavation, collected during RA Phase 2

Notes:

1. Footer G25 was removed during RA.
2. Samples from floor of excavation are located approximately 10ft bgs.
3. Samples locations shown correspond to locations where PCBs were detected at concentrations less than the subsurface cleanup level (7.6ppm).

Final Report - Mitigation of PCB Contamination
Building 3, St. Louis Army Ammunition Plant
St. Louis, Missouri

Figure 4-3
Final Subsurface Site Conditions and Residual PCB Contamination

Arrowhead Contracting, Inc.

Date 10/10/03	Project No. 00-215 SLAAP Building 3	Checked By GWW	Drawn By DLR

APPENDIX A
CORRESPONDENCE REGARDING BUILDING 3
SITE-SPECIFIC EBS SAMPLE RESULTS

August 1, 2002

Ms. Sandy Olinger (AMSAM-EN)
Building 111
Redstone Arsenal, Alabama 35898

Preliminary Evaluation of EBS Analytical Data
Basement Soils
Building 3, St. Louis Army Ammunition Plant
Contract No. DACW41-00-D-0019

Dear Ms. Olinger:

To accommodate the schedule for demolition and PCB remediation activities at Building 3, Saint Louis Army Ammunition Plant (SLAAP), potential areas of soil contamination were investigated at Building 3 in advance of other areas designated for investigation as part of the Site-Specific Environmental Baseline Survey (EBS). The Site-Specific EBS is being conducted by AMCOM in accordance with Department of Defense (DoD) standards in preparation for the eventual transfer of the property to a new owner. Sampling and analysis associated with the Building 3 Site-Specific EBS were conducted in March 2002. Samples were collected from random locations for risk assessment purposes and from specific areas where oil staining was observed. Detected concentrations from the EBS sampling are given in Attachment A. The results of the sampling effort indicated that two additional areas of PCB contamination would need to be remediated due to the presence of PCBs above the site cleanup level of 7.6 ppm. These areas include oil-stained soil near Sectors K9 and C8 (refer to Figure 1). The PCB results from samples collected at these locations were 18.7 mg/kg (sample 03SB-09-0006, Sector K9), 24 mg/kg (sample 03SB-09-2436, Sector K9), 10.7 mg/kg (sample RA-03SB-02-0006, Sector C8), and 23.9 mg/kg (sample RA-03SB-02-2436). The results of detected concentrations of PCBs in all the EBS soil samples are summarized in Table 1.

The only other contaminants detected at concentrations exceeding MDNR CALM levels for a commercial site (the projected use of the site) included benzo(a)pyrene and total petroleum hydrocarbon (TPH); 0.2 mg/kg and 500 mg/kg, respectively. The detected concentrations of these two compounds in all the samples collected as part of the EBS are given in Table 1. Benzo(a)pyrene was detected at concentrations that exceed the MDNR CALM level for commercial sites at four sample locations; RA-03SB-07-0006, RA-03SB-10-0006, RA-03SB-13-0006, and RA-03SB-14-0006 (refer to Table 1 and Figure 1). However, in accordance with

MDNR Tier 1 cleanup standards for soils located at depths greater than 3 feet, a decision whether cleanup is required should be based on the CLeach values given in Table B1, Cleanup Levels for Missouri (CALM, Appendix B, Tier 1 Soil and Groundwater Cleanup Standards. These sample locations are at a depth of 7 to 9 feet below finished grade when backfilling of the basement area is completed and therefore the appropriate MDNR CALM value to use as a cleanup standard is the CLeach value. The CLeach value for benzo(a)pyrene is 24 mg/kg. Based on a comparison of the detected concentrations with the CLeach value, cleanup of benzo(a)pyrene is not required.

Total petroleum hydrocarbon was detected above the commercial CALM value at one sample location (03SB-05-0006, Sector F26). The MDNR has not established a CLeach value for TPH and, therefore, it is recommended that AMCOM default to use of the commercial CALM value (500 mg/kg). The estimated area of TPH contaminated soil exceeding this value is ten (10) square feet. Soil should initially be removed to a depth of 2 feet and the base and the sidewalls of the excavation sampled to determine whether additional soil excavation is warranted to reach the cleanup standard. The estimated quantity of TPH contaminated soil is less than one cubic yard. The TPH contaminated soil should be removed prior to backfilling of the basement. It is believed the most cost efficient manner to address this contamination is to perform the cleanup during remediation activities for PCB contamination in the basement of Building 3. The TPH contaminated soil should be transported off-site by truck and taken to an approved landfill for disposal as special waste.

If you should have any questions regarding this proposal, please call us at (913) 814-9994.

Sincerely,

Greg Wallace

Greg Wallace, RG
Project Manager

Enclosures:

Cc: Brad Eaton (U.S. Army Corps of Engineers, Kansas City District)

September 25, 2002

Ms. Sandy Olinger (AMSAM-EN)
Building 111
Redstone Arsenal, Alabama 35898

Preliminary Evaluation of EBS Analytical Data
Soils Outside Building 3, Adjacent to the Chip Chute Load-Out Area
Building 3, St. Louis Army Ammunition Plant
Contract No. DACW41-00-D-0019

Dear Ms. Olinger:

This letter provides further information with regard to the soil samples collected at Building 3 as part of the Site-Specific Environmental Baseline Survey (EBS). To accommodate the schedule for demolition and PCB remediation activities at Building 3, Saint Louis Army Ammunition Plant (SLAAP), potential areas of soil contamination were investigated at Building 3 in advance of other areas to be investigated during the EBS. The Site-Specific EBS is being conducted by AMCOM in accordance with Department of Defense (DoD) standards in preparation for the eventual transfer of the property to a new owner. Sampling and analysis associated with the basement soil flooring inside Building 3 were conducted in March 2002. The results of these samples, including a plan for additional soil removal in select areas of the basement, were discussed in a letter submitted by Arrowhead to AMCOM on August 1, 2002.

The work plan for the Site-Specific EBS includes two soil samples (03SB-06 and 03SB-07) located outside Building 3 in the vicinity of the Chip Chute load-out area. The purpose of these samples is to characterize the soils beneath the planned excavation for PCBs in this area, to determine whether additional soil removal will be necessary prior to backfilling the excavation. Since the excavation for PCBs is planned to a depth of 5 ft bgs, the sampling depth intervals for 03SB-06 and 03SB-07 are 5 – 6 ft (60 – 72 in) and 9 – 10 ft (108 – 120 in) bgs. Arrowhead planned to collect these samples concurrent with the basement soil samples in March 2002. However, while attempting to collect the samples using a manual hand auger, utility obstructions were encountered at approximately 4 - 5 ft bgs. As a result, Arrowhead deferred the collection of the samples to the Site-Specific EBS field effort scheduled for August 2002. With the use of a Geoprobe hydraulic push-probe, Arrowhead successfully collected samples 03SB-06 and 03SB-07 on August 28, 2002. In accordance with the EBS work plan, the samples were analyzed for PCBs, gasoline range organics (GROs), diesel range organics (DROs), semivolatile organic compounds (SVOCs), and total metals.

12920 Metcalf, Suite 150 • Overland Park, KS 66213 • (913) 814-9994 • FAX (913) 814-9997

The analytical results for samples 03SB-06 and 03SB-07 are summarized as follows:

- No SVOCs were detected.
- No GROs were dected.
- DROs were detected from 16 – 21 ppm, which is below the commercial CALM (Cleanup Action Levels for Missouri) value of 500 mg/kg.
- PCBs were detected from 0.2 – 2.2 ppm in three of the four samples, which is below the site risk-based cleanup (subsurface) goal of 7.6 ppm.
- Metals, when detected, were below commercial CALM and C_{LEACH} values.

The data is currently being validated by URS Corp.

The results of samples 03SB-06 and 03SB-07 indicate that additional soil remediation below 5 ft bgs will not be required within the limits of excavation for PCBs, because the concentrations of detected compound are well below site action levels. The site actions levels include MDNR commercial CALM soil target concentrations, C_{LEACH} CALM values, and the site risk-based cleanup level for PCBs as discussed on our prior letter. Accordingly, Arrowhead does not recommend further remediation in this area beyond what will be implemented to remove PCB-contaminated soil to the risk-based cleanup level of 7.6 ppm.

If you should have any questions regarding this letter, please call us at (913) 814-9994.

Sincerely,

Scott Siegwald
QA/QC Manager

Greg Wallace, R.G.
Project Manager

Enclosures

cc: Brad Eaton (U.S. Army Corps of Engineers, Kansas City District)

Table 1
Detected Concentrations of Chemical Compounds in Comparison to MDNR Commercial CALM Values, CLeach Values and Site-Specific Risk-Based Goal for PCBs
SLAAP, St. Louis, MO

Project Sample Number	Result	Units of Measure	Data Qualifiers	Parameter Name
03SB-02-0006	0.368	mg/kg		Aroclor 1248
03SB-02-2436	0.0609	mg/kg		Aroclor 1248
03SB-05-0006	0.316	mg/kg		Aroclor 1248
03SB-05-2436	1.079	mg/kg		Aroclor 1248
03SB-09-0006	18.721	mg/kg		Aroclor 1248
03SB-09-2436	23.98	mg/kg		Aroclor 1248
03SB-505-0006	2.856	mg/kg		Aroclor 1248
RA-03SB-02-0006	10.747	mg/kg		Aroclor 1248
RA-03SB-02-2436	23.881	mg/kg		Aroclor 1248
RA-03SB-10-0006	0.28	mg/kg		Aroclor 1248
RA-03SB-11-0006	0.881	mg/kg		Aroclor 1248
RA-03SB-11-2436	1.739	mg/kg		Aroclor 1248
03SB-08-0006	0.296	mg/kg		Benzo(a)pyrene
03SB-09-0006	0.100	mg/kg		Benzo(a)pyrene
RA-03SB-02-0006	0.023	mg/kg		Benzo(a)pyrene
RA-03SB-02-2436	0.010	mg/kg		Benzo(a)pyrene
RA-03SB-05-0006	0.030	mg/kg	Data rejected based on surrogate recovery (masked by pertroleum residue)	Benzo(a)pyrene
RA-03SB-05-2436	0.016	mg/kg		Benzo(a)pyrene
RA-03SB-06-0006	0.028	mg/kg		Benzo(a)pyrene
RA-03SB-06-2436	0.031	mg/kg		Benzo(a)pyrene
RA-03SB-07-0006	5.032	mg/kg		Benzo(a)pyrene
RA-03SB-07-2436	0.194	mg/kg		Benzo(a)pyrene
RA-03SB-08-0006	0.021	mg/kg		Benzo(a)pyrene
RA-03SB-09-0006	0.007	mg/kg		Benzo(a)pyrene
RA-03SB-10-0006	1.363	mg/kg		Benzo(a)pyrene
RA-03SB-10-2436	0.175	mg/kg		Benzo(a)pyrene
RA-03SB-13-0006	0.410	mg/kg		Benzo(a)pyrene
RA-03SB-13-2436	0.018	mg/kg		Benzo(a)pyrene
RA-03SB-14-0006	0.339	mg/kg	J	Benzo(a)pyrene
RA-03SB-14-2436	0.044	mg/kg	J	Benzo(a)pyrene
RA-03SB-15-0006	0.026	mg/kg		Benzo(a)pyrene
RA-03SB-15-2436	0.012	mg/kg	J	Benzo(a)pyrene
RA-03SB-16-0006	0.034	mg/kg	J	Benzo(a)pyrene
RA-03SB-16-2436	0.018	mg/kg	J	Benzo(a)pyrene
RA-03SB-506-0006	0.059	mg/kg		Benzo(a)pyrene
RA-03SB-513-0006	0.263	mg/kg		Benzo(a)pyrene
RA-03SB-516-2436	0.012	mg/kg	J	Benzo(a)pyrene
03SB-01-0006	22.1	mg/kg		TPH
03SB-01-2436 (MS/MSD)	13.8	mg/kg		TPH
03SB-02-0006	7.63	mg/kg		TPH
03SB-02-2436	5.64	mg/kg		TPH
03SB-03-0006	53.3	mg/kg		TPH
03SB-03-2436	4.77	mg/kg		TPH
03SB-04-0006	14.1	mg/kg		TPH
03SB-04-2436	7.14	mg/kg		TPH
03SB-05-0006	673	mg/kg		TPH
03SB-05-2436	114	mg/kg		TPH
03SB-08-0006	2.63	mg/kg		TPH
03SB-08-2436	4.65	mg/kg		TPH
03SB-09-0006	57.8	mg/kg		TPH
03SB-09-2436	70	mg/kg		TPH
03SB-501-0006	23.9	mg/kg		TPH
03SB-503-2436	18	mg/kg		TPH
03SB-505-0006	570	mg/kg		TPH

Calm Values	Commercial	CLeach	Risk Based Ceanup Goal
Aroclor 1248	0.9 mg/kg	18 mg/kg	10 ppm
Benzo(a)pyrene	0.2 mg/kg	24 mg/kg	NA
TPH	500 mg/kg	NA	NA

APPENDIX B
RISK-BASED DETERMINATION OF THE SUBSURFACE PCB CLEANUP STANDARD

MEMORANDUM

To: Greg Wallace
Arrowhead Contracting, Inc.
12920 Metcalf, Suite 150
Overland Park, KS 66213

From: Jim Garrison, PhD
URS Corporation

Date: February 14, 2002

Re: Calculation of PCB Cleanup Goals
For Subsurface Soils Beneath Building 3
St Louis Army Ammunition Plant (SLAAP)

This memorandum presents the documentation for developing subsurface soil cleanup goals for PCBs that have been discovered beneath Building 3 at the SLAAP site. It is our understanding that extensive PCB contamination has been discovered beneath the basement floor of this building. We understand that once this building is demolished and any contaminated soils are removed, the basement footprint will be backfilled leaving any residual contamination in the subsurface soils at least 8 to 10 feet below ground surface. In order to complete demolition of the building and prepare that portion of the site for property transfer, cleanup goals must be developed for the underlying soils. At this time there are no standardized subsurface cleanup goals that can be readily applied to deep soils. For this reason, consistent with TSCA guidance, health-based cleanup goals have been developed herein.

Because of the depth of the PCB contamination (8-10 feet bgs and deeper), the only anticipated exposure to contaminated soil would be if construction workers were to excavate to that depth during future development of the property. The cleanup goals presented in this document were thus developed to be protective of a general construction worker population. The equations used to calculate cleanup goals, and the exposure assumptions use in these equations were taken from the *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (USEPA, 2001). The assumptions provided in this guidance were specifically designed to evaluate construction worker exposure, particularly the high soil contact rates associated with construction work. It should be noted that these equations assume significant exposure by two pathways: direct dermal contact and incidental ingestion. An evaluation of the inhalation pathway, based on the assumption of dust generation from heavy truck traffic, was performed using the Particulate Emission Factor equations presented in USEPA (2001). Inhalation was not identified as a significant pathway to overall risk, and as such, was not incorporated into the cleanup goal equations.

The equations and exposure assumptions used in the calculations are presented in Tables 1 and 2. Table 1 presents the calculation of health-based cleanup goals based on the

potential carcinogenic effects of PCBs. The slope factor used in these calculations, based on total PCB, was taken from USEPA's Integrated Risk Information System (IRIS) database. Alternative goals were calculated based on three different target risk levels; 1×10^{-6}, 1×10^{-5}, and 1×10^{-4}. Under industrial use scenarios, a 10^{-5} cleanup goal is generally considered protective, and is often used as the recommended cancer-based cleanup goal. Table 2 presents the calculation of health-based cleanup goals based on the non-cancer effects of PCBs. A reference dose (RfD) of 4.5×10^{-5} was used to evaluate non-cancer effects. This value was derived as the mean of the RfD for aroclor 1254 (RfD of 2×10^{-5}) and aroclor 1016 (RfD of 7×10^{-5}). This value was chosen because there is no RfD for the form of aroclor present at the site (aroclor 1248), and because this form of aroclor roughly falls between 1254 and 1016 in the degree of chlorination[1]. Alternative goals were calculated based on two different target hazard quotients; 0.1 and 1.0. Under most circumstances, the target hazard index of 1.0 is used as the basis for the non-cancer-based cleanup goal. A comparison of the alternative cleanup goals is presented in Table 3. A cleanup goal of 10 mg/kg, based on a target hazard index of 1.0, would also correlate with a target cancer risk less than 1×10^{-5} for construction worker exposure.

This memorandum was prepared for Arrowhead Contracting for the specific purpose of developing subsurface soil cleanup goals for soils underlying the basement of Building 3 at SLAAP under the assumptions identified above. Should site conditions vary from these assumptions, these cleanup goals should be revisited to insure they are adequately protective.

Reference

U.S. Environmental Protection Agency (USEPA). 2001. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Peer review Draft. OSWER Directive 9355.4-24. March.

[1] Aroclors consist of mixtures of individual PCB congeners with varying degrees of chlorination. Aroclor 1248 has a lower percentage of overall chlorination than aroclor 1254, but more than aroclor 1016. It is believed that the degree of toxicity is related to the degree of chlorination.

Table 1

Calculation of subsurface soil PCB cleanup goal based on construction worker scenario
Building 3 - St Louis Army Ammunition Plant (SLAAP)
Cancer endpoint

Equation:

$$Goal_c = \frac{TR * BW * ATc}{(EF * ED * CF) * ((SF * IR) + (SF * AF * ABS * SA))}$$

Where:
TR = Target Risk (unitless)
BW = Body Weight (kg)
ATc = Averaging Time for Carcinogens (days)
EF = Exposure frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
SF = Slope Factor $(mg/kg\text{-}day)^{-1}$
IR = Ingestion Rate (mg/day)
AF = Soil to Skin Adherence Factor (mg/cm^2)
ABS = Dermal Absorption fraction (unitless)
SA = Exposed Skin Surface Area (cm^2/day)

TR	BW	ATc	EF	ED	CF	SF	IR	AF	ABS	SA	**$Goal_c$**
unitless	kg	days	days/yr	years	kg/mg	$(mg/kg\text{-}d)^{-1}$	mg/day	mg/cm^2	unitless	cm^2/day	**mg/kg**
1.00E-04	70	25550	250	1	0.000001	2	330	0.3	0.14	3300	**763.3**
1.00E-05	70	25550	250	1	0.000001	2	330	0.3	0.14	3300	**76.3**
1.00E-06	70	25550	250	1	1.00E-06	2	330	0.3	0.14	3300	**7.6**

note: Exposure assumptions and equations from Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA, 2001).

Table 2

Calculation of subsurface soil PCB cleanup goal based on construction worker scenario
Building 3 - St Louis Army Ammunition Plant (SLAAP)
Non-Cancer endpoint

Equation:

$$Goal_{nc} = \frac{THQ * BW * ATnc}{(EF * ED * CF) * ((1/RfD * IR) + (1/RfD * AF * ABS * SA))}$$

Where:
THQ = Target Hazard Quotient (unitless)
BW = Body Weight (kg)
ATnc = Averaging Time for Non-Carcinogens (days)
EF = Exposure frequency (days/year)
ED = Exposure Duration (years)
CF = Conversion Factor (kg/mg)
RfD = Reference Dose (mg/kg-day)
IR = Ingestion Rate (mg/day)
AF = Soil to Skin Adherence Factor (mg/cm^2)
ABS = Dermal Absorption fraction (unitless)
SA = Exposed Skin Surface Area (cm^2/day)

THQ	BW	ATnc	EF	ED	CF	RfD	IR	AF	ABS	SA	**$Goal_{nc}$**
unitless	kg	days	days/yr	years	kg/mg	mg/kg-d	mg/day	mg/cm^2	unitless	cm^2/day	**mg/kg**
1	70	365	250	1	1.00E-06	4.50E-05	330	0.3	0.14	3300	**10**

note: Exposure assumptions and equations from Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA, 2001).

Table 3

Calculation of subsurface soil PCB cleanup goal based on construction worker scenario
Building 3 - St Louis Army Ammunition Plant (SLAAP)

All concentrations given in mg/kg

Target Risk Level			Target Hazard		Recommended Value Based on CR<1E-5 and HI = 1.0
1.00E-06	1.00E-05	1.00E-04	1	0.1	
8	76	763	10	1	***10***

APPENDIX C
ASBESTOS BULK SAMPLE RESULTS

ASBESTOS
CONSULTING
TESTING

14953 WEST 101ST TERRACE
LENEXA, KANSAS 66215
(913) 492-1337
FAX (913) 492-1392

January 24, 2002

Arrowhead Contracting Inc.
12920 Metcalf, Suite 160
Overland Park, KS 66213

Project: Bldg 3, SLAAP; Purchase Order # 3549

Enclosed please find results for the bulk samples submitted to our laboratory for asbestos analysis for the above referenced project.

The asbestos analysis was performed using Polarized Light Microscopy (PLM) with dispersion staining in accordance with the EPA test method for the determination of asbestos in bulk samples, EPA/600/R-93/116. If the sample was inhomogeneous (layered), the components or subsamples were analyzed and reported separately. The percentage of fibers is listed. The method of measurement is based on calibrated visual estimation. The data provided herein is related only to those samples submitted for analysis. Samples comprised of greater than one percent (1%) asbestos are to be considered an asbestos containing material.

The data provided herein is related only to those samples submitted for analysis. Verification by PLM point counting is available upon request. Due to limitations of the PLM microscope and the matrix of floor tile, any floor tile sample found to contain NO asbestos may be verified by TEM analysis upon the client's request.

This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. This report shall not be reproduced, except in full, without the written approval of ACT.

If you have any questions, please contact me at 913-492-1337.

Respectfully submitted,

Tami L. Van

Tami L. Van
Laboratory Director
NVLAP Lab Code: 101649-0

enclosures

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting Inc.
Address: 12920 Metcalf, Suite160
Overland Park, KS 66213

Date sample collected: 1/22/2002
Collected by:
Submitted by: Scott Siegwald
Date sample submitted: 1/23/2002

REPORT NO.: B-32937
RUSH TAT
Project Name: Bldg 3, SLAAP
Address: PO# 3549

Project No.:
Analyst: Tami Van
Analysis Date: 1/23/2001

Sample No.: 1a
Layer No.:
Location of Material: Window glaze @ CF2 L22
Description of Material: Gray, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
CHRYSOTILE	**5**			Bulk	95

Sample No.: 1b
Layer No.:
Location of Material: Window glaze @ CF2 L22
Description of Material: Gray, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
CHRYSOTILE	**5**			Bulk	95

Sample No.: 1c
Layer No.:
Location of Material: Window glaze @ CF2 L22
Description of Material: Gray, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
CHRYSOTILE	**5**			Bulk	95

Sample No.: 2a
Layer No.:
Location of Material: Dropped ceiling tile @ CF2 H23
Description of Material: Tan, compact, granular, fibrous/paint

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		CELLULOSE	40	Bulk	5
		FIBROUS GLASS	40	Perlite	15

Sample No.: 2b
Layer No.:
Location of Material: Dropped ceiling tile @ CF2 H23
Description of Material: Tan, compact, granular, fibrous/paint

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		CELLULOSE	40	Bulk	5
		FIBROUS GLASS	40	Perlite	15

Analyst: TV
Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting Inc.
Address: 12920 Metcalf, Suite160
Overland Park, KS 66213

Date sample collected: 1/22/2002
Collected by:
Submitted by: Scott Siegwald
Date sample submitted: 1/23/2002

REPORT NO.: B-32937
RUSH TAT
Project Name: Bldg 3, SLAAP
Address: PO# 3549

Project No.:
Analyst: Tami Van
Analysis Date: 1/23/2001

Sample No.: 2c
Layer No.:
Location of Material: Dropped ceiling tile @ CF2 H23
Description of Material: Tan, compact, granular, fibrous/paint

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		CELLULOSE	40	Bulk	5
		FIBROUS GLASS	40	Perlite	15

Sample No.: 3a
Layer No.:
Location of Material: Carpet pad/adhesive @ CF2 J19
Description of Material: Tan, spongy/white, putty-like

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 3b
Layer No.:
Location of Material: Carpet pad/adhesive @ CF2 J19
Description of Material: Tan, spongy/white, putty-like

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 3c
Layer No.:
Location of Material: Carpet pad/adhesive @ CF2 J19
Description of Material: Tan, spongy/white, putty-like

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 4a
Layer No.: 1
Location of Material: Sheetrock @ bathroom near CF2 L7
Description of Material: White, fibrous, chalky

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		CELLULOSE	3	Bulk	97

Analyst: TV
Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting Inc.
Address: 12920 Metcalf, Suite160
Overland Park, KS 66213

REPORT NO.: B-32937
RUSH TAT
Project Name: Bldg 3, SLAAP
Address: PO# 3549

Date sample collected: 1/22/2002
Collected by:
Submitted by: Scott Siegwald
Date sample submitted: 1/23/2002

Project No.:
Analyst: Tami Van
Analysis Date: 1/23/2001

Sample No.: 4a
Layer No.: 2
Location of Material: Sheetrock @ bathroom near CF2 L7
Description of Material: Brown, compact, fibrous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		CELLULOSE	100	Bulk	

Sample No.: 4b
Layer No.: 1
Location of Material: Sheetrock @ bathroom near CF2 L7
Description of Material: White, fibrous, chalky

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		CELLULOSE	3	Bulk	97

Sample No.: 4b
Layer No.: 2
Location of Material: Sheetrock @ bathroom near CF2 L7
Description of Material: Brown, compact, fibrous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		CELLULOSE	100	Bulk	

Sample No.: 4c
Layer No.: 1
Location of Material: Sheetrock @ bathroom near CF2 L7
Description of Material: White, fibrous, chalky

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		CELLULOSE	3	Bulk	97

Sample No.: 4c
Layer No.: 2
Location of Material: Sheetrock @ bathroom near CF2 L7
Description of Material: Brown, compact, fibrous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		CELLULOSE	100	Bulk	

Analyst: TV
Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting Inc.
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Date sample collected: 1/22/2002
Collected by:
Submitted by: Scott Siegwald
Date sample submitted: 1/23/2002

REPORT NO.: B-32937
RUSH TAT
Project Name: Bldg 3, SLAAP
Address: PO# 3549

Project No.:
Analyst: Tami Van
Analysis Date: 1/23/2001

Sample No.: 5a
Layer No.:
Location of Material: Joint compound @ bathroom near CF2 L7
Description of Material: Off-white, powder

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 5b
Layer No.:
Location of Material: Joint compound @ bathroom near CF2 L7
Description of Material: Off-white, powder

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 5c
Layer No.:
Location of Material: Joint compound @ bathroom near CF2 L7
Description of Material: Off-white, powder

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 6a
Layer No.:
Location of Material: Asphalt matting on roof
Description of Material: Black, viscous, fibrous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		FIBROUS GLASS	12	Bulk	88

Sample No.: 6b
Layer No.:
Location of Material: Asphalt matting on roof
Description of Material: Black, viscous, fibrous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		FIBROUS GLASS	12	Bulk	88

Analyst: TV
Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting Inc.
Address: 12920 Metcalf, Suite160
Overland Park, KS 66213

Date sample collected: 1/22/2002
Collected by:
Submitted by: Scott Siegwald
Date sample submitted: 1/23/2002

REPORT NO.: B-32937
RUSH TAT
Project Name: Bldg 3, SLAAP
Address: PO# 3549

Project No.:
Analyst: Tami Van
Analysis Date: 1/23/2001

Sample No.: 6c
Layer No.:
Location of Material: Asphalt matting on roof
Description of Material: Black, viscous, fibrous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		FIBROUS GLASS	12	Bulk	88

Sample No.: 7a
Layer No.:
Location of Material: Roof shingle
Description of Material: Black, viscous, fibrous/gray, granular

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		CELLULOSE	35	Bulk	65

Sample No.: 7b
Layer No.:
Location of Material: Roof shingle
Description of Material: Black, viscous, fibrous/gray, granular

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		CELLULOSE	35	Bulk	65

Sample No.: 7c
Layer No.:
Location of Material: Roof shingle
Description of Material: Black, viscous, fibrous/gray, granular

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED		CELLULOSE	35	Bulk	65

Sample No.: 8a
Layer No.: 1
Location of Material: Floor tile @ CF1 H9
Description of Material: Red, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
CHRYSOTILE	**2**			Bulk	98

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting Inc.
Address: 12920 Metcalf, Suite160
Overland Park, KS 66213

Date sample collected: 1/22/2002
Collected by:
Submitted by: Scott Siegwald
Date sample submitted: 1/23/2002

REPORT NO.: B-32937
RUSH TAT
Project Name: Bldg 3, SLAAP
Address: PO# 3549

Project No.:
Analyst: Tami Van
Analysis Date: 1/23/2001

Sample No.: 8a
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black, viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 8b
Layer No.: 1
Location of Material: Floor tile @ CF1 H9
Description of Material: Red, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
CHRYSOTILE	**2**			Bulk	98

Sample No.: 8b
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black, viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 8c
Layer No.: 1
Location of Material: Floor tile @ CF1 H9
Description of Material: Red, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
CHRYSOTILE	**2**			Bulk	98

Sample No.: 8c
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black, viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting Inc.
Address: 12920 Metcalf, Suite160
Overland Park, KS 66213

REPORT NO.: B-32937
RUSH TAT
Project Name: Bldg 3, SLAAP
Address: PO# 3549

Date sample collected: 1/22/2002
Collected by:
Submitted by: Scott Siegwald
Date sample submitted: 1/23/2002

Project No.:
Analyst: Tami Van
Analysis Date: 1/23/2001

Sample No.: 9a
Layer No.: 1
Location of Material: Floor tile @ CF1 L1
Description of Material: Dk brown, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
CHRYSOTILE	**2**			Bulk	98

Sample No.: 9a
Layer No.: 2
Location of Material: Tile mastic
Description of Material: Black, viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 9b
Layer No.: 1
Location of Material: Floor tile @ CF1 L1
Description of Material: Red, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
CHRYSOTILE	**2**			Bulk	98

Sample No.: 9b
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black, viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 9c
Layer No.: 1
Location of Material: Floor tile @ CF1 L1
Description of Material: Dk brown, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
CHRYSOTILE	**2**			Bulk	98

Analyst: TV
Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting Inc.
Address: 12920 Metcalf, Suite160
Overland Park, KS 66213

REPORT NO.: B-32937
RUSH TAT
Project Name: Bldg 3, SLAAP
Address: PO# 3549

Date sample collected: 1/22/2002
Collected by:
Submitted by: Scott Siegwald
Date sample submitted: 1/23/2002

Project No.:
Analyst: Tami Van
Analysis Date: 1/23/2001

Sample No.: 9c
Layer No.: 2
Location of Material: Tile mastic
Description of Material: Black, viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 10a
Layer No.:
Location of Material: Joint compound @ CF1 J1
Description of Material: Off-white, flat, brittle, powder

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 10b
Layer No.:
Location of Material: Joint compound @ CF1 J1
Description of Material: Off-white, flat, brittle, powder

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 10c
Layer No.:
Location of Material: Joint compound @ CF1 J1
Description of Material: Off-white, flat, brittle, powder

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 11a
Layer No.: 1
Location of Material: Sheetrock @ CF1 H3
Description of Material: Lt pink, fibrous, chalky

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		CELLULOSE	3	Bulk	97

Analyst: TV
Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting Inc.
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REPORT NO.: B-32937
RUSH TAT
Project Name: Bldg 3, SLAAP
Address: PO# 3549

Date sample collected: 1/22/2002
Collected by:
Submitted by: Scott Siegwald
Date sample submitted: 1/23/2002

Project No.:
Analyst: Tami Van
Analysis Date: 1/23/2001

Sample No.: 11a
Layer No.: 2
Location of Material: Sheetrock @ CF1 H3
Description of Material: Brown, compact, fibrous/paint

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		CELLULOSE	98	Bulk	2

Sample No.: 11b
Layer No.: 1
Location of Material: Sheetrock @ CF1 H3
Description of Material: Lt pink, fibrous, chalky

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		CELLULOSE	3	Bulk	97

Sample No.: 11b
Layer No.: 2
Location of Material: Sheetrock @ CF1 H3
Description of Material: Brown, compact, fibrous/paint

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		CELLULOSE	98	Bulk	2

Sample No.: 11c
Layer No.: 1
Location of Material: Sheetrock @ CF1 H3
Description of Material: Lt pink, fibrous, chalky

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		CELLULOSE	3	Bulk	97

Sample No.: 11c
Layer No.: 2
Location of Material: Sheetrock @ CF1 H3
Description of Material: Brown, compact, fibrous/paint

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		CELLULOSE	98	Bulk	2

Analyst: TV
Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting Inc.
Address: 12920 Metcalf, Suite160
Overland Park, KS 66213

Date sample collected: 1/22/2002
Collected by:
Submitted by: Scott Siegwald
Date sample submitted: 1/23/2002

REPORT NO.: B-32937
RUSH TAT
Project Name: Bldg 3, SLAAP
Address: PO# 3549

Project No.:
Analyst: Tami Van
Analysis Date: 1/23/2001

Sample No.: 12a
Layer No.: 1
Location of Material: 12X12 floor tile @ hallway on 2nd floor, row G
Description of Material: Gray, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 12a
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Tan, putty-like

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 12b
Layer No.: 1
Location of Material: 12X12 floor tile @ hallway on 2nd floor, row G
Description of Material: Gray, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 12b
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Tan, putty-like

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 12c
Layer No.: 1
Location of Material: 12X12 floor tile @ hallway on 2nd floor, row G
Description of Material: Gray, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting Inc.
Address: 12920 Metcalf, Suite160
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REPORT NO.: B-32937
RUSH TAT ___
Project Name: Bldg 3, SLAAP
Address: PO# 3549

Date sample collected: 1/22/2002
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Submitted by: Scott Siegwald
Date sample submitted: 1/23/2002

Project No.:
Analyst: Tami Van
Analysis Date: 1/23/2001

Sample No.: 12c
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Tan, putty-like

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 13a
Layer No.: 1
Location of Material: 12X12 floor tile @ CF1 K2
Description of Material: Reddish-brown, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
CHRYSOTILE	**10**			Bulk	90

Sample No.: 13a
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black, viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 13b
Layer No.: 1
Location of Material: 12X12 floor tile @ CF1 K2
Description of Material: Reddish-brown, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
CHRYSOTILE	**10**			Bulk	90

Sample No.: 13b
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black, viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Analyst: TV
Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting Inc.
Address: 12920 Metcalf, Suite160
Overland Park, KS 66213

REPORT NO.: B-32937
RUSH TAT
Project Name: Bldg 3, SLAAP
Address: PO# 3549

Date sample collected: 1/22/2002
Collected by:
Submitted by: Scott Siegwald
Date sample submitted: 1/23/2002

Project No.:
Analyst: Tami Van
Analysis Date: 1/23/2001

Sample No.: 13c
Layer No.: 1
Location of Material: 12X12 floor tile @ CF1 K2
Description of Material: Reddish-brown, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
CHRYSOTILE	**10**			Bulk	90

Sample No.: 13c
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black, viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 14a
Layer No.: 1
Location of Material: 12X12 floor tile @ office near CF1 F24
Description of Material: Dk gray, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 14a
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black, viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 14b
Layer No.: 1
Location of Material: 12X12 floor tile @ office near CF1 F24
Description of Material: Dk gray, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting Inc.
Address: 12920 Metcalf, Suite160
Overland Park, KS 66213

REPORT NO.: B-32937
RUSH TAT
Project Name: Bldg 3, SLAAP
Address: PO# 3549

Date sample collected: 1/22/2002
Collected by:
Submitted by: Scott Siegwald
Date sample submitted: 1/23/2002

Project No.:
Analyst: Tami Van
Analysis Date: 1/23/2001

Sample No.: 14b
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black, viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	10

Sample No.: 14c
Layer No.: 1
Location of Material: 12X12 floor tile @ office near CF1 F24
Description of Material: Dk gray, cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 14c
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black, viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.:
Layer No.:
Location of Material:
Description of Material:

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage
				Bulk

Sample No.:
Layer No.:
Location of Material:
Description of Material:

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage
				Bulk

Analyst: TV
Laboratory Director: Tami Van

ASBESTOS
CONSULTING
TESTING

14953 WEST 101ST TERRACE
LENEXA, KANSAS 66215
(913) 492-1337
FAX (913) 492-1392

January 25, 2002

Arrowhead Contracting, Inc.
12920 Metcalf Avenue, Suite 160
Overland Park, Kansas 66213

Project: SLAAP, Building 3

Enclosed please find results for the bulk samples submitted to our laboratory for asbestos analysis for the above referenced project.

The asbestos analysis was performed using Polarized Light Microscopy (PLM) with dispersion staining in accordance with the EPA test method for the determination of asbestos in bulk samples, EPA/600/R-93/116. If the sample was inhomogeneous (layered), the components or subsamples were analyzed and reported separately. The percentage of fibers is listed. The method of measurement is based on calibrated visual estimation. The data provided herein is related only to those samples submitted for analysis. Samples comprised of greater than one percent (1%) asbestos are to be considered an asbestos containing material.

The data provided herein is related only to those samples submitted for analysis. Verification by PLM point counting is available upon request. Due to limitations of the PLM microscope and the matrix of floor tile, any floor tile sample found to contain NO asbestos may be verified by TEM analysis upon the client's request.

This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. This report shall not be reproduced, except in full, without the written approval of ACT.

If you have any questions, please contact me at 913-492-1337.

Respectfully submitted,

Tami Van

Tami L. Van
Laboratory Director
NVLAP Lab Code: 101649-0

enclosures

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting, Inc.
Address: 12920 Metcalf, Suite 160
Overland Park, KS 66213

REPORT NO.: B-32970
RUSH TAT
Project Name: SLAAP, Bldg. 3
Address:

Date sample collected: 1/24/2002
Collected by: Scott Siegwald
Submitted by: Scott Siegwald
Date sample submitted: 1/25/2002

Project No.:
Analyst: Tami Van
Analysis Date: 1/25/2002

Sample No.: 1a
Layer No.: 1
Location of Material: Floor tile @ CF1A24
Description of Material: Grayish-brown cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 1a
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Tan brittle

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 1b
Layer No.: 1
Location of Material: Floor tile @ CF1A24
Description of Material: Grayish-brown cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 1b
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Tan brittle

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 1c
Layer No.: 1
Location of Material: Floor tile @ CF1A24
Description of Material: Grayish-brown cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Analyst: TV
Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting, Inc.
Address: 12920 Metcalf, Suite 160
Overland Park, KS 66213

REPORT NO.: B-32970
RUSH TAT
Project Name: SLAAP, Bldg. 3
Address:

Date sample collected: 1/24/2002
Collected by: Scott Siegwald
Submitted by: Scott Siegwald
Date sample submitted: 1/25/2002

Project No.:
Analyst: Tami Van
Analysis Date: 1/25/2002

Sample No.: 1c
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Tan brittle

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 2a
Layer No.: 1
Location of Material: Floor tile @ bathroom at CF1A23
Description of Material: Tan cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 2a
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Clear viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 2b
Layer No.: 1
Location of Material: Floor tile @ bathroom at CF1A23
Description of Material: Tan cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 2b
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Clear viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting, Inc.
Address: 12920 Metcalf, Suite 160
Overland Park, KS 66213

Date sample collected: 1/24/2002
Collected by: Scott Siegwald
Submitted by: Scott Siegwald
Date sample submitted: 1/25/2002

REPORT NO.: B-32970
RUSH TAT
Project Name: SLAAP, Bldg. 3
Address:

Project No.:
Analyst: Tami Van
Analysis Date: 1/25/2002

Sample No.: 2c
Layer No.: 1
Location of Material: Floor tile @ bathroom at CF1A23
Description of Material: Tan cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 2c
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Clear viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 3a
Layer No.: 1
Location of Material: Floor tile @ CF1E1, upper layer
Description of Material: Gray cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 3a
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 3b
Layer No.: 1
Location of Material: Floor tile @ CF1E1, upper layer
Description of Material: Gray cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting, Inc.
Address: 12920 Metcalf, Suite 160
Overland Park, KS 66213

REPORT NO.: B-32970
RUSH TAT ___
Project Name: SLAAP, Bldg. 3
Address:

Date sample collected: 1/24/2002
Collected by: Scott Siegwald
Submitted by: Scott Siegwald
Date sample submitted: 1/25/2002

Project No.:
Analyst: Tami Van
Analysis Date: 1/25/2002

Sample No.: 3b
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 3c
Layer No.: 1
Location of Material: Floor tile @ CF1E1, upper layer
Description of Material: Gray cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 3c
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 4a
Layer No.: 1
Location of Material: Floor tile @ CF1E1, lower layer
Description of Material: Red cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
CHRYSOTILE	**10**			Bulk	90

Sample No.: 4a
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Analyst: TV
Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting, Inc.
Address: 12920 Metcalf, Suite 160
Overland Park, KS 66213

Date sample collected: 1/24/2002
Collected by: Scott Siegwald
Submitted by: Scott Siegwald
Date sample submitted: 1/25/2002

REPORT NO.: B-32970
RUSH TAT
Project Name: SLAAP, Bldg. 3
Address:

Project No.:
Analyst: Tami Van
Analysis Date: 1/25/2002

Sample No.: 4b
Layer No.: 1
Location of Material: Floor tile @ CF1E1, lower layer
Description of Material: Red cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
CHRYSOTILE	**10**			Bulk	90

Sample No.: 4b
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 4c
Layer No.: 1
Location of Material: Floor tile @ CF1E1, lower layer
Description of Material: Red cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
CHRYSOTILE	**10**			Bulk	90

Sample No.: 4c
Layer No.: 2
Location of Material: Floor tile mastic
Description of Material: Black viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Sample No.: 5a
Layer No.: 1
Location of Material: Floor tile @ bathroom near CF2K6
Description of Material: Mauve cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage		Non-Fibrous Percentage
NONE DETECTED				Bulk	100

Analyst: TV Laboratory Director: Tami Van

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting, Inc.
Address: 12920 Metcalf, Suite 160
Overland Park, KS 66213

REPORT NO.: B-32970
RUSH TAT
Project Name: SLAAP, Bldg. 3
Address:

Date sample collected: 1/24/2002
Collected by: Scott Siegwald
Submitted by: Scott Siegwald
Date sample submitted: 1/25/2002

Project No.:
Analyst: Tami Van
Analysis Date: 1/25/2002

Sample No.: 5a
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Clear viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		Cellulose	<1	Bulk	>99

Sample No.: 5b
Layer No.: 1
Location of Material: Floor tile @ bathroom near CF2K6
Description of Material: Mauve cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 5b
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Clear viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		Cellulose	<1	Bulk	>99

Sample No.: 5c
Layer No.: 1
Location of Material: Floor tile @ bathroom near CF2K6
Description of Material: Mauve cementitious

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED				Bulk	100

Sample No.: 5c
Layer No.: 2
Location of Material: Floor tile adhesive
Description of Material: Clear viscous

Asbestos Fibers	Percentage	Non-Asbestos Fibers	Percentage	Non-Fibrous Percentage	
NONE DETECTED		Cellulose	<1	Bulk	>99

Analyst: TV
Laboratory Director: Tami Van

ASBESTOS
CONSULTING
TESTING

14953 WEST 101ST TERRACE
LENEXA, KANSAS 66215
(913) 492-1337
FAX (913) 492-1392

July 17, 2002

Arrowhead Contracting, Inc.
12920 Metcalf, Suite 160
Overland Park, KS 66213

Project: Bldg. 3 - SLAAP

Enclosed please find results for the bulk samples submitted to our laboratory for asbestos analysis for the above referenced project.

The asbestos analysis was performed using Polarized Light Microscopy (PLM) with dispersion staining in accordance with the EPA test method for the determination of asbestos in bulk samples, EPA/600/R-93/116. If the sample was inhomogeneous (layered), the components or subsamples were analyzed and reported separately. The percentage of fibers is listed. The method of measurement is based on calibrated visual estimation. The data provided herein is related only to those samples submitted for analysis. Samples comprised of greater than one percent (1%) asbestos are to be considered an asbestos containing material.

The data provided herein is related only to those samples submitted for analysis. Verification by PLM point counting is available upon request. Due to limitations of the PLM microscope and the matrix of floor tile, any floor tile sample found to contain NO asbestos may be verified by TEM analysis upon the client's request.

This report may not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. This report shall not be reproduced, except in full, without the written approval of ACT.

If you have any questions, please contact me at 913-492-1337.

Respectfully submitted,

Tami L. Van
Laboratory Director
NVLAP Lab Code: 101649-0

enclosures

Asbestos Bulk Analysis Laboratory Report

Asbestos Consulting Testing (ACT) 14953 W. 101st Terrace, Lenexa, KS 66215 (913) 492-1337 NVLAP Lab Code: 101649-0

Client Name: Arrowhead Contracting, Inc.
Address: 12920 Metcalf, Suite 160
Overland Park, KS 66213

REPORT NO.: B-33987
RUSH TAT
Project Name: Bldg. 3 - SLAAP
Address:

Date sample collected: 7/12/2002
Collected by:
Submitted by: Scott Siegwald
Date sample submitted: 7/15/2002

Project No.:
Analyst: Tami Van
Analysis Date: 7/16/2002

Sample No.: 1
Layer No.:
Location of Material: 1st floor: ceiling panel
Description of Material: Gray, fibrous, cementitious

Asbestos Fiber Type	Percentage	Non-Asbestos Fiber Type	Percentage	Non-Fibrous Percentage	
CHRYSOTILE	**18**			Bulk/Binder	82

Sample No.:
Layer No.:
Location of Material:
Description of Material:

Asbestos Fiber Type	Percentage	Non-Asbestos Fiber Type	Percentage	Non-Fibrous Percentage
				Bulk/Binder

Sample No.:
Layer No.:
Location of Material:
Description of Material:

Asbestos Fiber Type	Percentage	Non-Asbestos Fiber Type	Percentage	Non-Fibrous Percentage
				Bulk/Binder

Sample No.:
Layer No.:
Location of Material:
Description of Material:

Asbestos Fiber Type	Percentage	Non-Asbestos Fiber Type	Percentage	Non-Fibrous Percentage
				Bulk/Binder

Sample No.:
Layer No.:
Location of Material:
Description of Material:

Asbestos Fiber Type	Percentage	Non-Asbestos Fiber Type	Percentage	Non-Fibrous Percentage
				Bulk/Binder

Analyst: TV
Laboratory Director: Tami Van

APPENDIX D
PAINT SAMPLE RESULTS FOR HEAVY METALS

August 23, 2002

Scott Siegwald
Arrowhead Contracting
12920 Metcalf Ave
Suite 150
Overland Park, KS 66213

Dear Mr. Siegwald:

RE: SLAPP
AML Work Order Number: 1143 and 1153

Attached, please find the analytical report for the samples collected by Arrowhead Contracting for the project described above. Problems encountered in the analysis of these samples are documented in the laboratory case narrative. Please feel free to call me at (913) 829-0101 if you have any questions.

Respectfully Submitted,
Analytical Management Laboratories, Inc.

Kendall L. Lindquist, MBA
Operations Manager

Laboratory Case Narrative

Client:	Arrowhead Contracting
Project Name:	SLAAP
Lab Work Order No:	1143 and 1153

Samples

Cooler receipt form(s) and completed copies of the chain of custody form(s) are included in the Sample Information section. A copy of the project sample log (Sample Identification Form) showing field sample identifiers and corresponding laboratory identifiers is also included. The suffixes, F and U have been appended to field sample numbers for samples that have been filtered (F) and not filtered (U) either in the field or in the laboratory. Separate AML laboratory sample numbers were assigned to filtered and unfiltered samples.

Reports

The laboratory is in the process of implementing Horizon/Chemware laboratory information system (LIMS) to improve EDD and hardcopy report generation procedures. Under this system, hardcopy reports are actually generated using information contained in a database, which is also used to generate electronic deliverables. This procedure was implemented to assure data integrity between these two media. Consequently, the report formats are undergoing changes and revisions that are necessary to make continuous improvement until they are finalized. The attached report is organized as follows:

Cover Letter
Laboratory Case Narrative
Sample Information
Sample Result Forms, organized in the following order: by fraction and by sample.
QC Summary organized in the following order: by fraction, by matrix and by QC parameter.

The QC Summary for each fraction contains QC parameters in the following order:
QC Association Forms (EPA CLP Form-4 equivalents)
Surrogate Recovery Summary, when applicable (EPA CLP Form-2 equivalents)
Method Blank Results (EPA CLP Form-1 equivalents)
Matrix Spike (MS) and MS duplicate (MSD) Results (EPA CLP Form-1 equivalents)
Laboratory Control Sample (LCS) and LCS duplicate (LCSD, subject to availability) Results (EPA Form-1 equivalents)
Matrix Spike (MS) and MS duplicate (MSD) Recoveries and RPD Summary (EPA CLP Form-3 equivalents)
Laboratory Control Sample (LCS) and LCS duplicate (subject to availability) Recoveries and RPD Summary (EPA Form-3 equivalents)

Sample Result Forms

Sample results are shown on modified CLP Form 1 equivalents with the following qualifiers:
U = Not detected or detected below method detection limit (MDL) or reporting limit (RL).
J = Detected above MDL/RL but below the practical quantitation limit (PQL).

E = Detected at levels in excess of the upper calibration limit.
R = Rejected due to significant QA outliers.
MDLs, RLs and PQLs have been adjusted for sample volume and dilution.

Multiple sample result forms may be provided for one or more of the following reasons, if in the professional judgment of the laboratory that sample results for a given compound may be more accurate from one of the multiple analyses:
Sample was reanalyzed for surrogate recovery outliers;
Sample was reanalyzed at a dilution;
One of the analyses was performed outside the holding times; and
A replicate analysis was performed for internal QC purposes

QC Association Forms
A list of method blanks, laboratory control samples (LCS), LCS duplicates, (LCSD), if any, matrix spikes (MS, if available), and matrix spike duplicates (MSD, if available) and field samples associated with each QC batch are shown on QC Association Forms, which are CLP Form-4 equivalents. Separate forms are included for each matrix and each fraction. At present, the laboratory is using two tracking numbers for QC batches: numbers based on the manual system, which are recorded in the laboratory notebooks, instruments, etc; and numbers based on the LIMS system. The QC batch numbers shown on these reports are based on LIMS, which is currently in implementation.

Surrogate Recovery Forms (when applicable)

A summary of the system monitoring compound recoveries for project samples is included in this section. Surrogate recoveries for QC analyses (MB, LCS, MS, etc.) are shown in their respective sections. EPA CLP Form 2 equivalents are used to report surrogate recoveries for project samples.

Method Blank Result Forms

Laboratory method blank samples were analyzed with each QC batch as described in the QC Association Form. Analytical results for method blanks are shown on CLP Form 1 equivalents. They include data for all target compounds/analytes and surrogates. Laboratory policies on corrective action are included in parameter-specific case narratives.

Laboratory Control Sample (LCS) Report Forms

Laboratory control samples were analyzed with each QC batch as described in the QC Association Form. LCS results of these QC analyses are shown in CLP Form 1. LCS recoveries and RPDs for duplicates (if performed) are shown on EPA Form-3 equivalents. Recoveries and relative percent difference (RPDs) for duplicates outside the applicable QC limits are flagged with an asterisk (*). Laboratory policies on corrective action are included in parameter-specific case narratives.

Matrix Spike/Matrix Spike Duplicate Recoveries Report Forms

MS/MSD results are shown in EPA CLP Form-1 equivalents. Recoveries and relative percent difference (RPDs) for duplicates outside the applicable QC limits are flagged with an asterisk (*). They are shown on EPA Form-3 equivalents.

Calibration

Instruments were calibrated in accordance with applicable method. Deviations are shown in parameter-specific case narratives. Copies of initial calibration and calibration verification summaries and associated raw data will be maintained in project files and made available for detailed client review, if necessary.

Test Methods and Holding Times

Analyses were performed within applicable holding times except as noted in parameter-specific case narratives.

Batch-specific Quality Control Procedures

Method blanks and laboratory control samples are used as batch QC elements. Matrix spikes are used as sample specific QC elements at AML. When these QC elements are outside their QC limits, results for all associated samples are evaluated and corrective actions that affect the entire sample set are performed. Laboratory policies on corrective action are included in parameter-specific case narratives.

Sample-specific Quality Control Procedures

Sample concentrations exceeding the upper calibration limit, surrogate recoveries outside the QC limits, calibration parameters (e.g. ICAL, CALV, ICV, CCV, ICB, CCB, etc.) not within QC limits, etc. are used as sample-specific and/or sample-group specific QC elements for one or more associated samples during instrumental analysis. Serial dilution, standard addition, etc. are used as matrix-specific QC elements for one or more associated samples. When these QC elements are outside their QC limits, associated individual sample results are evaluated and appropriate corrective actions are performed. Laboratory policies and procedures on corrective action are included in parameter-specific case narratives.

Manual Integration

Manual integration operations that have potential to improve accuracy of analysis are performed, as necessary (shown with a "M" flag on raw data) based on visual inspection of peak shapes for each target analyte. Such operations are technically defensible and they are not aimed at meeting the minimum technical requirements of the analytical procedure.

Statement

To the best of our knowledge, this data package is in compliance with the terms and conditions of the contract/purchase order/delivery order, both technically and for completeness, for other than the conditions detailed in this case narrative. The quality assurance manager or his designee, as verified by the signature on the cover letter has authorized release of data contained in this report.

Metals – 6020A

Calibration and sample analyses were performed using ICP-MS by SW-846 Method 6020A. Corrective action was attempted in response to QC outliers requiring such action. When corrective action was not successful, data released by the laboratory may require qualifications for usability in accordance with client procedures and project requirements.

Initial Calibration (ICAL)

The instrument was standardized using a blank and one std (10 ug/L, 100 ug/L, or 10000 ug/L). The %RSDs for triplicate analysis were within QC limits (ie, <5%).

Instrument QC Standards

Initial Calibration Verification (ICV)

A second source standard was employed for the ICV. The %Recoveries were within QC limits (ie, ±10%), and the %RSDs for triplicate analysis were within QC limits (ie, <5%).

Initial Calibration Blank (ICB)

No significant anomalies were noted. The target analyte concentrations when present were < ½ of the applicable MQLs.

Contract Required Detection Level CRDL (MQL)

The target analytes were analyzed at the instrument MQLs for each. The %Recoveries were within QC limits (ie, ±20%).

High Level Standard (HLSTD)

Although Linear Range Studies are run quarterly, AML has implemented a standard for daily analysis containing all analytes ranging from 50 ug/L for Hg to 100000 ug/L for the Minerals , Al, and Fe. The %Recoveries were within QC limits (ie, ±10%).

Interference Check Standards (ICSA & ICSAB)

Per the 6020A method a set of interference check standards were employed after calibration. The %Recoveries were within QC limits (ie, ±20%) for both interferents and target analytes.
Initial Outliers: None

Continuing Calibration Verification (CCVs)

The %Recoveries for applicable CCVs were within QC limits (ie, ±10%), and the %RSDs for triplicate analysis were within QC limits (ie, <5%).

Continuing Calibration Blank (CCB)

No significant anomalies were noted. The target analyte concentrations when present were < ½ of the applicable MQLs.

Sample Batch QC Samples

Method Blank

No significant anomalies were noted. The target analyte concentrations when present were < ½ of the applicable MQLs.

Laboratory Control Sample Recoveries

The QC limits are 80% to 120% for aqueous and soil samples. Compounds that may have recoveries outside the QC limits in the LCS may be within the QC limits in the LCSD. QC outliers requiring corrective action: None.

Matrix Spike Recoveries

The QC limits are 75% to 125% for aqueous and soil samples. Compounds that may have recoveries outside the QC limits in the MS may be within the QC limits in MSD. QC outliers requiring corrective action: **WO# 1043 – MS recoveries out low for Arsenic, Barium and Selenium. MSD recoveries out low for Arsenic, Barium, Selenium and silver. WO# 1053 - Selenium & Silver out low. The MS/MSD was re-digested and re-analyzed. Please see the section for corrective action results.**

Matrix Spike Duplicates

The %RPD for matrix spike duplicate results are calculated to assess precision. The QC limit for aqueous samples is 25%. **All RPD's within QA/QC limits.**

Post Digestion Spike

The QC limits are 75% to 125% for aqueous and soil samples. QC outliers requiring corrective action: **Silver (mixed <20 seconds before start of anlysis, fell out of solution) 9.3% Precipitated out of solution twice for both PDS (WO# 1043 and 1053).**

Serial Dilution

The QC limits are within 10%D for aqueous and soil samples. QC outliers requiring corrective action: None.

Samples Comments: This is the Corrective Action data for WO# 1043 and 1053 (The matrices were very similar). Difficult matrix for RCRA metals analysis. Originally logged in as sample # 105307, it was re-logged as 105320 and re-prepped. The results are very similar, except that on re-digestion Arsenic MS/MSD recoveries were within QC acceptance limits when they were not on the first digestion.

Sample Information

Analytical Management Laboratories, Inc.
15130 B South Keeler
Olathe, Kansas 66062
Phone (913) 829-0101
Fax (913) 829-1181

14632

Chain of Custody Record / Request for Analysis

Client Contact Name: Scott Siegwald
Company Name: Arrowhead Contracting, Inc.
Address: 12920 Metcalf Ave, Ste 160
City, State, Zip: Overland Park, KS 66213
Phone #: (913) 814-9994
Fax #: (913) 814-9997
(314) 381-5079 Site

Project Name: St Louis AAP
Project Number: 00-215
Purchase Order Number:
Project Due Date: 8-20-02
Project Comments: 7-day TAT
Sampler's Signature: David Nagel (Spirtas)

Laboratory Project Number: 1043

Method # --->

Analyses/Method to be Performed (Check all that apply)

Preservative: List total number of bottles for each preservative type.

Lab ID	Sample Description	Date	Time	Matrix	Total # Containers	HCl	HNO_3	NaOH	H_2SO_4	Unpreserved	4 °C	TPH Diesel	TPH Gasoline	BTEX	MTBE	Volatiles (VOCs)	BNAs (SVOCs)	Pesticides/PCBs	PCBs	RCRA8 Metals (6010/7471)	Lead	Flash Point	Paint Filter	pH	Comments:
1043-01	P-001	8/12/02	0900	Solid	1						X									X					
1043-02	P-002		0910																						
1043-03	P-003		0920																						
1043-04	P-004		0930																						
1043-05	P-005		0940																						
1043-06	P-006		0950																						
1043-07	P-007		1000																						
1043-08	P-008		1010																						
1043-09	P-009		1020																						
1043-10	P-010		1030																						

Please include any information that may be useful in the analysis of the sample.
Example: high concentration

CUSTODY							
Relinquished By:	Scott Siegwald	Date/Time:	8/12/02 1900	Received By:	[signature]	Date/Time:	08/13/02 09:15am
Relinquished By:		Date/Time:		Received By:		Date/Time:	

By signing the request (chain of custody) you are ordering work from Analytical Management Laboratories, Inc. which constitutes the acceptance of the terms and conditions on the back of this form.

Delivery Method	Custody Seals	Coolant	Cooler Temp.	Receiving Comments:
☐ Delivered in ...	☑ Yes ☐ No	☑ Ice	4.0 °C	
☐ Courier ...	☑ Intact	☐ Blue Ice	☐ Temp. Blank	
☐ Airbill #: ...769577437	☐ Broken	☐ None	☑ Cooler	

Analytical Management Laboratories, Inc.
15130 B South Keeler
Olathe, Kansas 66062
Phone (913) 829-0101
Fax (913) 829-1181

14633

Chain of Custody Record / Request for Analysis

Client Contact Name: _____
Company Name: _____
Address: _____
City, State, Zip: _____
Phone #: ( ) _____
Fax #: ( ) _____

Project Name: _____
Project Number: _____
Purchase Order Number: _____
Project Due Date: _____
Project Comments: _____
Sampler's Signature: _____

Analyses/Method to be Performed (Check all that apply)

Laboratory Project Number: 1043

Method # ---> 8270/7471

Lab ID	Sample Description	Date	Time	Matrix	Total # Containers	HCl	HNO_3	NaOH	H_2SO_4	Unpreserved	4°C	TPH Diesel	TPH Gasoline	BTEX	MTBE	Volatiles (VOCs)	BNAs (SVOCs)	Pesticides/PCBs	PCBs	RCRA8 Metals	Lead	Flash Point	Paint Filter	pH					Comments:
1043-11	P-011	8/12/02	1040	Solid	1						X									X									
1043-12	P-012		1050																										
1043-13	P-013		1100																										
1043-14	P-014		1110																										
1043-15	P-015		1120																										
1043-16	P-016		1130																										
1043-17	P-017		1140																										
1043-18	P-018		1150																										
9																													
10																													

Please include any information that may be useful in the analysis of the sample.

Example: high concentration

CUSTODY						
Relinquished By:	[signature]	Date/Time:	8/12/02 1500	Received By:	[signature]	Date/Time: 08/13/02 09:15am.
Relinquished By:		Date/Time:		Received By:		Date/Time:

By signing the request (chain of custody) you are ordering work from Analytical Management Laboratories, Inc. which constitutes the acceptance of the terms and conditions on the back of this form.

Delivery Method	Custody Seals	Coolant	Cooler Temp.	Receiving Comments:
☐ Delivered in Person ☐ Courier _____ ☐ Airbill #: _____	☐ Yes ☐ No ☐ Intact ☐ Broken	☐ Ice ☐ Blue Ice ☐ None	_____ °C ☐ Temp. Blank ☐ Cooler	see COC# 14632

ical Management Laboratories,

AML - Sample Condition Upon Receipt Report

Client ID: Arrowhead

Project ID: St Louis AAP

AML Work Order Number: 1043

Cooler ID: _____

Delivery Method

Delivery Method: Courier

Couirer ID: Federal Express

Name of Person Receiving Samples: NS

Airbill Number: 835769577437

Custody Seals

Were Custody Seals Present? ☑

Were Custody Seals Intact? ☑

Number of Custody Seals: 3

Custody Seal Broken By: NS

Cooler Opened By: 8/13/02

Coolant / Temperature

Type of Coolant Used: Ice

Temperature Taken From: Cooler

Temperature of Cooler: 4

Chain of Custody

Was Chain of Custody filled out properly? ☑

Do Chain of Custody and Sample Labels agree? ☑

Comments

Type of Packing Used? Bubble Wrap

Were all sample labels complete? ☑

Were all bottles sealed in separate plastic bags? ☑

Were correct preservatives added to the samples? ☐

Did all the bottles arrive unbroken? ☑

Were air bubbles absent in VOA samples? ☐

Was a sufficient amount of sample sent for analysis? ☑

Was project manager contacted about any "out of control" issues? ☐

EDD (if applicable) Type: _____

☑ None ☐ ERPMS ☐ Excel

☐ ITEMS ☐ Access 97 ☐ Access 2000

Samples Received by: NS

Date: 8/13/02

Project Manager Review: KP

Date: 8/14/02

0010

14634

Analytical Management Laboratories, Inc.
15130 B South Keeler
Olathe, Kansas 66062
Phone (913) 829-0101
Fax (913) 829-1181

Chain of Custody Record / Request for Analysis

Client Contact Name: Scott Siegwald
Company Name: Arrowhead Contracting, Inc.
Address: 12920 Metcalf Ave, Ste 160
City, State, Zip: Overland Park, KS 66213
Phone #: (913) 814-5594
Fax #: (913) 814-5597
(314) 381-5079

Project Name: St. Louis AAP
Project Number: 00-215
Purchase Order Number:
Project Due Date: 8-21-02
Project Comments: 5-day TAT
Sampler's Signature: David Nagel (Spirtas)

Analyses/Method to be Performed (Check all that apply)

Laboratory Project Number: 1053

Method # ---> 6010/7471

Lab ID	Sample Description	Date	Time	Matrix	Total # Containers	HCl	HNO_3	NaOH	H_2SO_4	Unpreserved	4°C		TPH Diesel	TPH Gasoline	BTEX	MTBE	Volatiles (VOCs)	BNAs (SVOCs)	Pesticides/PCBs	PCBs	RCRA8 Metals	Lead	Flash Point	Paint Filter	pH					Comments:
1053-01	P-019	8/13/02	0700	Solid	1																X									
1053-02	P-020		0710																											
1053-03	P-021		0720																											
1053-04	P-022		0730																											
1053-05	P-023		0740																											
1053-06	P-024		0750																											
1053-07	P-025		0800																											
1053-08	P-026		0810																											
1053-09	P-027		0820																											
1053-10	P-028		0830																											

Please include any information that may be useful in the analysis of the sample.

Example: high concentration

CUSTODY							
Relinquished By:	Scott Siegwald	Date/Time:	8/13/02 1900	Received By:	[illegible signature]	Date/Time:	08/14/02 09:55am
Relinquished By:		Date/Time:		Received By:		Date/Time:	

By signing the request (chain of custody) you are ordering work from Analytical Management Laboratories, Inc. which constitutes the acceptance of the terms and conditions on the back of this form.

Delivery Method	Custody Seals	Coolant	Cooler Temp.	Receiving Comments:
☐ Delivered in Person ☑ Courier Fedex ☐ Airbill #: 835769577415	☑ Yes ☐ No ☑ Intact ☐ Broken	☑ Ice ☐ Blue Ice ☑ None	N/A °C ☐ Temp. Blank ☐ Cooler	

Analytical Management Laboratories, Inc.
15130 B South Keeler
Olathe, Kansas 66062
Phone (913) 829-0101
Fax (913) 829-1181

14635

Chain of Custody Record / Request for Analysis

Client Contact Name: _____
Company Name: _____
Address: _____
City, State, Zip: _____
Phone #: ( ) _____
Fax #: ( ) _____

Project Name: _____
Project Number: _____
Purchase Order Number: _____
Project Due Date: _____
Project Comments: _____
Sampler's Signature: _____

Analyses/Method to be Performed (Check all that apply)

Laboratory Project Number: 1053

Method # ---> 6010/7471

Lab ID	Sample Description	Date	Time	Matrix	Total # Containers	HCl	HNO_3	NaOH	H_2SO_4	Unpreserved	4 °C		TPH Diesel	TPH Gasoline	BTEX	MTBE	Volatiles (VOCs)	BNAs (SVOCs)	Pesticides/PCBs	PCBs	RCRA8 Metals	Lead	Flash Point	Paint Filter	pH					Comments:
1053-11	P-029	5/13/02	0840	Solid	1																X									
1053-12	P-030		0850																											
1053-13	P-031		0900																											
1053-14	P-032		1400																											
1053-15	P-033		1410																											
1053-16	P-034		1420																											
1053-17	P-035		1430																											
1053-18	P-036		1440																											
1053-19	P-037		1450																											
10																														

Please include any information that may be useful in the analysis of the sample.

Example: high concentration

CUSTODY							
Relinquished By:	[signature]	Date/Time:	5/13/02 1900	Received By:	[signature]	Date/Time:	08/14/02 09:55am
Relinquished By:		Date/Time:		Received By:		Date/Time:	

By signing the request (chain of custody) you are ordering work from Analytical Management Laboratories, Inc. which constitutes the acceptance of the terms and conditions on the back of this form.

Delivery Method	Custody Seals	Coolant	Cooler Temp.	Receiving Comments:
☐ Delivered [illegible] on	☐ Yes ☐ No	☐ Ice	_____ °C	see COC# 14634
☐ Courier _____	☐ Intact	☐ Blue Ice	☐ Temp. Blank	
☐ Airbill #: _____	☐ Broken	☐ None	☐ Cooler	

ical Management Laboratories,

AML - Sample Condition Upon Receipt Report

Client ID: Arrowhead

AML Work Order Number: 1053

Project ID: St Louis AAP

Cooler ID:

Delivery Method

Delivery Method: Courier

Name of Person Receiving Samples: NS

Couirer ID: Federal Express

Airbill Number: 835769577415

Custody Seals

Were Custody Seals Present? ☑

Custody Seal Broken By: NS

Were Custody Seals Intact? ☑

Cooler Opened By: 8/14/02

Number of Custody Seals: 3

Coolant / Temperature

Type of Coolant Used: None

Temperature of Cooler:

Temperature Taken From: Cooler

Chain of Custody

Was Chain of Custody filled out properly? ☑

Do Chain of Custody and Sample Labels agree? ☑

Comments

Type of Packing Used? Bubble Wrap

Were all sample labels complete? ☑

Were all bottles sealed in separate plastic bags? ☐

Were correct preservatives added to the samples? ☐

Did all the bottles arrive unbroken? ☐

Were air bubbles absent in VOA samples? ☐

Was a sufficient amount of sample sent for analysis? ☑

Was project manager contacted about any "out of control" issues? ☐

EDD (if applicable) Type:

☑ None ☐ ERPMS ☐ Excel

☐ ITEMS ☐ Access 97 ☐ Access 2000

Samples Received by: NS

Project Manager Review: KL

Date: 8/14/02

Date: 8/15/02

Metals Field Sample Data

WO # 1043

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.28

% Solids: not dec.

Instrument ID

Sample ID: P-001

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104301

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 9:00

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 11:11

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	0.76	mg/kg	J	0.391	0.781	390.6
7440-39-3	Barium	7.71	mg/kg		0.195	0.391	390.6
7440-43-9	Cadmium	1.94	mg/kg		0.195	0.391	390.6
7440-47-3	Chromium	10.4	mg/kg		0.977	1.95	390.6
7439-92-1	Lead	61.7	mg/kg		0.195	0.391	390.6
7439-97-6	Mercury		mg/kg	U	0.098	0.195	390.6
7782-49-2	Selenium		mg/kg	U	0.391	0.781	390.6
7440-22-4	Silver		mg/kg	U	0.977	1.95	390.6

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.25

% Solids: not dec.

Instrument ID

Sample ID: P-002

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104302

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 9:10

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 11:16

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	1.49	mg/kg		0.4	0.8	400
7440-39-3	Barium	24.1	mg/kg		0.2	0.4	400
7440-43-9	Cadmium	2.69	mg/kg		0.2	0.4	400
7440-47-3	Chromium	3.6	mg/kg		1	2	400
7439-92-1	Lead	860	mg/kg		0.2	0.4	400
7439-97-6	Mercury	2.49	mg/kg		0.1	0.2	400
7782-49-2	Selenium	1.46	mg/kg		0.4	0.8	400
7440-22-4	Silver		mg/kg	U	1	2	400

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.37

% Solids: not dec.

Instrument ID

Sample ID: P-003

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104303

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 9:20

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 11:45

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	0.366	mg/kg	J	0.365	0.73	365
7440-39-3	Barium	3.74	mg/kg		0.182	0.365	365
7440-43-9	Cadmium	2.11	mg/kg		0.182	0.365	365
7440-47-3	Chromium	2.25	mg/kg		0.912	1.82	365
7439-92-1	Lead	96.3	mg/kg		0.182	0.365	365
7439-97-6	Mercury		mg/kg	U	0.091	0.182	365
7782-49-2	Selenium		mg/kg	U	0.365	0.73	365
7440-22-4	Silver		mg/kg	U	0.912	1.82	365

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.52

% Solids: not dec.

Instrument ID

Sample ID: P-004

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104304

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 9:30

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 12:00

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.329	0.658	328.9
7440-39-3	Barium	7.66	mg/kg		0.164	0.329	328.9
7440-43-9	Cadmium	8.87	mg/kg		0.164	0.329	328.9
7440-47-3	Chromium	1.17	mg/kg	J	0.822	1.64	328.9
7439-92-1	Lead	86	mg/kg		0.164	0.329	328.9
7439-97-6	Mercury		mg/kg	U	0.082	0.164	328.9
7782-49-2	Selenium		mg/kg	U	0.329	0.658	328.9
7440-22-4	Silver		mg/kg	U	0.822	1.64	328.9

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.63

% Solids: not dec.

Instrument ID

Sample ID: P-005

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104305

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 9:40

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 12:05

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.307	0.613	306.7
7440-39-3	Barium	17.4	mg/kg		0.153	0.307	306.7
7440-43-9	Cadmium	1.76	mg/kg		0.153	0.307	306.7
7440-47-3	Chromium	1.89	mg/kg		0.767	1.53	306.7
7439-92-1	Lead	49.4	mg/kg		0.153	0.307	306.7
7439-97-6	Mercury	0.875	mg/kg		0.077	0.153	306.7
7782-49-2	Selenium		mg/kg	U	0.307	0.613	306.7
7440-22-4	Silver		mg/kg	U	0.767	1.53	306.7

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.29

% Solids: not dec.

Instrument ID

Sample ID: P-006

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104306

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 9:50

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 12:11

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.388	0.775	387.6
7440-39-3	Barium	18.8	mg/kg		0.194	0.388	387.6
7440-43-9	Cadmium	4.35	mg/kg		0.194	0.388	387.6
7440-47-3	Chromium	10.5	mg/kg		0.969	1.94	387.6
7439-92-1	Lead	102	mg/kg		0.194	0.388	387.6
7439-97-6	Mercury	0.159	mg/kg	J	0.097	0.194	387.6
7782-49-2	Selenium		mg/kg	U	0.388	0.775	387.6
7440-22-4	Silver		mg/kg	U	0.969	1.94	387.6

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.23

% Solids: not dec.

Instrument ID

Sample ID: P-007

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104307

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 10:00

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 12:17

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	1.36	mg/kg		0.407	0.813	406.5
7440-39-3	Barium	69.8	mg/kg		0.203	0.407	406.5
7440-43-9	Cadmium	3.61	mg/kg		0.203	0.407	406.5
7440-47-3	Chromium	3252	mg/kg		1.02	2.03	406.5
7439-92-1	Lead	14510	mg/kg		0.203	0.407	406.5
7439-97-6	Mercury	2.59	mg/kg		0.102	0.203	406.5
7782-49-2	Selenium		mg/kg	U	0.407	0.813	406.5
7440-22-4	Silver		mg/kg	U	1.02	2.03	406.5

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.41

% Solids: not dec.

Instrument ID

Sample ID: P-008

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104308

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 10:10

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 12:22

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	2.55	mg/kg		0.355	0.709	354.6
7440-39-3	Barium	20.4	mg/kg		0.177	0.355	354.6
7440-43-9	Cadmium	1.36	mg/kg		0.177	0.355	354.6
7440-47-3	Chromium	3046	mg/kg		0.887	1.77	354.6
7439-92-1	Lead	10192	mg/kg		0.177	0.355	354.6
7439-97-6	Mercury	1.47	mg/kg		0.089	0.177	354.6
7782-49-2	Selenium		mg/kg	U	0.355	0.709	354.6
7440-22-4	Silver		mg/kg	U	0.887	1.77	354.6

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 0.86

% Solids: not dec.

Instrument ID

Sample ID: P-009

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104309

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 10:20

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 12:28

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	2.36	mg/kg		0.581	1.16	581.4
7440-39-3	Barium	92.9	mg/kg		0.291	0.581	581.4
7440-43-9	Cadmium	0.898	mg/kg		0.291	0.581	581.4
7440-47-3	Chromium	5661	mg/kg		1.45	2.91	581.4
7439-92-1	Lead	17785	mg/kg		0.291	0.581	581.4
7439-97-6	Mercury	0.716	mg/kg		0.145	0.291	581.4
7782-49-2	Selenium		mg/kg	U	0.581	1.16	581.4
7440-22-4	Silver		mg/kg	U	1.45	2.91	581.4

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.34

% Solids: not dec.

Instrument ID

Sample ID: P-010

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104310

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 10:30

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 12:33

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	0.672	mg/kg	J	0.373	0.746	373.1
7440-39-3	Barium	64.5	mg/kg		0.187	0.373	373.1
7440-43-9	Cadmium	0.822	mg/kg		0.187	0.373	373.1
7440-47-3	Chromium	2249	mg/kg		0.933	1.87	373.1
7439-92-1	Lead	11343	mg/kg		0.187	0.373	373.1
7439-97-6	Mercury	1.37	mg/kg		0.093	0.187	373.1
7782-49-2	Selenium		mg/kg	U	0.373	0.746	373.1
7440-22-4	Silver		mg/kg	U	0.933	1.87	373.1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.59

% Solids: not dec.

Instrument ID

Sample ID: P-011

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104311

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 10:40

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 12:39

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	0.553	mg/kg	J	0.314	0.629	314.5
7440-39-3	Barium	117	mg/kg		0.157	0.314	314.5
7440-43-9	Cadmium	1.04	mg/kg		0.157	0.314	314.5
7440-47-3	Chromium	154	mg/kg		0.786	1.57	314.5
7439-92-1	Lead	3173	mg/kg		0.157	0.314	314.5
7439-97-6	Mercury	10.5	mg/kg		0.079	0.157	314.5
7782-49-2	Selenium		mg/kg	U	0.314	0.629	314.5
7440-22-4	Silver		mg/kg	U	0.786	1.57	314.5

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.45

% Solids: not dec.

Instrument ID

Sample ID: P-012

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104312

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 10:50

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 12:45

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	0.38	mg/kg	J	0.345	0.69	344.8
7440-39-3	Barium	29.1	mg/kg		0.172	0.345	344.8
7440-43-9	Cadmium	0.891	mg/kg		0.172	0.345	344.8
7440-47-3	Chromium	134	mg/kg		0.862	1.72	344.8
7439-92-1	Lead	3019	mg/kg		0.172	0.345	344.8
7439-97-6	Mercury	14.2	mg/kg		0.086	0.172	344.8
7782-49-2	Selenium		mg/kg	U	0.345	0.69	344.8
7440-22-4	Silver		mg/kg	U	0.862	1.72	344.8

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.54

% Solids: not dec.

Instrument ID

Sample ID: P-013

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104313

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 11:00

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 12:50

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	0.752	mg/kg		0.325	0.649	324.7
7440-39-3	Barium	473	mg/kg		0.162	0.325	324.7
7440-43-9	Cadmium	0.501	mg/kg		0.162	0.325	324.7
7440-47-3	Chromium	184	mg/kg		0.812	1.62	324.7
7439-92-1	Lead	3374	mg/kg		0.162	0.325	324.7
7439-97-6	Mercury	1.32	mg/kg		0.081	0.162	324.7
7782-49-2	Selenium		mg/kg	U	0.325	0.649	324.7
7440-22-4	Silver		mg/kg	U	0.812	1.62	324.7

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.70

% Solids: not dec.

Instrument ID

Sample ID: P-014

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104314

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 11:10

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 13:08

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	1.54	mg/kg		0.294	0.588	294.1
7440-39-3	Barium	45.3	mg/kg		0.147	0.294	294.1
7440-43-9	Cadmium	1.71	mg/kg		0.147	0.294	294.1
7440-47-3	Chromium	4.53	mg/kg		0.735	1.47	294.1
7439-92-1	Lead	3011	mg/kg		0.147	0.294	294.1
7439-97-6	Mercury	1.99	mg/kg		0.074	0.147	294.1
7782-49-2	Selenium	0.427	mg/kg	J	0.294	0.588	294.1
7440-22-4	Silver		mg/kg	U	0.735	1.47	294.1

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.39

% Solids: not dec.

Instrument ID

Sample ID: P-015

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104315

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 11:20

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 13:13

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.36	0.719	359.7
7440-39-3	Barium	17.8	mg/kg		0.18	0.36	359.7
7440-43-9	Cadmium	0.416	mg/kg		0.18	0.36	359.7
7440-47-3	Chromium	8.99	mg/kg		0.899	1.8	359.7
7439-92-1	Lead	60	mg/kg		0.18	0.36	359.7
7439-97-6	Mercury	1.7	mg/kg		0.09	0.18	359.7
7782-49-2	Selenium		mg/kg	U	0.36	0.719	359.7
7440-22-4	Silver		mg/kg	U	0.899	1.8	359.7

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.88

% Solids: not dec.

Instrument ID

Sample ID: P-016

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104316

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 11:30

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 13:19

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.266	0.532	266
7440-39-3	Barium	4.92	mg/kg		0.133	0.266	266
7440-43-9	Cadmium	2.62	mg/kg		0.133	0.266	266
7440-47-3	Chromium	1.58	mg/kg		0.665	1.33	266
7439-92-1	Lead	52.5	mg/kg		0.133	0.266	266
7439-97-6	Mercury	0.249	mg/kg		0.066	0.133	266
7782-49-2	Selenium		mg/kg	U	0.266	0.532	266
7440-22-4	Silver		mg/kg	U	0.665	1.33	266

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.34

% Solids: not dec.

Instrument ID

Sample ID: P-017

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104317

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 11:40

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 13:25

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	2.72	mg/kg		0.373	0.746	373.1
7440-39-3	Barium	27.8	mg/kg		0.187	0.373	373.1
7440-43-9	Cadmium	2.37	mg/kg		0.187	0.373	373.1
7440-47-3	Chromium	141	mg/kg		0.933	1.87	373.1
7439-92-1	Lead	2403	mg/kg		0.187	0.373	373.1
7439-97-6	Mercury	1.24	mg/kg		0.093	0.187	373.1
7782-49-2	Selenium	1.92	mg/kg		0.373	0.746	373.1
7440-22-4	Silver		mg/kg	U	0.933	1.87	373.1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.55

% Solids: not dec.

Instrument ID

Sample ID: P-018

Project ID St Louis AAP

Project Num 1043

Lab Sample ID: 104318

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 11:50

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 13:30

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	0.916	mg/kg		0.323	0.645	322.6
7440-39-3	Barium	15.7	mg/kg		0.161	0.323	322.6
7440-43-9	Cadmium	2.66	mg/kg		0.161	0.323	322.6
7440-47-3	Chromium	9.57	mg/kg		0.806	1.61	322.6
7439-92-1	Lead	156	mg/kg		0.161	0.323	322.6
7439-97-6	Mercury	0.406	mg/kg		0.081	0.161	322.6
7782-49-2	Selenium		mg/kg	U	0.323	0.645	322.6
7440-22-4	Silver		mg/kg	U	0.806	1.61	322.6

Metals Field Sample Data

WO # 1053

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.32

% Solids: not dec.

Instrument ID

Sample ID: P-019

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105301

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 7:00

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 14:28

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	0.467	mg/kg	J	0.379	0.758	378.8
7440-39-3	Barium	385	mg/kg		0.189	0.379	378.8
7440-43-9	Cadmium	1.34	mg/kg		0.189	0.379	378.8
7440-47-3	Chromium	24.6	mg/kg		0.947	1.89	378.8
7439-92-1	Lead	595	mg/kg		0.189	0.379	378.8
7439-97-6	Mercury	0.509	mg/kg		0.095	0.189	378.8
7782-49-2	Selenium		mg/kg	U	0.379	0.758	378.8
7440-22-4	Silver		mg/kg	U	0.947	1.89	378.8

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name:	Analytical Management Laboratories	Sample ID:	P-020
Client ID:	Arrowhead	Project ID	St Louis AAP
Matrix:	S	Project Num	1053
Sample g/ml:	1.57	Lab Sample ID:	105302
% Solids: not dec.		Analytical Batch	1606 Prep Batch 6168
Instrument ID		Date Collected:	8/13/02 Time: 7:10
		Date Received:	8/14/02 9:55:00 AM
Analytical Method:	EPA 6020A	Date Analyzed:	8/20/02 Time: 14:34
Prep Method:	EPA 3050B	Date Prepared:	8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	0.774	mg/kg		0.318	0.637	318.5
7440-39-3	Barium	13.8	mg/kg		0.159	0.318	318.5
7440-43-9	Cadmium	1.78	mg/kg		0.159	0.318	318.5
7440-47-3	Chromium	9.05	mg/kg		0.796	1.59	318.5
7439-92-1	Lead	52.2	mg/kg		0.159	0.318	318.5
7439-97-6	Mercury	5.13	mg/kg		0.08	0.159	318.5
7782-49-2	Selenium		mg/kg	U	0.318	0.637	318.5
7440-22-4	Silver		mg/kg	U	0.796	1.59	318.5

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.28

% Solids: not dec.

Instrument ID

Sample ID: P-021

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105303

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 7:20

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 14:39

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	1.89	mg/kg		0.391	0.781	390.6
7440-39-3	Barium	264	mg/kg		0.195	0.391	390.6
7440-43-9	Cadmium	1.61	mg/kg		0.195	0.391	390.6
7440-47-3	Chromium	96	mg/kg		0.977	1.95	390.6
7439-92-1	Lead	2616	mg/kg		0.195	0.391	390.6
7439-97-6	Mercury	1.15	mg/kg		0.098	0.195	390.6
7782-49-2	Selenium		mg/kg	U	0.391	0.781	390.6
7440-22-4	Silver		mg/kg	U	0.977	1.95	390.6

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.71

% Solids: not dec.

Instrument ID

Sample ID: P-022

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105304

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 7:30

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 14:45

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.292	0.585	292.4
7440-39-3	Barium	92.8	mg/kg		0.146	0.292	292.4
7440-43-9	Cadmium	3.1	mg/kg		0.146	0.292	292.4
7440-47-3	Chromium	10.7	mg/kg		0.731	1.46	292.4
7439-92-1	Lead	44.6	mg/kg		0.146	0.292	292.4
7439-97-6	Mercury	1.41	mg/kg		0.073	0.146	292.4
7782-49-2	Selenium		mg/kg	U	0.292	0.585	292.4
7440-22-4	Silver		mg/kg	U	0.731	1.46	292.4

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.36

% Solids: not dec.

Instrument ID

Sample ID: P-023

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105305

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 7:40

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 14:51

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	2.64	mg/kg		0.368	0.735	367.7
7440-39-3	Barium	120	mg/kg		0.184	0.368	367.7
7440-43-9	Cadmium	3.31	mg/kg		0.184	0.368	367.7
7440-47-3	Chromium	4972	mg/kg		0.919	1.84	367.7
7439-92-1	Lead	22772	mg/kg		0.184	0.368	367.7
7439-97-6	Mercury	1.16	mg/kg		0.092	0.184	367.7
7782-49-2	Selenium		mg/kg	U	0.368	0.735	367.7
7440-22-4	Silver		mg/kg	U	0.919	1.84	367.7

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.45

% Solids: not dec.

Instrument ID

Sample ID: P-024

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105306

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 7:50

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 14:56

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	0.69	mg/kg		0.345	0.69	344.8
7440-39-3	Barium	99.5	mg/kg		0.172	0.345	344.8
7440-43-9	Cadmium	2.03	mg/kg		0.172	0.345	344.8
7440-47-3	Chromium	2684	mg/kg		0.862	1.72	344.8
7439-92-1	Lead	13037	mg/kg		0.172	0.345	344.8
7439-97-6	Mercury	1.88	mg/kg		0.086	0.172	344.8
7782-49-2	Selenium		mg/kg	U	0.345	0.69	344.8
7440-22-4	Silver		mg/kg	U	0.862	1.72	344.8

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.39

% Solids: not dec.

Instrument ID

Sample ID: P-025

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105307

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 8:00

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 15:02

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	1.11	mg/kg		0.36	0.719	359.7
7440-39-3	Barium	17	mg/kg		0.18	0.36	359.7
7440-43-9	Cadmium	2.43	mg/kg		0.18	0.36	359.7
7440-47-3	Chromium	21	mg/kg		0.899	1.8	359.7
7439-92-1	Lead	85.1	mg/kg		0.18	0.36	359.7
7439-97-6	Mercury	7.44	mg/kg		0.09	0.18	359.7
7782-49-2	Selenium		mg/kg	U	0.36	0.719	359.7
7440-22-4	Silver	1.07	mg/kg	J	0.899	1.8	359.7

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.45

% Solids: not dec.

Instrument ID

Sample ID: P-026

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105308

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 8:10

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 16:09

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.345	0.69	344.8
7440-39-3	Barium	9.16	mg/kg		0.172	0.345	344.8
7440-43-9	Cadmium	2.38	mg/kg		0.172	0.345	344.8
7440-47-3	Chromium	7.21	mg/kg		0.862	1.72	344.8
7439-92-1	Lead	38	mg/kg		0.172	0.345	344.8
7439-97-6	Mercury	4.13	mg/kg		0.086	0.172	344.8
7782-49-2	Selenium		mg/kg	U	0.345	0.69	344.8
7440-22-4	Silver		mg/kg	U	0.862	1.72	344.8

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.45

% Solids: not dec.

Instrument ID

Sample ID: P-027

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105309

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 8:20

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 16:15

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.345	0.69	344.8
7440-39-3	Barium	4.86	mg/kg		0.172	0.345	344.8
7440-43-9	Cadmium	1.86	mg/kg		0.172	0.345	344.8
7440-47-3	Chromium	4.41	mg/kg		0.862	1.72	344.8
7439-92-1	Lead	18	mg/kg		0.172	0.345	344.8
7439-97-6	Mercury	0.753	mg/kg		0.086	0.172	344.8
7782-49-2	Selenium		mg/kg	U	0.345	0.69	344.8
7440-22-4	Silver		mg/kg	U	0.862	1.72	344.8

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.46

% Solids: not dec.

Instrument ID

Sample ID: P-028

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105310

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 8:30

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 16:20

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.342	0.685	342.5
7440-39-3	Barium	11.2	mg/kg		0.171	0.342	342.5
7440-43-9	Cadmium	0.722	mg/kg		0.171	0.342	342.5
7440-47-3	Chromium	3.52	mg/kg		0.856	1.71	342.5
7439-92-1	Lead	25.1	mg/kg		0.171	0.342	342.5
7439-97-6	Mercury	2.24	mg/kg		0.086	0.171	342.5
7782-49-2	Selenium		mg/kg	U	0.342	0.685	342.5
7440-22-4	Silver		mg/kg	U	0.856	1.71	342.5

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.95

% Solids: not dec.

Instrument ID

Sample ID: P-029

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105311

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 8:40

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 16:26

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.256	0.513	256.4
7440-39-3	Barium	25.7	mg/kg		0.128	0.256	256.4
7440-43-9	Cadmium	1.1	mg/kg		0.128	0.256	256.4
7440-47-3	Chromium	20.9	mg/kg		0.641	1.28	256.4
7439-92-1	Lead	635	mg/kg		0.128	0.256	256.4
7439-97-6	Mercury	0.919	mg/kg		0.064	0.128	256.4
7782-49-2	Selenium		mg/kg	U	0.256	0.513	256.4
7440-22-4	Silver		mg/kg	U	0.641	1.28	256.4

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.65

% Solids: not dec.

Instrument ID

Sample ID: P-030

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105312

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 8:50

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 16:32

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	2.04	mg/kg		0.303	0.606	303.0
7440-39-3	Barium	22.6	mg/kg		0.152	0.303	303.0
7440-43-9	Cadmium	1.09	mg/kg		0.152	0.303	303.0
7440-47-3	Chromium	3.32	mg/kg		0.758	1.52	303.0
7439-92-1	Lead	11.3	mg/kg		0.152	0.303	303.0
7439-97-6	Mercury	0.21	mg/kg		0.076	0.152	303.0
7782-49-2	Selenium		mg/kg	U	0.303	0.606	303.0
7440-22-4	Silver		mg/kg	U	0.758	1.52	303.0

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.75

% Solids: not dec.

Instrument ID

Sample ID: P-031

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105313

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 9:00

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 16:37

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	0.355	mg/kg	J	0.286	0.571	285.7
7440-39-3	Barium	13.7	mg/kg		0.143	0.286	285.7
7440-43-9	Cadmium	2.21	mg/kg		0.143	0.286	285.7
7440-47-3	Chromium	5.74	mg/kg		0.714	1.43	285.7
7439-92-1	Lead	90.7	mg/kg		0.143	0.286	285.7
7439-97-6	Mercury	1.7	mg/kg		0.071	0.143	285.7
7782-49-2	Selenium		mg/kg	U	0.286	0.571	285.7
7440-22-4	Silver		mg/kg	U	0.714	1.43	285.7

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.37

% Solids: not dec.

Instrument ID

Sample ID: P-032

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105314

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 14:00

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 16:52

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.365	0.73	365
7440-39-3	Barium	14.1	mg/kg		0.182	0.365	365
7440-43-9	Cadmium	0.36	mg/kg	J	0.182	0.365	365
7440-47-3	Chromium	2.39	mg/kg		0.912	1.82	365
7439-92-1	Lead	25.8	mg/kg		0.182	0.365	365
7439-97-6	Mercury	1.06	mg/kg		0.091	0.182	365
7782-49-2	Selenium		mg/kg	U	0.365	0.73	365
7440-22-4	Silver		mg/kg	U	0.912	1.82	365

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.64

% Solids: not dec.

Instrument ID

Sample ID: P-033

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105315

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 14:10

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 16:58

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	0.442	mg/kg	J	0.305	0.61	304.9
7440-39-3	Barium	118	mg/kg		0.152	0.305	304.9
7440-43-9	Cadmium	1.56	mg/kg		0.152	0.305	304.9
7440-47-3	Chromium	5.39	mg/kg		0.762	1.52	304.9
7439-92-1	Lead	98.4	mg/kg		0.152	0.305	304.9
7439-97-6	Mercury	0.972	mg/kg		0.076	0.152	304.9
7782-49-2	Selenium		mg/kg	U	0.305	0.61	304.9
7440-22-4	Silver		mg/kg	U	0.762	1.52	304.9

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.71

% Solids: not dec.

Instrument ID

Sample ID: P-034

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105316

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 14:20

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 17:04

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	1.67	mg/kg		0.292	0.585	292.4
7440-39-3	Barium	35.5	mg/kg		0.146	0.292	292.4
7440-43-9	Cadmium	0.769	mg/kg		0.146	0.292	292.4
7440-47-3	Chromium	8.9	mg/kg		0.731	1.46	292.4
7439-92-1	Lead	73.1	mg/kg		0.146	0.292	292.4
7439-97-6	Mercury		mg/kg	U	0.073	0.146	292.4
7782-49-2	Selenium		mg/kg	U	0.292	0.585	292.4
7440-22-4	Silver		mg/kg	U	0.731	1.46	292.4

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.54

% Solids: not dec.

Instrument ID

Sample ID: P-035

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105317

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 14:30

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 17:09

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.325	0.649	324.7
7440-39-3	Barium	6.93	mg/kg		0.162	0.325	324.7
7440-43-9	Cadmium	0.49	mg/kg		0.162	0.325	324.7
7440-47-3	Chromium	6.69	mg/kg		0.812	1.62	324.7
7439-92-1	Lead	69.9	mg/kg		0.162	0.325	324.7
7439-97-6	Mercury	0.219	mg/kg		0.081	0.162	324.7
7782-49-2	Selenium		mg/kg	U	0.325	0.649	324.7
7440-22-4	Silver		mg/kg	U	0.812	1.62	324.7

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.39

% Solids: not dec.

Instrument ID

Sample ID: P-036

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105318

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 14:40

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 17:15

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.36	0.719	359.7
7440-39-3	Barium	6.13	mg/kg		0.18	0.36	359.7
7440-43-9	Cadmium	5.45	mg/kg		0.18	0.36	359.7
7440-47-3	Chromium	2.98	mg/kg		0.899	1.8	359.7
7439-92-1	Lead	162	mg/kg		0.18	0.36	359.7
7439-97-6	Mercury	0.956	mg/kg		0.09	0.18	359.7
7782-49-2	Selenium		mg/kg	U	0.36	0.719	359.7
7440-22-4	Silver		mg/kg	U	0.899	1.8	359.7

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.37

% Solids: not dec.

Instrument ID

Sample ID: P-037

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105319

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 14:50

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 17:21

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.365	0.73	365
7440-39-3	Barium	5.08	mg/kg		0.182	0.365	365
7440-43-9	Cadmium	1.48	mg/kg		0.182	0.365	365
7440-47-3	Chromium	1.66	mg/kg	J	0.912	1.82	365
7439-92-1	Lead	62.5	mg/kg		0.182	0.365	365
7439-97-6	Mercury	2.53	mg/kg		0.091	0.182	365
7782-49-2	Selenium		mg/kg	U	0.365	0.73	365
7440-22-4	Silver		mg/kg	U	0.912	1.82	365

Metals QAQC Sample Data

WO # 1043

Quality Control Association Form

Lab Name Analytical Management Laboratories **Fraction** META

Analytical Batch	Prep Batch	Date Analyzed	Date Prepared	Lab Sample ID	Original Sample	Sample Type	Project Number
1605	6167	8/20/02	8/19/02	7630		MB	
1605	6167	8/20/02	8/19/02	7631		LCS	
1605	6167	8/20/02	8/19/02	7632		LCSD	
1605	6167	8/20/02	8/19/02	7633	104302	MS	
1605	6167	8/20/02	8/19/02	7634	104302	MSD	
1605	6167	8/20/02	8/19/02	7635	104302	PDS	
1605	6167	8/20/02	8/19/02	7636	104302	SD	
1605	6167	8/20/02	8/19/02	104301		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104302		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104303		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104304		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104305		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104306		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104307		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104308		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104309		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104310		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104311		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104312		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104313		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104314		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104315		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104316		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104317		SAMPLE	1043
1605	6167	8/20/02	8/19/02	104318		SAMPLE	1043

Batch Reviewed by JPeheim Date Reviewed 8/20/02 Date Printed *Tuesday, August 20, 2002*

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.25

% Solids: not dec. 100.0

Instrument ID

Sample ID: MB for HBN 6167 [MDIG/1631]

Project ID

Project Num

Lab Sample ID: 7630

Analytical Batch 1605 Prep Batch 6167

Date Collected: Time:

Date Received: 8/19/02 10:17:36 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 10:57

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.4	0.8	400
7440-39-3	Barium		mg/kg	U	0.2	0.4	400
7440-43-9	Cadmium		mg/kg	U	0.2	0.4	400
7440-47-3	Chromium		mg/kg	U	1	2	400
7439-92-1	Lead		mg/kg	U	0.2	0.4	400
7439-97-6	Mercury		mg/kg	U	0.1	0.2	400
7782-49-2	Selenium		mg/kg	U	0.4	0.8	400
7440-22-4	Silver		mg/kg	U	1	2	400

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.25

% Solids: not dec. 100.0

Instrument ID

Sample ID: LCS for HBN 6167 [MDIG/1631]

Project ID

Project Num

Lab Sample ID: 7631

Analytical Batch 1605 Prep Batch 6167

Date Collected: Time:

Date Received: 8/19/02 10:17:36 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 11:01

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	20.4	mg/kg		0.4	0.8	400
7440-39-3	Barium	40.1	mg/kg		0.2	0.4	400
7440-43-9	Cadmium	20	mg/kg		0.2	0.4	400
7440-47-3	Chromium	19.3	mg/kg		1	2	400
7439-92-1	Lead	195	mg/kg		0.2	0.4	400
7439-97-6	Mercury	1.95	mg/kg		0.1	0.2	400
7782-49-2	Selenium	20.8	mg/kg		0.4	0.8	400
7440-22-4	Silver	16.4	mg/kg		1	2	400

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name:	Analytical Management Laboratories	Sample ID:	LCSD for HBN 6167 [MDIG/1631]
Client ID:	QC ACCOUNT	Project ID	
Matrix:	S	Project Num	
Sample g/ml:	1.25	Lab Sample ID:	7632
% Solids: not dec.	100.0	Analytical Batch	1605 Prep Batch 6167
Instrument ID		Date Collected:	Time:
		Date Received:	8/19/02 10:17:36 AM
Analytical Method:	EPA 6020A	Date Analyzed:	8/20/02 Time: 11:05
Prep Method:	EPA 3050B	Date Prepared:	8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	20.3	mg/kg		0.4	0.8	400
7440-39-3	Barium	40.6	mg/kg		0.2	0.4	400
7440-43-9	Cadmium	20.2	mg/kg		0.2	0.4	400
7440-47-3	Chromium	19.5	mg/kg		1	2	400
7439-92-1	Lead	197	mg/kg		0.2	0.4	400
7439-97-6	Mercury	1.92	mg/kg		0.1	0.2	400
7782-49-2	Selenium	20.6	mg/kg		0.4	0.8	400
7440-22-4	Silver	16.3	mg/kg		1	2	400

7 - Equivalent

INORGANIC ANALYSIS DATA SHEET / Laboratory Control Sample Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1605

Fraction META

Prep Batch 6167

Units

LCS HSN : ***7631***

LCSD HSN : ***7632***

COMPOUND	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC# FLAG	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC#	RPD	RPD FLAG	QC. LIMITS LCL	UCL	RPD
Arsenic	20	20.4	102		20	20.3	102		0.25		80	120	20
Barium	40	40.1	100		40	40.6	102		1.28		80	120	20
Cadmium	20	20	99.8		20	20.2	101		1.21		80	120	20
Chromium	20	19.3	96.5		20	19.5	97.6		1.11		80	120	20
Lead	200	195	97.4		200	197	98.6		1.25		80	120	20
Mercury	2	1.95	97.6		2	1.92	96.2		1.5		80	120	20
Selenium	20	20.8	104		20	20.6	103		0.871		80	120	20
Silver	20	16.4	81.9		20	16.3	81.4		0.557		80	120	20

FORM VII - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.29

% Solids: not dec.

Instrument ID

Sample ID: P-002(104302MS)

Project ID

Project Num

Lab Sample ID: 7633

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 9:10

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 11:28

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	29	mg/kg		0.388	0.775	387.6
7440-39-3	Barium	35.4	mg/kg		0.194	0.388	387.6
7440-43-9	Cadmium	40.6	mg/kg		0.194	0.388	387.6
7440-47-3	Chromium	39.3	mg/kg		0.969	1.94	387.6
7439-92-1	Lead	1212	mg/kg		0.194	0.388	387.6
7439-97-6	Mercury	6.14	mg/kg		0.097	0.194	387.6
7782-49-2	Selenium	27.5	mg/kg		0.388	0.775	387.6
7440-22-4	Silver	29.2	mg/kg		0.969	1.94	387.6

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.28

% Solids: not dec.

Instrument ID

Sample ID: P-002(104302MSD)

Project ID

Project Num

Lab Sample ID: 7634

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 9:10

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 11:33

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	29.8	mg/kg		0.391	0.781	390.6
7440-39-3	Barium	41.3	mg/kg		0.195	0.391	390.6
7440-43-9	Cadmium	39.4	mg/kg		0.195	0.391	390.6
7440-47-3	Chromium	38.6	mg/kg		0.977	1.95	390.6
7439-92-1	Lead	1198	mg/kg		0.195	0.391	390.6
7439-97-6	Mercury	5.84	mg/kg		0.098	0.195	390.6
7782-49-2	Selenium	28.3	mg/kg		0.391	0.781	390.6
7440-22-4	Silver	28.4	mg/kg		0.977	1.95	390.6

5 - Equivalent

INORGANICS ANALYSIS DATA SHEET / Matrix Spike Summary Sheet

Lab Name : Analytical Management Laboratories

Anaytical Batch : 1605

Fraction : META

Prep Batch : 6167

Units : ug/L

Orig HSN : 104302 **MS HSN : 7633** **MSD HSN : 7634**

Compound	Original Amount	Spike Added	MS Amount	MS % REC #	MS % REC # FLAG	MSD Amount	MSD % REC #	MSD % REC # FLAG	RPD	RPD FLAG	QC LIMITS LCL	UCL	RPD
Arsenic	1.49	38.8	29.0	70.8	*	29.8	72.9	*	2.69		80	120	20
Barium	24.1	77.6	35.4	14.5	*	41.3	22.1	*	15.5		80	120	20
Cadmium	2.69	38.8	40.6	97.7		42.0	101.4		3.42		80	120	20
Chromium	3.60	38.8	39.3	92.1		38.6	90.2		1.88		80	120	20
Lead	860	388	1212	90.8		1198	87.3		1.13		80	120	20
Mercury	2.49	3.88	6.14	94.0		5.84	86.4		4.96		80	120	20
Selenium	1.46	38.8	27.5	67.1	*	28.3	69.1	*	2.84		80	120	20
Silver	0	38.8	29.2	75.1		28.4	73.1	*	2.72		80	120	20

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.25

% Solids: not dec.

Instrument ID

Sample ID: P-002(104302PDS)

Project ID

Project Num

Lab Sample ID: 7635

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 9:10

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 11:39

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	43.6	mg/kg		0.4	0.8	400
7440-39-3	Barium	103	mg/kg		0.2	0.4	400
7440-43-9	Cadmium	42	mg/kg		0.2	0.4	400
7440-47-3	Chromium	41.9	mg/kg		1	2	400
7439-92-1	Lead	1313	mg/kg		0.2	0.4	400
7439-97-6	Mercury	6.58	mg/kg		0.1	0.2	400
7782-49-2	Selenium	45.4	mg/kg		0.4	0.8	400
7440-22-4	Silver	16.8	mg/kg		1	2	400

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

5 - Equivalent

INORGANICS ANALYSIS DATA SHEET / Post-Digestion Spike Summary Sheet

Lab Name : Analytical Management Laboratories

Anaytical Batch : 1605

Fraction : META

Prep Batch : 6167

Units : ug/L

Orig HSN : 104302 **PDS HSN : 7635**

Compound	Original Amount	Spike Added	PDS Amount	PDS % REC #	PDS % REC # FLAG	QC LIMITS LCL	QC LIMITS UCL
Arsenic	1.49	38.8	43.6	108.5		80	120
Barium	24.1	77.6	103	102.0		80	120
Cadmium	2.69	38.8	42.0	101.4		80	120
Chromium	3.60	38.8	41.9	98.6		80	120
Lead	860	388	1313	116.9		80	120
Mercury	2.49	3.88	6.58	105.4		80	120
Selenium	1.46	38.8	45.4	113.3		80	120
Silver	0	38.8	16.8	43.2	*	80	120

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.25

% Solids: not dec.

Instrument ID

Sample ID: P-002(104302SD)

Project ID

Project Num

Lab Sample ID: 7636

Analytical Batch 1605 Prep Batch 6167

Date Collected: 8/12/02 Time: 9:10

Date Received: 8/13/02 9:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 11:22

Date Prepared: 8/19/02 Time: 10:17

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	2	4	2000
7440-39-3	Barium	24.5	mg/kg		1	2	2000
7440-43-9	Cadmium	2.94	mg/kg		1	2	2000
7440-47-3	Chromium		mg/kg	U	5	10	2000
7439-92-1	Lead	865	mg/kg		1	2	2000
7439-97-6	Mercury	2.47	mg/kg		0.5	1	2000
7782-49-2	Selenium		mg/kg	U	2	4	2000
7440-22-4	Silver		mg/kg	U	5	10	2000

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

Metals QAQC Sample Data

WO # 1053

Quality Control Association Form

Lab Name Analytical Management Laboratories **Fraction** META

Analytical Batch	Prep Batch	Date Analyzed	Date Prepared	Lab Sample ID	Original Sample	Sample Type	Project Number
1606	6168	8/20/02	8/19/02	7637		MB	
1606	6168	8/20/02	8/19/02	7638		LCS	
1606	6168	8/20/02	8/19/02	7639		LCSD	
1606	6168	8/20/02	8/19/02	7640	105307	MS	
1606	6168	8/20/02	8/19/02	7641	105307	MSD	
1606	6168	8/20/02	8/19/02	7642	105307	PDS	
1606	6168	8/20/02	8/19/02	7643	105307	SD	
1606	6168	8/20/02	8/19/02	105301		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105302		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105303		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105304		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105305		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105306		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105307		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105308		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105309		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105310		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105311		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105312		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105313		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105314		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105315		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105316		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105317		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105318		SAMPLE	1053
1606	6168	8/20/02	8/19/02	105319		SAMPLE	1053

Batch Reviewed by JPeheim Date Reviewed 8/21/02 Date Printed *Wednesday, August 21, 2002*

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.25

% Solids: not dec. 100.0

Instrument ID

Sample ID: MB for HBN 6168 [MDIG/1632]

Project ID

Project Num

Lab Sample ID: 7637

Analytical Batch 1606 Prep Batch 6168

Date Collected: Time:

Date Received: 8/19/02 11:08:19 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 14:05

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.4	0.8	400
7440-39-3	Barium		mg/kg	U	0.2	0.4	400
7440-43-9	Cadmium		mg/kg	U	0.2	0.4	400
7440-47-3	Chromium		mg/kg	U	1	2	400
7439-92-1	Lead	0.66	mg/kg		0.2	0.4	400
7439-97-6	Mercury		mg/kg	U	0.1	0.2	400
7782-49-2	Selenium		mg/kg	U	0.4	0.8	400
7440-22-4	Silver		mg/kg	U	1	2	400

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.25

% Solids: not dec. 100.0

Instrument ID

Sample ID: LCS for HBN 6168 [MDIG/1632]

Project ID

Project Num

Lab Sample ID: 7638

Analytical Batch 1606 Prep Batch 6168

Date Collected: Time:

Date Received: 8/19/02 11:08:19 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 14:18

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	21.9	mg/kg		0.4	0.8	400
7440-39-3	Barium	40	mg/kg		0.2	0.4	400
7440-43-9	Cadmium	19.2	mg/kg		0.2	0.4	400
7440-47-3	Chromium	21.2	mg/kg		1	2	400
7439-92-1	Lead	205	mg/kg		0.2	0.4	400
7439-97-6	Mercury	1.83	mg/kg		0.1	0.2	400
7782-49-2	Selenium	22.1	mg/kg		0.4	0.8	400
7440-22-4	Silver	18.1	mg/kg		1	2	400

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.25

% Solids: not dec. 100.0

Instrument ID

Sample ID: LCSD for HBN 6168 [MDIG/1632]

Project ID

Project Num

Lab Sample ID: 7639

Analytical Batch 1606 Prep Batch 6168

Date Collected: Time:

Date Received: 8/19/02 11:08:19 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 14:22

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	21.8	mg/kg		0.4	0.8	400
7440-39-3	Barium	37.2	mg/kg		0.2	0.4	400
7440-43-9	Cadmium	19.4	mg/kg		0.2	0.4	400
7440-47-3	Chromium	21.4	mg/kg		1	2	400
7439-92-1	Lead	201	mg/kg		0.2	0.4	400
7439-97-6	Mercury	1.82	mg/kg		0.1	0.2	400
7782-49-2	Selenium	22.1	mg/kg		0.4	0.8	400
7440-22-4	Silver	17.7	mg/kg		1	2	400

7 - Equivalent

INORGANIC ANALYSIS DATA SHEET / Laboratory Control Sample Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1606

Fraction META

Prep Batch 6168

Units

LCS HSN : ***7638***

LCSD HSN : ***7639***

COMPOUND	*SPIKE ADDED*	*LCS Amount*	*LCS % REC #*	*LCS % REC# FLAG*	*SPIKE ADDED*	*LCS Amount*	*LCS % REC #*	*LCS % REC#*	*RPD*	*RPD FLAG*	*QC. LIMITS LCL*	*UCL*	*RPD*
Arsenic	20	21.9	109		20	21.8	109		0.252		80	120	20
Barium	40	40	99.9		40	37.2	93		7.13		80	120	20
Cadmium	20	19.2	95.9		20	19.4	97.1		1.22		80	120	20
Chromium	20	21.2	106		20	21.4	107		0.836		80	120	20
Lead	200	205	102		200	201	101		1.69		80	120	20
Mercury	2	1.83	91.3		2	1.82	91.1		0.219		80	120	20
Selenium	20	22.1	111		20	22.1	111		0.126		80	120	20
Silver	20	18.1	90.3		20	17.7	88.7		1.79		80	120	20

FORM VII - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.38

% Solids: not dec.

Instrument ID

Sample ID: P-025(105307MS)

Project ID

Project Num

Lab Sample ID: 7640

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 8:00

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 15:52

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	32.9	mg/kg		0.362	0.725	362.3
7440-39-3	Barium	81.4	mg/kg		0.181	0.362	362.3
7440-43-9	Cadmium	37.1	mg/kg		0.181	0.362	362.3
7440-47-3	Chromium	53.1	mg/kg		0.906	1.81	362.3
7439-92-1	Lead	485	mg/kg		0.181	0.362	362.3
7439-97-6	Mercury	11	mg/kg		0.091	0.181	362.3
7782-49-2	Selenium	27.1	mg/kg		0.362	0.725	362.3
7440-22-4	Silver	27.7	mg/kg		0.906	1.81	362.3

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.32

% Solids: not dec.

Instrument ID

Sample ID: P-025(105307MSD)

Project ID

Project Num

Lab Sample ID: 7641

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 8:00

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 15:58

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	33.7	mg/kg		0.379	0.758	378.8
7440-39-3	Barium	84.9	mg/kg		0.189	0.379	378.8
7440-43-9	Cadmium	38.2	mg/kg		0.189	0.379	378.8
7440-47-3	Chromium	56.4	mg/kg		0.947	1.89	378.8
7439-92-1	Lead	497	mg/kg		0.189	0.379	378.8
7439-97-6	Mercury	11.8	mg/kg		0.095	0.189	378.8
7782-49-2	Selenium	28	mg/kg		0.379	0.758	378.8
7440-22-4	Silver	27.7	mg/kg		0.947	1.89	378.8

5 - Equivalent

INORGANICS ANALYSIS DATA SHEET / Matrix Spike Summary Sheet

Lab Name : Analytical Management Laboratories

Anaytical Batch : 1606

Fraction : META

Prep Batch : 6168

Units : ug/L

Orig HSN : 105307 **MS HSN : 7640** **MSD HSN : 7641**

Compound	Original Amount	Spike Added	MS Amount	MS % REC #	MS % REC # FLAG	Spike Added	MSD Amount	MSD % REC #	MSD % REC # FLAG	RPD	RPD FLAG	QC LIMITS LCL	UCL	RPD
Arsenic	1.11	36.2	32.9	87.8		37.9	33.7	86.1		2.40		80	120	20
Barium	17.0	72.4	81.4	89.0		75.7	84.9	89.7		4.21		80	120	20
Cadmium	2.43	36.2	37.1	95.8		37.9	38.2	94.6		3.03		80	120	20
Chromium	21.0	36.2	53.1	88.8		37.9	56.4	93.7		6.03		80	120	20
Lead	85.1	362	485	110.5		379	497	108.8		2.44		80	120	20
Mercury	7.44	3.62	11.0	98.5		3.79	11.80	115.3		7.02		80	120	20
Selenium	0	36.2	27.1	74.9	*	37.9	28.0	74.0	*	3.27		80	120	20
Silver	1.07	36.2	27.7	73.6	*	37.9	27.7	70.3	*	0.00		80	120	20

FORM V - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.39

% Solids: not dec.

Instrument ID

Sample ID: P-025(105307PDS)

Project ID

Project Num

Lab Sample ID: 7642

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 8:00

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 16:04

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	42.7	mg/kg		0.36	0.719	359.7
7440-39-3	Barium	80.7	mg/kg		0.18	0.36	359.7
7440-43-9	Cadmium	35.5	mg/kg		0.18	0.36	359.7
7440-47-3	Chromium	55.6	mg/kg		0.899	1.8	359.7
7439-92-1	Lead	452	mg/kg		0.18	0.36	359.7
7439-97-6	Mercury	10.4	mg/kg		0.09	0.18	359.7
7782-49-2	Selenium	41.1	mg/kg		0.36	0.719	359.7
7440-22-4	Silver	4.47	mg/kg		0.899	1.8	359.7

5 - Equivalent

INORGANICS ANALYSIS DATA SHEET / Post-Digestion Spike Summary Sheet

Lab Name : Analytical Management Laboratories

Anaytical Batch : 1606

Fraction : META

Prep Batch : 6168

Units : ug/L

Orig HSN : 105307 **PDS HSN : 7642**

Compound	Original Amount	Spike Added	PDS Amount	PDS % REC #	PDS % REC # FLAG	QC LIMITS LCL	QC LIMITS UCL
Arsenic	1.11	36.2	42.7	114.9		80	120
Barium	17.0	72.4	80.7	88.0		80	120
Cadmium	2.43	36.2	35.5	91.4		80	120
Chromium	21.0	36.2	55.6	95.7		80	120
Lead	85.1	362	452	101.4		80	120
Mercury	7.44	3.62	10.4	81.9		80	120
Selenium	0	36.2	41.1	113.5		80	120
Silver	1.07	36.2	4.5	9.4	*	80	120

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.39

% Solids: not dec.

Instrument ID

Sample ID: P-025(105307SD)

Project ID

Project Num

Lab Sample ID: 7643

Analytical Batch 1606 Prep Batch 6168

Date Collected: 8/13/02 Time: 8:00

Date Received: 8/14/02 9:55:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/20/02 Time: 15:47

Date Prepared: 8/19/02 Time: 11:08

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	1.8	3.6	1799
7440-39-3	Barium	16.3	mg/kg		0.899	1.8	1799
7440-43-9	Cadmium	2.51	mg/kg		0.899	1.8	1799
7440-47-3	Chromium	21	mg/kg		4.5	8.99	1799
7439-92-1	Lead	77.6	mg/kg		0.899	1.8	1799
7439-97-6	Mercury	7.17	mg/kg		0.45	0.899	1799
7782-49-2	Selenium		mg/kg	U	1.8	3.6	1799
7440-22-4	Silver		mg/kg	U	4.5	8.99	1799

Corrective Action Supporting Documentation

Quality Control Association Form

Lab Name Analytical Management Laboratories **Fraction** META

Analytical Batch	Prep Batch	Date Analyzed	Date Prepared	Lab Sample ID	Original Sample	Sample Type	Project Number
1623	6502	8/23/02	8/22/02	7823		MB	
1623	6502	8/23/02	8/22/02	7824		LCS	
1623	6502	8/23/02	8/22/02	7825		LCSD	
1623	6502	8/23/02	8/22/02	7826	105320	MS	
1623	6502	8/23/02	8/22/02	7827	105320	MSD	
1623	6502	8/23/02	8/22/02	7828	105320	PDS	
1623	6502	8/23/02	8/22/02	7829	105320	SD	
1623	6502	8/23/02	8/22/02	105320		SAMPLE	1053

Batch Reviewed by JPehrim Date Reviewed 8/23/02 Date Printed *Friday, August 23, 2002*

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name:	Analytical Management Laboratories	Sample ID:	MB for HBN 6502 [MDIG/1646]
Client ID:	QC ACCOUNT	Project ID	
Matrix:	S	Project Num	
Sample g/ml:	1.25	Lab Sample ID:	7823
% Solids: not dec.	100.0	Analytical Batch	1623 Prep Batch 6502
Instrument ID		Date Collected:	Time:
		Date Received:	8/22/02 1:23:26 PM
Analytical Method:	EPA 6020A	Date Analyzed:	8/23/02 Time: 12:22
Prep Method:	EPA 3050B	Date Prepared:	8/22/02 Time: 13:23

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	0.4	0.8	400
7440-39-3	Barium		mg/kg	U	0.2	0.4	400
7440-43-9	Cadmium		mg/kg	U	0.2	0.4	400
7440-47-3	Chromium		mg/kg	U	1	2	400
7439-92-1	Lead		mg/kg	U	0.2	0.4	400
7439-97-6	Mercury		mg/kg	U	0.1	0.2	400
7782-49-2	Selenium		mg/kg	U	0.4	0.8	400
7440-22-4	Silver		mg/kg	U	1	2	400

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name:	Analytical Management Laboratories	Sample ID:	LCS for HBN 6502 [MDIG/1646]
Client ID:	QC ACCOUNT	Project ID	
Matrix:	S	Project Num	
Sample g/ml:	1.25	Lab Sample ID:	7824
% Solids: not dec.	100.0	Analytical Batch	1623 Prep Batch 6502
Instrument ID		Date Collected:	Time:
		Date Received:	8/22/02 1:23:26 PM
Analytical Method:	EPA 6020A	Date Analyzed:	8/23/02 Time: 12:56
Prep Method:	EPA 3050B	Date Prepared:	8/22/02 Time: 13:23

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	21.9	mg/kg		0.4	0.8	400
7440-39-3	Barium	41.6	mg/kg		0.2	0.4	400
7440-43-9	Cadmium	21.5	mg/kg		0.2	0.4	400
7440-47-3	Chromium	20.9	mg/kg		1	2	400
7439-92-1	Lead	212	mg/kg		0.2	0.4	400
7439-97-6	Mercury	2.1	mg/kg		0.1	0.2	400
7782-49-2	Selenium	22.6	mg/kg		0.4	0.8	400
7440-22-4	Silver	20.1	mg/kg		1	2	400

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.25

% Solids: not dec. 100.0

Instrument ID

Sample ID: LCSD for HBN 6502 [MDIG/1646]

Project ID

Project Num

Lab Sample ID: 7825

Analytical Batch 1623 Prep Batch 6502

Date Collected: Time:

Date Received: 8/22/02 1:23:26 PM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/23/02 Time: 13:00

Date Prepared: 8/22/02 Time: 13:23

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	21	mg/kg		0.4	0.8	400
7440-39-3	Barium	41.3	mg/kg		0.2	0.4	400
7440-43-9	Cadmium	21.1	mg/kg		0.2	0.4	400
7440-47-3	Chromium	20.1	mg/kg		1	2	400
7439-92-1	Lead	207	mg/kg		0.2	0.4	400
7439-97-6	Mercury	2.06	mg/kg		0.1	0.2	400
7782-49-2	Selenium	22	mg/kg		0.4	0.8	400
7440-22-4	Silver	20.5	mg/kg		1	2	400

7 - Equivalent

INORGANIC ANALYSIS DATA SHEET / Laboratory Control Sample Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1623

Fraction META

Prep Batch 6502

Units

LCS HSN : ***7824***

LCSD HSN : ***7825***

COMPOUND	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC# FLAG	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC#	RPD	RPD FLAG	QC. LIMITS LCL	UCL	RPD
Arsenic	20	21.9	109		20	21	105		3.79		80	120	20
Barium	40	41.6	104		40	41.3	103		0.584		80	120	20
Cadmium	20	21.5	107		20	21.1	106		1.67		80	120	20
Chromium	20	20.9	105		20	20.1	101		4.04		80	120	20
Lead	200	212	106		200	207	104		2.22		80	120	20
Mercury	2	2.1	105		2	2.06	103		2.07		80	120	20
Selenium	20	22.6	113		20	22	110		2.66		80	120	20
Silver	20	20.1	101		20	20.5	103		2.12		80	120	20

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.28

% Solids: not dec.

Instrument ID

Sample ID: P025(105320MS)

Project ID

Project Num

Lab Sample ID: 7826

Analytical Batch 1623 Prep Batch 6502

Date Collected: 8/13/02 Time: 8:00

Date Received: 8/22/02 10:32:59 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/23/02 Time: 13:14

Date Prepared: 8/22/02 Time: 13:23

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	30.3	mg/kg		0.391	0.781	390.6
7440-39-3	Barium	94.5	mg/kg		0.195	0.391	390.6
7440-43-9	Cadmium	39.5	mg/kg		0.195	0.391	390.6
7440-47-3	Chromium	49.7	mg/kg		0.977	1.95	390.6
7439-92-1	Lead	502	mg/kg		0.195	0.391	390.6
7439-97-6	Mercury	11.2	mg/kg		0.098	0.195	390.6
7782-49-2	Selenium	25.2	mg/kg		0.391	0.781	390.6
7440-22-4	Silver	25.8	mg/kg		0.977	1.95	390.6

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name:	Analytical Management Laboratories	Sample ID:	P025(105320MSD)
Client ID:	QC ACCOUNT	Project ID	
Matrix:	S	Project Num	
Sample g/ml:	1.26	Lab Sample ID:	7827
% Solids: not dec.		Analytical Batch	1623 Prep Batch 6502
Instrument ID		Date Collected:	8/13/02 Time: 8:00
		Date Received:	8/22/02 10:32:59 AM
Analytical Method:	EPA 6020A	Date Analyzed:	8/23/02 Time: 13:20
Prep Method:	EPA 3050B	Date Prepared:	8/22/02 Time: 13:23

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	33.1	mg/kg		0.397	0.794	396.8
7440-39-3	Barium	95.2	mg/kg		0.198	0.397	396.8
7440-43-9	Cadmium	40.5	mg/kg		0.198	0.397	396.8
7440-47-3	Chromium	51.3	mg/kg		0.992	1.98	396.8
7439-92-1	Lead	513	mg/kg		0.198	0.397	396.8
7439-97-6	Mercury	11.8	mg/kg		0.099	0.198	396.8
7782-49-2	Selenium	27.3	mg/kg		0.397	0.794	396.8
7440-22-4	Silver	24.7	mg/kg		0.992	1.98	396.8

5 - Equivalent

INORGANICS ANALYSIS DATA SHEET / Matrix Spike Summary Sheet

Lab Name : Analytical Management Laboratories

Anaytical Batch : 1623

Fraction : META

Prep Batch : 6502

Units : ug/L

Orig HSN : 105320 **MS HSN : 7826** **MSD HSN : 7827**

Compound	Original Amount	Spike Added	MS Amount	MS % REC #	MS % REC # FLAG	Spike Added	MSD Amount	MSD % REC #	MSD % REC # FLAG	RPD	RPD FLAG	QC LIMITS LCL	UCL	RPD
Arsenic	0.839	39.1	30.3	75.3		39.7	33.1	81.3		8.87		80	120	20
Barium	24.5	78.1	94.5	89.6		79.4	95.2	89.1		0.76		80	120	20
Cadmium	2.76	39.1	39.5	94.2		39.7	40.5	95.2		2.43		80	120	20
Chromium	14.7	39.1	49.7	89.7		39.7	51.3	92.3		3.19		80	120	20
Lead	93.2	391	502	104.5		397	513	105.8		2.25		80	120	20
Mercury	7.18	3.91	11.2	102.8		3.97	11.8	117.5		5.59		80	120	20
Selenium	0	39.1	25.2	64.5	*	39.7	27.3	68.7	*	7.94		80	120	20
Silver	1.27	39.1	25.8	62.7	*	39.7	24.7	59.0	*	4.27		80	120	20

FORM V - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name:	Analytical Management Laboratories	Sample ID:	P025(105320PDS)
Client ID:	QC ACCOUNT	Project ID	
Matrix:	S	Project Num	
Sample g/ml:	1.31	Lab Sample ID:	7828
% Solids: not dec.		Analytical Batch	1623 Prep Batch 6502
Instrument ID		Date Collected:	8/13/02 Time: 8:00
		Date Received:	8/22/02 10:32:59 AM
Analytical Method:	EPA 6020A	Date Analyzed:	8/23/02 Time: 13:26
Prep Method:	EPA 3050B	Date Prepared:	8/22/02 Time: 13:23

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	45.1	mg/kg		0.382	0.763	381.7
7440-39-3	Barium	102	mg/kg		0.191	0.382	381.7
7440-43-9	Cadmium	41.8	mg/kg		0.191	0.382	381.7
7440-47-3	Chromium	52.8	mg/kg		0.954	1.91	381.7
7439-92-1	Lead	523	mg/kg		0.191	0.382	381.7
7439-97-6	Mercury	11.2	mg/kg		0.095	0.191	381.7
7782-49-2	Selenium	42.9	mg/kg		0.382	0.763	381.7
7440-22-4	Silver	4.82	mg/kg		0.954	1.91	381.7

5 - Equivalent

INORGANICS ANALYSIS DATA SHEET / Post-Digestion Spike Summary Sheet

Lab Name : Analytical Management Laboratories

Anaytical Batch : 1350

Fraction : META

Prep Batch : 3751

Units : ug/L

Orig HSN : 53624 **PDS HSN : 4594**

Compound	Original Amount	Spike Added	PDS Amount	PDS % REC #	PDS % REC # FLAG	QC LIMITS LCL	UCL
Arsenic	0.839	38.2	45.1	116.1		80	120
Barium	24.5	76.3	102	101.3		80	120
Cadmium	2.76	38.2	41.8	102.3		80	120
Chromium	14.7	38.2	52.8	99.9		80	120
Lead	93.2	382	523	112.6		80	120
Mercury	7.18	3.82	11.2	104.0		80	120
Selenium	0	38.2	42.9	112.5		80	120
Silver	1.27	38.2	4.82	9.3	*	80	120

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: S

Sample g/ml: 1.31

% Solids: not dec.

Instrument ID

Sample ID: P025(105320SD)

Project ID

Project Num

Lab Sample ID: 7829

Analytical Batch 1623 Prep Batch 6502

Date Collected: 8/13/02 Time: 8:00

Date Received: 8/22/02 10:32:59 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/23/02 Time: 13:10

Date Prepared: 8/22/02 Time: 13:23

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic		mg/kg	U	1.91	3.82	1908
7440-39-3	Barium	24.6	mg/kg		0.954	1.91	1908
7440-43-9	Cadmium	2.52	mg/kg		0.954	1.91	1908
7440-47-3	Chromium	14	mg/kg		4.77	9.54	1908
7439-92-1	Lead	90.6	mg/kg		0.954	1.91	1908
7439-97-6	Mercury	7.36	mg/kg		0.477	0.954	1908
7782-49-2	Selenium		mg/kg	U	1.91	3.82	1908
7440-22-4	Silver		mg/kg	U	4.77	9.54	1908

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Arrowhead

Matrix: S

Sample g/ml: 1.31

% Solids: not dec.

Instrument ID

Sample ID: P025

Project ID St Louis AAP

Project Num 1053

Lab Sample ID: 105320

Analytical Batch 1623 Prep Batch 6502

Date Collected: 8/13/02 Time: 8:00

Date Received: 8/22/02 10:32:59 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3050B

Date Analyzed: 8/23/02 Time: 13:06

Date Prepared: 8/22/02 Time: 13:23

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-38-2	Arsenic	0.839	mg/kg		0.382	0.763	381.7
7440-39-3	Barium	24.5	mg/kg		0.191	0.382	381.7
7440-43-9	Cadmium	2.76	mg/kg		0.191	0.382	381.7
7440-47-3	Chromium	14.7	mg/kg		0.954	1.91	381.7
7439-92-1	Lead	93.2	mg/kg		0.191	0.382	381.7
7439-97-6	Mercury	7.18	mg/kg		0.095	0.191	381.7
7782-49-2	Selenium		mg/kg	U	0.382	0.763	381.7
7440-22-4	Silver	1.27	mg/kg	J	0.954	1.91	381.7

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

Arrowhead. It is currently anticipated that one to two loads of TSCA waste will be shipped out each day that TSCA waste removal activities are performed On a daily basis during the Removal Action, Arrowhead will inform the Subcontractor as to the number of roll-off containers required for load-out and off-site shipment. Arrowhead will also provide the Subcontractor with a schedule of activities at the on set of the work. Arrowhead will monitor this schedule daily and inform the Subcontractor of any changes as soon as they are known.

Type of Subcontract: Fixed Unit Rate.

Identification of the proposed Subcontractor:

Name:	The Environmental Quality Company
Address:	36255 Michigan Avenue
City, State Zip:	Wayne, Michigan 48184

Price Analysis: The Environmental Quality (EQ) Company submitted a responsive bid in terms of price and best value subcontracting. Their total bid was low-bid ($751,530) among the two potential bidders.

Responsibility: Each of the two respondents met the minimum technical requirements of the solicitation. Each respondent demonstrated adequate in-house resources to complete the work scope in conjunction with the anticipated project schedule.

A debar check was performed to determine whether or not The EQ Company has been debarred from working for the federal government. The search was conducted by accessing the debar web site at www.arnet.gov/epls. The search revealed no debarment.

Cost Accounting Standards: Not required.

Recommendation:

It is the determination and recommendation of Arrowhead Contracting, Incorporation that the subject contract be awarded to The EQ Company based upon the foregoing analysis. This recommendation for award is made in accordance with the applicable regulations and policies and is deemed to be in the best interest of Arrowhead Contracting and the United States Government.

Consent is hereby granted for the above, subject to the clauses contained in the prime contract. This consent shall in no way relieve the prime contractor of any obligations or responsibilities it may otherwise have under the contract or under law, shall not create any obligation of the Government to, or privity with, the subcontractor or vendor, and shall be without prejudice to any right or claim of the Government under the prime contract. This consent does not constitute a determination on the allowability of costs, determination of the acceptability of the subcontract terms or price, unless the consent or approval specifies otherwise.

Sean Sennenez 11 July 02

Contracting Officer Consent Date

Contractor's Certification: I certify that this document has been reviewed and is complete.

Jay Walker 6-17-02

Project Manager Date

The information in this document is confidential and proprietary and is intended only for the individual or entity named on the cover sheet. If you are not the intended recipient, disclosure, copying, distribution or use of this information is prohibited. If you do not receive all of the pages or have received this fax in error, please notify us immediately at the above telephone number.

Analytical Management Laboratories, Inc.

15130 South Keeler, Olathe, Kansas 66062
Phone: (913) 829-0101 • Fax: (913) 829-1181
Operations Manager: klindquist@amlabinc.com
Quality Manager: smeeks@amlabinc.co

Certificate of Analysis

August 30, 2002

Scott Siegwald
Arrowhead Contracting
12920 Metcalf Suite 160
Overland Park, KS 66213
Phone: 913-814-9994
Fax: 913-814-9997

Client Project ID : SLAAP Bldg 3
Chain of Custody #: 14636

Laboratory Work Order # 1127

Dear Mr. Siegwald:

Included are the analytical results for the samples received on August 29, 2002. All analyses were prepared and analyzed within analytical holding time.

Data qualifiers are as follows:

ND = Not detected at or above the reporting limit.
B = Some level of the compound was present in the method blank.
J = Compound results are an estimated concentration.
E = Compound present in levels greater than the instrument calibration range.

If you have any questions regarding this report, feel free to contact me at (913) 829-0101.

Kendall L. Lindquist, MBA
Operations Manager

Analytical Management Laboratories, Inc.

15130 South Keeler, Olathe, Kansas 66062
Phone: (913) 829-0101 • Fax: (913) 829-1181
Operations Manager: klindquist@amlabinc.com
Quality Manager: smeeks@amlabinc.com

Certificate of Analysis

Arrowhead Contracting

Client Project ID : SLAAP Bldg 3
Chain of Custody #: 14636

Laboratory Work Order # 1127

Client Sample ID: P-038 Date Collected: 08/28/02
Lab Sample ID: 112701 Date Received 08/29/02

RCRA8 Metals

Analyte	Results	Units	Reporting Limit	Analyst	Date Analyzed	Method
Lead	18804	mg/kg	8.04	MA	08/30/02	6010B

Client Sample ID: P-039 Date Collected: 08/28/02
Lab Sample ID: 112702 Date Received 08/29/02

RCRA8 Metals

Analyte	Results	Units	Reporting Limit	Analyst	Date Analyzed	Method
Lead	5762.6	mg/kg	8.06	MA	08/30/02	6010B

Client Sample ID: P-040 Date Collected: 08/28/02
Lab Sample ID: 112703 Date Received 08/29/02

RCRA8 Metals

Analyte	Results	Units	Reporting Limit	Analyst	Date Analyzed	Method
Lead	82.3	mg/kg	18.08	MA	08/30/02	6010B

Client Sample ID: P-041 Date Collected: 08/28/02
Lab Sample ID: 112704 Date Received 08/29/02

RCRA8 Metals

Analyte	Results	Units	Reporting Limit	Analyst	Date Analyzed	Method
Lead	3626.8	mg/kg	8.43	MA	08/30/02	6010B

14636

Analytical Management Laboratories, Inc.
15130 B South Keeler
Olathe, Kansas 66062
Phone (913) 829-0101
Fax (913) 829-1181

Page _____ of _____

Chain of Custody Record / Request for Analysis

Client Contact Name: Scott Siegwald
Company Name: Arrowhead Contracting, Inc.
Address: 12920 Metcalf, Suite 150
City, State, Zip: Overland Park, KS 66213
Phone #: (913) 814-9994
Fax #: (913) 814-9997 OP office
314 381-5079 Job Site

Project Name: SLAAP Bldg 3
Project Number: 00-215, 1-07400
Purchase Order Number:
Project Due Date: 8-30-02 by noon
Project Comments: 24-hr TAT; Fax results to office & Job site
Sampler's Signature:

Laboratory Project Number: 1127

Analyses/Method to be Performed (Check all that apply)

Lab ID	Sample Description	Date	Time	Matrix	Total # Containers	HCl	HNO_3	NaOH	H_2SO_4	Unpreserved	4°C	TPH Diesel	TPH Gasoline	BTEX	MTBE	Volatiles (VOCs)	BNAs (SVOCs)	Pesticides/PCBs	PCBs	RCRA8 Metals	Lead	Flash Point	Paint Filter	pH	6010 Lead				Comments:
1127-01	P-038	8/28/02	0800	Solid	1						X														X				
1127-02	P-039		0810		1						X														X				
1127-03	P-040		0820		1						X														X				
1127-04	P-041		0830		1						X														X				
5																													
6																													
7																													
8																													
9																													
10																													

Preservative: List total number of bottles for each preservative type.

Please include any information that may be useful in the analysis of the sample. Example: high concentration

CUSTODY							
Relinquished By:	[signature]	Date/Time:	8/28/02 1900	Received By:	[signature]	Date/Time:	08/29/02 09:35am
Relinquished By:		Date/Time:		Received By:		Date/Time:	

By signing the request (chain of custody) you are ordering work from Analytical Management Laboratories, Inc. which constitutes the acceptance of the terms and conditions on the back of this form.

Delivery Method	Custody Seals	Coolant	Cooler Temp.	Receiving Comments:
☐ Delivered in ☑ Courier ☐ Airbill #: 835769577172	☐ Yes ☐ No ☑ Intact ☐ Broken	☑ Ice ☐ Blue Ice ☐ None	2.6 °C ☐ Temp. Blank ☑ Cooler	

ical Management Laboratories,

AML - Sample Condition Upon Receipt Report

Client ID: Arrowhead

Project ID: SLAAP Bldg 3

AML Work Order Number: 1127

Cooler ID: _____

Delivery Method

Delivery Method: Courier

Couirer ID: Federal Express

Name of Person Receiving Samples: NS

Airbill Number: 835769577172

Custody Seals

Were Custody Seals Present? ☑

Were Custody Seals Intact? ☑

Number of Custody Seals: 2

Cooler Opened By: NS

Date Opened: 8/29/02

Coolant / Temperature

Type of Coolant Used: Ice

Temperature Taken From: Cooler

Temperature of Cooler: 2.6

Chain of Custody

Was Chain of Custody filled out properly? ☑

Do Chain of Custody and Sample Labels agree? ☑

Comments

Type of Packing Used? Bubble Wrap

Were all sample labels complete? ☑

Were correct preservatives added to the samples? ☐

Were air bubbles absent in VOA samples? ☐

Were all bottles sealed in separate plastic bags? ☑

Did all the bottles arrive unbroken? ☑

Was a sufficient amount of sample sent for analysis? ☑

Was project manager contacted about any "out of control" issues? ☐

EDD (if applicable) Type: _____

☑ None ☐ ERPMS ☐ Excel

☐ ITEMS ☐ Access 97 ☐ Access 2000

Samples Received by: *NS*

Date: 8/29/02

Project Manager Review: LP

Date: 8/29/02

APPENDIX E
SAMPLE RESULTS FOR STANDING WATER AND WASTE OIL IN BASEMENT

Certificate of Analysis

December 04, 2002

Scott Siegwald
Arrowhead Contracting
12920 Metcalf Suite 160
Overland Park, KS 66213
Phone: 913-814-9994
Fax: 913-814-9997

Client Project ID : SLAAP/00-215 Laboratory Work Order # 1588

Dear Mr. Siegwald:

Included are the analytical results for the samples received on November 22, 2002. All analyses were prepared and analyzed within analytical holding time.

Data qualifiers are as follows:

ND = Not detected at or above the reporting limit.
B = Some level of the compound was present in the method blank.
J = Compound results are an estimated concentration.
E = Compound present in levels greater than the instrument calibration range.

If you have any questions regarding this report, feel free to contact me at (913) 829-0101.

Kendall L. Lindquist, MBA
Operations Manager

Certificate of Analysis

Arrowhead Contracting

Client Project ID : SLAAP/00-215 Laboratory Work Order # 1588

Client Sample ID:	Oil Lines	Date Collected:	11/21/02
Lab Sample ID:	158802	Date Received	11/22/02

PCBs Date Analyzed: 11/25/02 Analyst: RRH Method: 8082

Analyte	Results	Units	Detection Limit
PCB-1016	ND	mg/kg	1
PCB-1221	ND	mg/kg	1
PCB-1232	ND	mg/kg	1
PCB-1242	ND	mg/kg	1
PCB-1248	ND	mg/kg	1
PCB-1254	46.3	mg/kg	1
PCB-1260	ND	mg/kg	1
DCB (surrogate)	86	%	

August 06, 2002

Scott Siegwald
Arrowhead Contracting
12920 Metcalf Ave
Suite 150
Overland Park, KS 66213

Dear Mr. Siegwald:

RE: SLAPP
AML Work Order Number: 967

Attached, please find the analytical report for the samples collected by Arrowhead Contracting for the project described above. Problems encountered in the analysis of these samples are documented in the laboratory case narrative. Please feel free to call me at (913) 829-0101 if you have any questions.

Respectfully Submitted,
Analytical Management Laboratories, Inc.

Kendall L. Lindquist, MBA
Operations Manager

Laboratory Case Narrative

Client:	Arrowhead Contracting
Project Name:	SLAAP
Lab Work Order No:	967

Samples

Cooler receipt form(s) and completed copies of the chain of custody form(s) are included in the Sample Information section. A copy of the project sample log (Sample Identification Form) showing field sample identifiers and corresponding laboratory identifiers is also included. The suffixes, F and U have been appended to field sample numbers for samples that have been filtered (F) and not filtered (U) either in the field or in the laboratory. Separate AML laboratory sample numbers were assigned to filtered and unfiltered samples.

Reports

The laboratory is in the process of implementing Horizon/Chemware laboratory information system (LIMS) to improve EDD and hardcopy report generation procedures. Under this system, hardcopy reports are actually generated using information contained in a database, which is also used to generate electronic deliverables. This procedure was implemented to assure data integrity between these two media. Consequently, the report formats are undergoing changes and revisions that are necessary to make continuous improvement until they are finalized. The attached report is organized as follows:

Cover Letter
Laboratory Case Narrative
Sample Information
Sample Result Forms, organized in the following order: by fraction and by sample.
QC Summary organized in the following order: by fraction, by matrix and by QC parameter.

The QC Summary for each fraction contains QC parameters in the following order:
QC Association Forms (EPA CLP Form-4 equivalents)
Surrogate Recovery Summary, when applicable (EPA CLP Form-2 equivalents)
Method Blank Results (EPA CLP Form-1 equivalents)
Matrix Spike (MS) and MS duplicate (MSD) Results (EPA CLP Form-1 equivalents)
Laboratory Control Sample (LCS) and LCS duplicate (LCSD, subject to availability) Results (EPA Form-1 equivalents)
Matrix Spike (MS) and MS duplicate (MSD) Recoveries and RPD Summary (EPA CLP Form-3 equivalents)
Laboratory Control Sample (LCS) and LCS duplicate (subject to availability) Recoveries and RPD Summary (EPA Form-3 equivalents)

Sample Result Forms

Sample results are shown on modified CLP Form 1 equivalents with the following qualifiers:
U = Not detected or detected below method detection limit (MDL) or reporting limit (RL).
J = Detected above MDL/RL but below the practical quantitation limit (PQL).

E = Detected at levels in excess of the upper calibration limit.
R = Rejected due to significant QA outliers.
MDLs, RLs and PQLs have been adjusted for sample volume and dilution.

Multiple sample result forms may be provided for one or more of the following reasons, if in the professional judgment of the laboratory that sample results for a given compound may be more accurate from one of the multiple analyses:
Sample was reanalyzed for surrogate recovery outliers;
Sample was reanalyzed at a dilution;
One of the analyses was performed outside the holding times; and
A replicate analysis was performed for internal QC purposes

QC Association Forms
A list of method blanks, laboratory control samples (LCS), LCS duplicates, (LCSD), if any, matrix spikes (MS, if available), and matrix spike duplicates (MSD, if available) and field samples associated with each QC batch are shown on QC Association Forms, which are CLP Form-4 equivalents. Separate forms are included for each matrix and each fraction. At present, the laboratory is using two tracking numbers for QC batches: numbers based on the manual system, which are recorded in the laboratory notebooks, instruments, etc; and numbers based on the LIMS system. The QC batch numbers shown on these reports are based on LIMS, which is currently in implementation.

Surrogate Recovery Forms (when applicable)

A summary of the system monitoring compound recoveries for project samples is included in this section. Surrogate recoveries for QC analyses (MB, LCS, MS, etc.) are shown in their respective sections. EPA CLP Form 2 equivalents are used to report surrogate recoveries for project samples.

Method Blank Result Forms

Laboratory method blank samples were analyzed with each QC batch as described in the QC Association Form. Analytical results for method blanks are shown on CLP Form 1 equivalents. They include data for all target compounds/analytes and surrogates. Laboratory policies on corrective action are included in parameter-specific case narratives.

Laboratory Control Sample (LCS) Report Forms

Laboratory control samples were analyzed with each QC batch as described in the QC Association Form. LCS results of these QC analyses are shown in CLP Form 1. LCS recoveries and RPDs for duplicates (if performed) are shown on EPA Form-3 equivalents. Recoveries and relative percent difference (RPDs) for duplicates outside the applicable QC limits are flagged with an asterisk (*). Laboratory policies on corrective action are included in parameter-specific case narratives.

Matrix Spike/Matrix Spike Duplicate Recoveries Report Forms

MS/MSD results are shown in EPA CLP Form-1 equivalents. Recoveries and relative percent difference (RPDs) for duplicates outside the applicable QC limits are flagged with an asterisk (*). They are shown on EPA Form-3 equivalents.

Calibration

Instruments were calibrated in accordance with applicable method. Deviations are shown in parameter-specific case narratives. Copies of initial calibration and calibration verification summaries and associated raw data will be maintained in project files and made available for detailed client review, if necessary.

Test Methods and Holding Times

Analyses were performed within applicable holding times except as noted in parameter-specific case narratives.

Batch-specific Quality Control Procedures

Method blanks and laboratory control samples are used as batch QC elements. Matrix spikes are used as sample specific QC elements at AML. When these QC elements are outside their QC limits, results for all associated samples are evaluated and corrective actions that affect the entire sample set are performed. Laboratory policies on corrective action are included in parameter-specific case narratives.

Sample-specific Quality Control Procedures

Sample concentrations exceeding the upper calibration limit, surrogate recoveries outside the QC limits, calibration parameters (e.g. ICAL, CALV, ICV, CCV, ICB, CCB, etc.) not within QC limits, etc. are used as sample-specific and/or sample-group specific QC elements for one or more associated samples during instrumental analysis. Serial dilution, standard addition, etc. are used as matrix-specific QC elements for one or more associated samples. When these QC elements are outside their QC limits, associated individual sample results are evaluated and appropriate corrective actions are performed. Laboratory policies and procedures on corrective action are included in parameter-specific case narratives.

Manual Integration

Manual integration operations that have potential to improve accuracy of analysis are performed, as necessary (shown with a "M" flag on raw data) based on visual inspection of peak shapes for each target analyte. Such operations are technically defensible and they are not aimed at meeting the minimum technical requirements of the analytical procedure.

Statement

To the best of our knowledge, this data package is in compliance with the terms and conditions of the contract/purchase order/delivery order, both technically and for completeness, for other than the conditions detailed in this case narrative. The quality assurance manager or his designee, as verified by the signature on the cover letter has authorized release of data contained in this report.

14629

Analytical Management Laboratories, Inc.
15130 B South Keeler
Olathe, Kansas 66062
Phone (913) 829-0101
Fax (913) 829-1181

Chain of Custody Record / Request for Analysis

Client Contact Name: Scott Siegwald
Company Name: Arrowhead Contracting, Inc.
Address: 12920 Metcalf Ave, Ste 160
City, State, Zip: Overland Park, KS 66213
Phone #: (913) 814-9994
Fax #: (913) 814-9997
(314) 381-5079 @ Site

Project Name: St. Louis AAP
Project Number: 00-215
Purchase Order Number:
Project Due Date: 8/5/02
Project Comments: 7-day TAT
Sampler's Signature: [signature]

0008

Laboratory Project Number: 967

Method # --->

Analyses/Method to be Performed (Check all that apply)

Preservative: List total number of bottles for each preservative type.

Lab ID	Sample Description	Date	Time	Matrix	Total # Containers	HCl VOCs	HNO_3 Metals	NaOH	H_2SO_4	Unpreserved	4 °C		TPH Diesel	TPH Gasoline	BTEX	MTBE	Volatiles (VOCs) 8260	BNAs (SVOCs) 8270	Pesticides/PCBs	PCBs 8082	RCRA8 Metals	Lead	Flash Point	Paint Filter	pH	Metals 6010/7471	Oil & Grease 1664			Comments:
967-01	RADW-072602A	1500	7/26/02	Water	8	X	X		X		X						X	X		X						X	X			
967-02	RADW-072602B	1530	7/26/02	Water	1						X									X										
3																														
4																														
5																														
6																														
7																														
8																														
9																														
10																														

Please include any information that may be useful in the analysis of the sample.

Example: high concentration

CUSTODY							
Relinquished By:	[signature]	Date/Time:	7-26-02 1900	Received By:	[signature]	Date/Time:	07/27/02 [illegible]
Relinquished By:		Date/Time:		Received By:		Date/Time:	

By signing the request (chain of custody) you are ordering work from Analytical Management Laboratories, Inc. which constitutes the acceptance of the terms and conditions on the back of this form.

Delivery Method	Custody Seals	Coolant	Cooler Temp.	Receiving Comments:
☐ Delivered in Person ☑ Courier Feelex ☐ Airbill #:	☑ Yes ☐ No ☑ Intact ☐ Broken	☑ Ice ☐ Blue Ice ☐ None	3.0 °C ☐ Temp. Blank ☐ Cooler	

Analytical Management Laboratories, Inc.
15130 B South Keeler
Olathe, Kansas 66062
Phone (913) 829-0101
Fax (913) 829-1181

14630

Chain of Custody Record / Request for Analysis

Client Contact Name: Scott Siegwald
Company Name: Arrowhead Contracting, Inc.
Address: 12920 Metcalf Ave, Ste 160
City, State, Zip: Overland Park, KS 66213
Phone #: (913) 814-9994
Fax #: (913) 814-9997
(314) 381-5079 Site

Project Name: St. Louis AAP
Project Number: 00-215
Purchase Order Number:
Project Due Date: 8-5-02
Project Comments: 7-day TAT
Sampler's Signature: [signature]

6000

Laboratory Project Number: 967

Method # ---> 8260 8270 6010/7471 1664

Preservative: List total number of bottles for each preservative type.

Lab ID	Sample Description	Date	Time	Matrix	Total # Containers	HCl VOCs	HNO_3 Metals	NaOH	H_2SO_4	Unpreserved	4 °C		TPH Diesel	TPH Gasoline	BTEX	MTBE	Volatiles (VOCs)	BNAs (SVOCs)	Pesticides/PCBs	PCBs	RCRA8 Metals	Lead	Flash Point	Paint Filter	pH	Metals	Oil & Grease			Comments:
967-02	RADW-072602B	7/26/02	1530	Water	7	X	X		X		X						X	X								X	X			
2																														
3																														
4																														
5																														
6																														
7																														
8																														
9																														
10																														

Please include any information that may be useful in the analysis of the sample.

Example: high concentration

CUSTODY							
Relinquished By:	[signature]	Date/Time:	7-27-02 1900	Received By:	[signature]	Date/Time:	07/29/02 10:15am
Relinquished By:		Date/Time:		Received By:		Date/Time:	

By signing the request (chain of custody) you are ordering work from Analytical Management Laboratories, Inc. which constitutes the acceptance of the terms and conditions on the back of this form.

Delivery Method	Custody Seals	Coolant	Cooler Temp.	Receiving Comments:
☐ Delivered on ☐ Courier ☐ Airbill #:	☐ Yes ☐ No ☐ Intact ☐ Broken	☐ Ice ☐ Blue Ice ☐ None	3.5 °C ☐ Temp. Blank ☐ Cooler	see COC # 14629. cooler #2

AML - Sample Condition Upon Receipt Report

Client ID: Arrowhead

Project ID: St Louis AAP

AML Work Order Number: 967

Cooler ID: 1

Delivery Method

Delivery Method: Courier

Couirer ID: Federal Express

Name of Person Receiving Samples: NS

Airbill Number: 835769577518

Custody Seals

Were Custody Seals Present? ☑

Were Custody Seals Intact? ☑

Number of Custody Seals: 2

Custody Seal Broken By: NS

Cooler Opened By: 7/29/02

Coolant / Temperature

Type of Coolant Used: Ice

emperature Taken From: Temperature Blank

Temperature of Cooler: 3.5

Chain of Custody

Was Chain of Custody filled out properly? ☑

Do Chain of Custody and Sample Labels agree? ☑

Chain of Custody Comments

Type of Packing Used? Bubble Wrap

Were all sample labels complete? ☑

Were all bottles sealed in separate plastic bags? ☑

Were correct preservatives added to the samples? ☑

Did all the bottles arrive unbroken? ☑

Were air bubbles absent in VOA samples? ☑

Was a sufficient amount of sample sent for analysis? ☑

Was project manager contacted about any "out of control" issues? ☐

Comments

Samples Received by: NS

Date: 7/29/02

Project Manager Review: KP

Date: 8/01/02

Ical Management Laboratories

AML - Sample Condition Upon Receipt Report

Client ID: Arrowhead

AML Work Order Number: 967

Project ID: St Louis AAP

Cooler ID: 2

Delivery Method

Delivery Method: Courier

Name of Person Receiving Samples: NS

Couirer ID: Federal Express

Airbill Number: 835769577507

Custody Seals

Were Custody Seals Present? ☑

Custody Seal Broken By: NS

Were Custody Seals Intact? ☑

Cooler Opened By: 7/29/02

Number of Custody Seals: 2

Coolant / Temperature

Type of Coolant Used: Ice

Temperature of Cooler: 3

emperature Taken From: Temperature Blank

Chain of Custody

Was Chain of Custody filled out properly? ☑

Do Chain of Custody and Sample Labels agree? ☑

Chain of Custody Comments

Type of Packing Used? Bubble Wrap

Were all sample labels complete? ☑

Were all bottles sealed in separate plastic bags? ☑

Were correct preservatives added to the samples? ☑

Did all the bottles arrive unbroken? ☑

Were air bubbles absent in VOA samples? ☑

Was a sufficient amount of sample sent for analysis? ☑

Was project manager contacted about any "out of control" issues? ☐

Comments

Samples Received by: *NS*

Project Manager Review: KC

Date: 7/29/02

Date: 8/01/02

PCB Field Sample Analysis

1 - Equivalent

PESTICIDES ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: Tetra Tech

Matrix: W

Sample g/ml: 960

% Solids: not dec.

Instrument ID P58902

Extract Volume: 5 (mL)

Analytical Method: EPA 8082

Prep Method: EPA 3510

Sample ID: RADW-072602A

Project ID St Louis AAP

Project Num 967

Lab Sample ID: 96701

Analytical Batch 1147 Prep Batch 5985

Date Collected: 7/26/02 Time: 15:00

Date Received: 7/29/02 10:15:00 AM

Date Analyzed: 8/5/02 Time: 14:59

Date Prepared: 8/3/02 Time: 14:56

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF	Date Analyzed
12674-11-2	Aroclor-1016		µg/l	U	0.217	1.09	1	8/5/02
11104-28-2	Aroclor-1221		µg/l	U	0.217	1.09	1	8/5/02
11141-16-5	Aroclor-1232		µg/l	U	0.217	1.09	1	8/5/02
53469-21-9	Aroclor-1242		µg/l	U	0.217	1.09	1	8/5/02
12672-29-6	Aroclor-1248		µg/l	U	0.217	1.09	1	8/5/02
11097-69-1	Aroclor-1254		µg/l	U	0.217	1.09	1	8/5/02
11096-82-5	Aroclor-1260		µg/l	U	0.217	1.09	1	8/5/02

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I PEST - Equivalent

1 - Equivalent

PESTICIDES ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: Tetra Tech

Matrix: W

Sample g/ml: 955

% Solids: not dec.

Instrument ID P58902

Extract Volume: 5 (mL)

Analytical Method: EPA 8082

Prep Method: EPA 3510

Sample ID: RADW-072602B

Project ID St Louis AAP

Project Num 967

Lab Sample ID: 96702

Analytical Batch 1147 Prep Batch 5985

Date Collected: 7/26/02 Time: 15:30

Date Received: 7/29/02 10:15:00 AM

Date Analyzed: 8/5/02 Time: 14:59

Date Prepared: 8/3/02 Time: 14:56

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF	Date Analyzed
12674-11-2	Aroclor-1016		µg/l	U	76.8	384	350	8/5/02
11104-28-2	Aroclor-1221		µg/l	U	76.8	384	350	8/5/02
11141-16-5	Aroclor-1232		µg/l	U	76.8	384	350	8/5/02
53469-21-9	Aroclor-1242		µg/l	U	76.8	384	350	8/5/02
12672-29-6	Aroclor-1248		µg/l	U	76.8	384	350	8/5/02
11097-69-1	Aroclor-1254		µg/l	U	76.8	384	350	8/5/02
11096-82-5	Aroclor-1260	3337	µg/l		76.8	384	350	8/5/02

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I PEST - Equivalent

O&G Field Sample Analysis

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Tetra Tech

Matrix: W

Sample g/ml: 1000.00

% Solids: not dec.

Instrument ID

Dilution Factor: 1

Analytical Method: EPA 1664

Prep Method:

Sample ID: RADW-072602A

Project ID St Louis AAP

Project Num 967

Lab Sample ID: 96701

Analytical Batch 1587 Prep Batch 5817

Date Collected: 7/26/02 Time: 15:00

Date Received: 7/29/02 10:15:00 AM

Date Analyzed: 7/31/02

Date Prepared: 7/31/02

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL
OilGr	Oil and Grease	2.5	mg/L		0.5	1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Tetra Tech

Matrix: W

Sample g/ml: 1000.00

% Solids: not dec.

Instrument ID

Dilution Factor: 1

Analytical Method: EPA 1664

Prep Method:

Sample ID: RADW-072602B

Project ID St Louis AAP

Project Num 967

Lab Sample ID: 96702

Analytical Batch 1587 Prep Batch 5817

Date Collected: 7/26/02 Time: 15:30

Date Received: 7/29/02 10:15:00 AM

Date Analyzed: 7/31/02

Date Prepared: 7/31/02

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL
OilGr	Oil and Grease	7250	mg/L		0.5	1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

TAL Metals Field Sample Analysis

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Tetra Tech

Matrix: W

Sample g/ml: 50.00

% Solids: not dec.

Instrument ID MICPTJ

Sample ID: RADW-072602A

Project ID St Louis AAP

Project Num 967

Lab Sample ID: 96701

Analytical Batch 1568 Prep Batch 5851

Date Collected: 7/26/02 Time: 15:00

Date Received: 7/29/02 10:15:00 AM

Analytical Method: EPA 6010B

Prep Method: EPA 3010A

Date Analyzed: 8/6/02 Time: 11:19

Date Prepared: 8/1/02 Time: 10:58

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7429-90-5	Aluminum		mg/l	U	0.1	0.4	1
7440-36-0	Antimony		mg/l	U	0.1	0.2	1
7440-38-2	Arsenic		mg/l	U	0.15	0.3	1
7440-39-3	Barium	0.0302	mg/l		0.005	0.01	1
7440-41-7	Beryllium		mg/l	U	0.005	0.01	1
7440-43-9	Cadmium		mg/l	U	0.005	0.02	1
7440-70-2	Calcium	47	mg/l		0.1	0.2	1
7440-47-3	Chromium		mg/l	U	0.01	0.02	1
7440-48-4	Cobalt		mg/l	U	0.01	0.02	1
7440-50-8	Copper		mg/l	U	0.01	0.02	1
7439-89-6	Iron	0.101	mg/l	J	0.1	0.2	1
7439-92-1	Lead		mg/l	U	0.05	0.2	1
7439-95-4	Magnesium	4.94	mg/l		0.1	0.2	1
7439-96-5	Manganese		mg/l	U	0.005	0.01	1
7440-02-0	Nickel		mg/l	U	0.015	0.05	1
7440-09-7	Potassium	20	mg/l		2.5	10	1
7782-49-2	Selenium		mg/l	U	0.15	0.3	1
7440-22-4	Silver		mg/l	U	0.01	0.03	1
7440-23-5	Sodium	68.6	mg/l		0.2	0.3	1
7440-28-0	Thallium		mg/l	U	0.2	0.3	1
7440-62-2	Vanadium		mg/l	U	0.007	0.02	1
7440-66-6	Zinc		mg/l	U	0.02	0.06	1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Tetra Tech

Matrix: W

Sample g/ml: 50.00

% Solids: not dec.

Instrument ID

Sample ID: RADW-072602A

Project ID St Louis AAP

Project Num 967

Lab Sample ID: 96701

Analytical Batch 1559 Prep Batch 5853

Date Collected: 7/26/02 Time: 15:00

Date Received: 7/29/02 10:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3015A

Date Analyzed: 8/7/02 Time: 9:36

Date Prepared: 8/1/02 Time: 10:59

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-36-0	Antimony	3.88	µg/l		1	2	1
7440-38-2	Arsenic	2.21	µg/l		1	2	1
7440-43-9	Cadmium		µg/l	U	0.5	1	1
7439-92-1	Lead	13.8	µg/l		0.5	1	1
7439-97-6	Mercury	0.354	µg/l	J	0.25	0.5	1
7782-49-2	Selenium	3.42	µg/l		1	2	1
7440-28-0	Thallium		µg/l	U	0.5	1	1

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Tetra Tech

Matrix: W

Sample g/ml: 50.00

% Solids: not dec.

Instrument ID MICPTJ

Sample ID: RADW-072602B

Project ID St Louis AAP

Project Num 967

Lab Sample ID: 96702

Analytical Batch 1568 Prep Batch 5851

Date Collected: 7/26/02 Time: 15:30

Date Received: 7/29/02 10:15:00 AM

Analytical Method: EPA 6010B

Prep Method: EPA 3010A

Date Analyzed: 8/6/02 Time: 11:27

Date Prepared: 8/1/02 Time: 10:58

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7429-90-5	Aluminum		mg/l	U	0.1	0.4	1
7440-36-0	Antimony		mg/l	U	0.1	0.2	1
7440-38-2	Arsenic		mg/l	U	0.15	0.3	1
7440-39-3	Barium	0.0784	mg/l		0.005	0.01	1
7440-41-7	Beryllium		mg/l	U	0.005	0.01	1
7440-43-9	Cadmium		mg/l	U	0.005	0.02	1
7440-70-2	Calcium	76.6	mg/l		0.1	0.2	1
7440-47-3	Chromium	0.0511	mg/l		0.01	0.02	1
7440-48-4	Cobalt		mg/l	U	0.01	0.02	1
7440-50-8	Copper	0.171	mg/l		0.01	0.02	1
7439-89-6	Iron	36	mg/l		0.1	0.2	1
7439-92-1	Lead	0.123	mg/l	J	0.05	0.2	1
7439-95-4	Magnesium	19.3	mg/l		0.1	0.2	1
7439-96-5	Manganese	0.347	mg/l		0.005	0.01	1
7440-02-0	Nickel	0.0207	mg/l	J	0.015	0.05	1
7440-09-7	Potassium	19.7	mg/l		2.5	10	1
7782-49-2	Selenium		mg/l	U	0.15	0.3	1
7440-22-4	Silver		mg/l	U	0.01	0.03	1
7440-23-5	Sodium	35.8	mg/l		0.2	0.3	1
7440-28-0	Thallium		mg/l	U	0.2	0.3	1
7440-62-2	Vanadium		mg/l	U	0.007	0.02	1
7440-66-6	Zinc	1.75	mg/l		0.02	0.06	1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: Tetra Tech

Matrix: W

Sample g/ml: 50.00

% Solids: not dec.

Instrument ID

Sample ID: RADW-072602B

Project ID St Louis AAP

Project Num 967

Lab Sample ID: 96702

Analytical Batch 1559 Prep Batch 5853

Date Collected: 7/26/02 Time: 15:30

Date Received: 7/29/02 10:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3015A

Date Analyzed: 8/7/02 Time: 9:40

Date Prepared: 8/1/02 Time: 10:59

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-36-0	Antimony		µg/l	U	1	2	1
7440-38-2	Arsenic		µg/l	U	1	2	1
7440-43-9	Cadmium	2.43	µg/l		0.5	1	1
7439-92-1	Lead	45.4	µg/l		0.5	1	1
7439-97-6	Mercury	0.25	µg/l	J	0.25	0.5	1
7782-49-2	Selenium		µg/l	U	1	2	1
7440-28-0	Thallium		µg/l	U	0.5	1	1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

VOC Field Sample Analysis

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: Tetra Tech

Matrix: W

Sample g/ml: 25

% Solids: not dec.

Instrument ID Instru

Analytical Method: 8260B

Prep Method: EPA 5030

Analytical Batch: 1288

Sample ID: RADW-072602A

Project ID St Louis AAP

Project Num 967

Lab Sample ID: 96701

Date Collected: 7/26/02 Time: 15:00

Dilution Factor: 1

Date Analyzed: 8/5/02 Time: 20:09

Date Received: 7/29/02 10:15:00 AM

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
630-20-6	1,1,1,2-Tetrachloroethane		µg/l	U	0.222	2
71-55-6	1,1,1-Trichloroethane		µg/l	U	0.18	2
79-34-5	1,1,2,2-Tetrachloroethane		µg/l	U	0.1	2
79-00-5	1,1,2-Trichloroethane		µg/l	U	0.143	2
75-34-3	1,1-Dichloroethane		µg/l	U	0.214	2
75-35-4	1,1-Dichloroethene		µg/l	U	0.183	2
563-58-6	1,1-Dichloropropene		µg/l	U	0.1	2
87-61-6	1,2,3-Trichlorobenzene		µg/l	U	0.142	2
120-82-1	1,2,4-Trichlorobenzene		µg/l	U	0.108	2
95-63-6	1,2,4-Trimethylbenzene		µg/l	U	0.111	2
106-93-4	1,2-Dibromoethane		µg/l	U	0.117	2
95-50-1	1,2-Dichlorobenzene		µg/l	U	0.141	2
107-06-2	1,2-Dichloroethane		µg/l	U	0.182	2
78-87-5	1,2-Dichloropropane		µg/l	U	0.119	2
108-67-8	1,3,5-Trimethylbenzene		µg/l	U	0.113	2
541-73-1	1,3-Dichlorobenzene		µg/l	U	0.189	2
142-28-9	1,3-Dichloropropane		µg/l	U	0.107	2
106-46-7	1,4-Dichlorobenzene		µg/l	U	0.15	2
590-20-7	2,2-Dichloropropane		µg/l	U	0.108	2
78-93-3	2-Butanone		µg/l	U	0.481	2
95-49-8	2-Chlorotoluene		µg/l	U	0.106	2
591-78-6	2-Hexanone		µg/l	U	0.163	2
106-43-4	4-Chlorotoluene		µg/l	U	0.1	2
99-87-6	4-Isopropyltoluene		µg/l	U	0.1	2
108-10-1	4-Methyl-2-pentanone		µg/l	U	0.128	2
67-64-1	Acetone		µg/l	U	0.612	2
71-43-2	Benzene		µg/l	U	0.139	2
108-86-1	Bromobenzene		µg/l	U	0.156	2
74-97-5	Bromochloromethane		µg/l	U	0.165	2
75-27-4	Bromodichloromethane		µg/l	U	0.135	2
75-25-2	Bromoform		µg/l	U	0.163	2
74-83-9	Bromomethane		µg/l	U	0.201	2
75-15-0	Carbon disulfide		µg/l	U	0.183	2
56-23-5	Carbon tetrachloride		µg/l	U	0.137	2
108-90-7	Chlorobenzene		µg/l	U	0.156	2
75-00-3	Chloroethane		µg/l	U	0.207	2
67-66-3	Chloroform		µg/l	U	0.214	2
74-87-3	Chloromethane		µg/l	U	0.173	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: Tetra Tech

Matrix: W

Sample g/ml: 25

% Solids: not dec.

Instrument ID Instru

Analytical Method: 8260B

Prep Method: EPA 5030

Analytical Batch: 1288

Sample ID: RADW-072602A

Project ID St Louis AAP

Project Num 967

Lab Sample ID: 96701

Date Collected: 7/26/02 Time: 15:00

Dilution Factor: 1

Date Analyzed: 8/5/02 Time: 20:09

Date Received: 7/29/02 10:15:00 AM

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
156-59-2	cis-1,2-Dichloroethene		µg/l	U	0.151	2
10061-01-5	cis-1,3-Dichloropropene		µg/l	U	0.1	2
124-48-1	Dibromochloromethane		µg/l	U	0.133	2
74-95-3	Dibromomethane		µg/l	U	0.1	2
75-71-8	Dichlorodifluoromethane		µg/l	U	0.5	2
100-41-4	Ethylbenzene		µg/l	U	0.1	2
87-68-3	Hexachlorobutadiene		µg/l	U	0.192	2
98-82-8	Isopropylbenzene		µg/l	U	0.1	2
75-09-2	Methylene chloride		µg/l	U	0.398	2
1634-04-4	Methyl-tert-butyl-ether		µg/l	U	0.1	2
m+p xylene	m-Xylene and p-Xylene		µg/l	U	0.216	2
91-20-3	Naphthalene		µg/l	U	0.139	2
104-51-8	n-Butylbenzene		µg/l	U	0.14	2
103-65-1	n-Propylbenzene		µg/l	U	0.1	2
95-47-6	o-Xylene		µg/l	U	0.102	2
135-98-8	sec-Butylbenzene		µg/l	U	0.133	2
100-42-5	Styrene		µg/l	U	0.1	2
98-06-6	tert-Butylbenzene		µg/l	U	0.17	2
127-18-4	Tetrachloroethene		µg/l	U	0.115	2
108-88-3	Toluene		µg/l	U	0.105	2
156-60-5	trans-1,2-Dichloroethene		µg/l	U	0.152	2
10061-02-6	trans-1,3-Dichloropropene		µg/l	U	0.1	2
79-01-6	Trichloroethene		µg/l	U	0.151	2
75-01-4	Vinyl chloride		µg/l	U	0.239	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name:	Analytical Managment Laboratories	Sample ID:	RADW-072602B
Client ID:	Tetra Tech	Project ID	St Louis AAP
Matrix:	W	Project Num	967
Sample g/ml:	25	Lab Sample ID:	96702
% Solids: not dec.		Date Collected:	7/26/02 Time: 15:30
Instrument ID	Instru	Dilution Factor:	1
Analytical Method:	8260B	Date Analyzed:	8/5/02 Time: 20:39
Prep Method:	EPA 5030	Date Received:	7/29/02 10:15:00 AM
Analytical Batch:	1288		

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
630-20-6	1,1,1,2-Tetrachloroethane		µg/l	U	0.222	2
71-55-6	1,1,1-Trichloroethane		µg/l	U	0.18	2
79-34-5	1,1,2,2-Tetrachloroethane		µg/l	U	0.1	2
79-00-5	1,1,2-Trichloroethane		µg/l	U	0.143	2
75-34-3	1,1-Dichloroethane		µg/l	U	0.214	2
75-35-4	1,1-Dichloroethene		µg/l	U	0.183	2
563-58-6	1,1-Dichloropropene		µg/l	U	0.1	2
87-61-6	1,2,3-Trichlorobenzene		µg/l	U	0.142	2
120-82-1	1,2,4-Trichlorobenzene		µg/l	U	0.108	2
95-63-6	1,2,4-Trimethylbenzene		µg/l	U	0.111	2
106-93-4	1,2-Dibromoethane		µg/l	U	0.117	2
95-50-1	1,2-Dichlorobenzene		µg/l	U	0.141	2
107-06-2	1,2-Dichloroethane		µg/l	U	0.182	2
78-87-5	1,2-Dichloropropane		µg/l	U	0.119	2
108-67-8	1,3,5-Trimethylbenzene		µg/l	U	0.113	2
541-73-1	1,3-Dichlorobenzene		µg/l	U	0.189	2
142-28-9	1,3-Dichloropropane		µg/l	U	0.107	2
106-46-7	1,4-Dichlorobenzene		µg/l	U	0.15	2
590-20-7	2,2-Dichloropropane		µg/l	U	0.108	2
78-93-3	2-Butanone		µg/l	U	0.481	2
95-49-8	2-Chlorotoluene		µg/l	U	0.106	2
591-78-6	2-Hexanone		µg/l	U	0.163	2
106-43-4	4-Chlorotoluene		µg/l	U	0.1	2
99-87-6	4-Isopropyltoluene		µg/l	U	0.1	2
108-10-1	4-Methyl-2-pentanone		µg/l	U	0.128	2
67-64-1	Acetone		µg/l	U	0.612	2
71-43-2	Benzene		µg/l	U	0.139	2
108-86-1	Bromobenzene		µg/l	U	0.156	2
74-97-5	Bromochloromethane		µg/l	U	0.165	2
75-27-4	Bromodichloromethane		µg/l	U	0.135	2
75-25-2	Bromoform		µg/l	U	0.163	2
74-83-9	Bromomethane		µg/l	U	0.201	2
75-15-0	Carbon disulfide		µg/l	U	0.183	2
56-23-5	Carbon tetrachloride		µg/l	U	0.137	2
108-90-7	Chlorobenzene		µg/l	U	0.156	2
75-00-3	Chloroethane		µg/l	U	0.207	2
67-66-3	Chloroform		µg/l	U	0.214	2
74-87-3	Chloromethane		µg/l	U	0.173	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name:	Analytical Managment Laboratories	Sample ID:	RADW-072602B
Client ID:	Tetra Tech	Project ID	St Louis AAP
Matrix:	W	Project Num	967
Sample g/ml:	25	Lab Sample ID:	96702
% Solids: not dec.		Date Collected:	7/26/02 Time: 15:30
Instrument ID	Instru	Dilution Factor:	1
Analytical Method:	8260B	Date Analyzed:	8/5/02 Time: 20:39
Prep Method:	EPA 5030	Date Received:	7/29/02 10:15:00 AM
Analytical Batch:	1288		

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
156-59-2	cis-1,2-Dichloroethene		µg/l	U	0.151	2
10061-01-5	cis-1,3-Dichloropropene		µg/l	U	0.1	2
124-48-1	Dibromochloromethane		µg/l	U	0.133	2
74-95-3	Dibromomethane		µg/l	U	0.1	2
75-71-8	Dichlorodifluoromethane		µg/l	U	0.5	2
100-41-4	Ethylbenzene		µg/l	U	0.1	2
87-68-3	Hexachlorobutadiene		µg/l	U	0.192	2
98-82-8	Isopropylbenzene		µg/l	U	0.1	2
75-09-2	Methylene chloride		µg/l	U	0.398	2
1634-04-4	Methyl-tert-butyl-ether		µg/l	U	0.1	2
m+p xylene	m-Xylene and p-Xylene		µg/l	U	0.216	2
91-20-3	Naphthalene		µg/l	U	0.139	2
104-51-8	n-Butylbenzene		µg/l	U	0.14	2
103-65-1	n-Propylbenzene		µg/l	U	0.1	2
95-47-6	o-Xylene		µg/l	U	0.102	2
135-98-8	sec-Butylbenzene		µg/l	U	0.133	2
100-42-5	Styrene		µg/l	U	0.1	2
98-06-6	tert-Butylbenzene		µg/l	U	0.17	2
127-18-4	Tetrachloroethene		µg/l	U	0.115	2
108-88-3	Toluene		µg/l	U	0.105	2
156-60-5	trans-1,2-Dichloroethene		µg/l	U	0.152	2
10061-02-6	trans-1,3-Dichloropropene		µg/l	U	0.1	2
79-01-6	Trichloroethene		µg/l	U	0.151	2
75-01-4	Vinyl chloride		µg/l	U	0.239	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

SVOC Field Sample Analysis

1 - Equivalent

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: Tetra Tech

Matrix: W

Sample g/ml: 960

% Solids: not dec.

Instrument ID S5973A

Extract Volume: 1 (mL)

Dilution Factor: 1

Analytical Method: EPA 8270

Prep Method: EPA 3510

Sample ID: RADW-072602A

Project ID St Louis AAP

Project Num 967

Lab Sample ID: 96701

Analytical Batch 1109 Prep Batch 5815

Date Collected: 7/26/02 Time: 15:00

Date Received: 7/29/02 10:15:00 AM

Date Analyzed: 8/6/02 Time: 15:42

Date Prepared: 7/30/02 Time: 17:00

CAS NO.	COMPOUND	RESULT	Units	Q	RL	MQL
120-82-1	1,2,4-Trichlorobenzene		µg/l	U	0.26	10.4
95-50-1	1,2-Dichlorobenzene		µg/l	U	0.24	10.4
541-73-1	1,3-Dichlorobenzene		µg/l	U	0.375	10.4
106-46-7	1,4-Dichlorobenzene		µg/l	U	0.208	10.4
95-95-4	2,4,5-Trichlorophenol		µg/l	U	0.896	10.4
88-06-2	2,4,6-Trichlorophenol		µg/l	U	0.698	10.4
120-83-2	2,4-Dichlorophenol		µg/l	U	0.375	10.4
105-67-9	2,4-Dimethylphenol		µg/l	U	0.271	10.4
51-28-5	2,4-Dinitrophenol		µg/l	U	1.66	10.4
121-14-2	2,4-Dinitrotoluene		µg/l	U	0.365	10.4
606-20-2	2,6-Dinitrotoluene		µg/l	U	0.25	10.4
91-58-7	2-Chloronaphthalene		µg/l	U	0.167	10.4
95-57-8	2-Chlorophenol		µg/l	U	0.125	10.4
534-52-1	2-Methyl-4,6-dinitrophenol		µg/l	U	1.04	10.4
91-57-6	2-Methylnaphthalene		µg/l	U	2.73	10.4
95-48-7	2-Methylphenol (o-Cresol)		µg/l	U	0.323	10.4
88-74-4	2-Nitroaniline		µg/l	U	0.448	10.4
88-75-5	2-Nitrophenol		µg/l	U	0.365	10.4
99-09-2	3-Nitroaniline		µg/l	U	0.354	10.4
101-55-3	4-Bromophenyl-phenylether		µg/l	U	0.375	10.4
59-50-7	4-Chloro-3-methylphenol		µg/l	U	0.26	10.4
106-47-8	4-Chloroaniline		µg/l	U	0.906	10.4
7005-72-3	4-Chlorophenyl-phenylether		µg/l	U	0.802	10.4
106-44-5	4-Methylphenol (p-Cresol)		µg/l	U	0.156	10.4
100-01-6	4-Nitroaniline		µg/l	U	3.68	10.4
100-02-7	4-Nitrophenol		µg/l	U	0.844	10.4
83-32-9	Acenaphthene		µg/l	U	0.188	10.4
208-96-8	Acenaphthylene		µg/l	U	0.125	10.4
120-12-7	Anthracene		µg/l	U	0.229	10.4
56-55-3	Benzo(a)anthracene		µg/l	U	0.354	10.4
50-32-8	Benzo(a)pyrene		µg/l	U	0.688	10.4
205-99-2	Benzo(b)fluoranthene		µg/l	U	1.73	10.4
191-24-2	Benzo(g,h,i)perylene		µg/l	U	2.54	10.4
207-08-9	Benzo(k)fluoranthene		µg/l	U	3.15	10.4

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I SVOA - Equivalent

1 - Equivalent

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: Tetra Tech

Matrix: W

Sample g/ml: 960

% Solids: not dec.

Instrument ID S5973A

Extract Volume: 1 (mL)

Dilution Factor: 1

Analytical Method: EPA 8270

Prep Method: EPA 3510

Sample ID: RADW-072602A

Project ID St Louis AAP

Project Num 967

Lab Sample ID: 96701

Analytical Batch 1109 Prep Batch 5815

Date Collected: 7/26/02 Time: 15:00

Date Received: 7/29/02 10:15:00 AM

Date Analyzed: 8/6/02 Time: 15:42

Date Prepared: 7/30/02 Time: 17:00

CAS NO.	COMPOUND	RESULT	Units	Q	RL	MQL
111-91-1	Bis(2-Chloroethoxy)methane		µg/l	U	0.219	10.4
111-44-4	Bis(2-Chloroethyl)ether		µg/l	U	0.271	10.4
108-60-1	bis(2-chloroisopropyl)ethe		µg/l	U	0.458	10.4
117-81-7	bis(2-ethylhexyl)phthalate		µg/l	U	0.969	10.4
85-68-7	Butylbenzylphthalate		µg/l	U	0.427	10.4
218-01-9	Chrysene		µg/l	U	0.417	10.4
53-70-3	Dibenz(a,h)anthracene		µg/l	U	2.35	10.4
132-64-9	Dibenzofuran		µg/l	U	0.177	10.4
84-66-2	Diethylphthalate		µg/l	U	0.427	10.4
131-11-3	Dimethylphthalate		µg/l	U	0.323	10.4
84-74-2	Di-n-butylphthalate		µg/l	U	0.229	10.4
117-84-0	Di-n-octylphthalate		µg/l	U	1.96	10.4
206-44-0	Fluoranthene		µg/l	U	0.229	10.4
86-73-7	Fluorene		µg/l	U	0.438	10.4
118-74-1	Hexachlorobenzene		µg/l	U	0.646	10.4
87-68-3	Hexachlorobutadiene		µg/l	U	0.99	10.4
77-47-4	Hexachlorocyclopentadiene		µg/l	U	0.333	10.4
67-72-1	Hexachloroethane		µg/l	U	0.323	10.4
193-39-5	Indeno(1,2,3-cd)pyrene		µg/l	U	3.38	10.4
78-59-1	Isophorone		µg/l	U	0.125	10.4
91-20-3	Naphthalene		µg/l	U	0.25	10.4
98-95-3	Nitrobenzene		µg/l	U	0.344	10.4
621-64-7	N-Nitroso-di-n-propylamine		µg/l	U	0.375	10.4
86-30-6	N-Nitrosodiphenylamine		µg/l	U	0.146	10.4
87-86-5	Pentachlorophenol		µg/l	U	0.938	10.4
85-01-8	Phenanthrene		µg/l	U	0.25	10.4
108-95-2	Phenol		µg/l	U	0.125	10.4
129-00-0	Pyrene		µg/l	U	0.417	10.4

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I SVOA - Equivalent

1 - Equivalent

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories
Client ID: Tetra Tech
Matrix: W
Sample g/ml: 955
% Solids: not dec.
Instrument ID S5973A
Extract Volume: 20 (mL)
Dilution Factor: 20
Analytical Method: EPA 8270
Prep Method: EPA 3510

Sample ID: RADW-072602B
Project ID St Louis AAP
Project Num 967
Lab Sample ID: 96702
Analytical Batch 1109 Prep Batch 5815
Date Collected: 7/26/02 Time: 15:30
Date Received: 7/29/02 10:15:00 AM

Date Analyzed: 8/6/02 Time: 16:13
Date Prepared: 7/30/02 Time: 17:00

CAS NO.	COMPOUND	RESULT	Units	Q	RL	MQL
120-82-1	1,2,4-Trichlorobenzene		µg/l	U	105	4188
95-50-1	1,2-Dichlorobenzene		µg/l	U	96.3	4188
541-73-1	1,3-Dichlorobenzene		µg/l	U	151	4188
106-46-7	1,4-Dichlorobenzene		µg/l	U	83.8	4188
95-95-4	2,4,5-Trichlorophenol		µg/l	U	360	4188
88-06-2	2,4,6-Trichlorophenol		µg/l	U	281	4188
120-83-2	2,4-Dichlorophenol		µg/l	U	151	4188
105-67-9	2,4-Dimethylphenol		µg/l	U	109	4188
51-28-5	2,4-Dinitrophenol		µg/l	U	666	4188
121-14-2	2,4-Dinitrotoluene		µg/l	U	147	4188
606-20-2	2,6-Dinitrotoluene		µg/l	U	101	4188
91-58-7	2-Chloronaphthalene		µg/l	U	67	4188
95-57-8	2-Chlorophenol		µg/l	U	50.3	4188
534-52-1	2-Methyl-4,6-dinitrophenol		µg/l	U	419	4188
91-57-6	2-Methylnaphthalene		µg/l	U	1097	4188
95-48-7	2-Methylphenol (o-Cresol)		µg/l	U	130	4188
88-74-4	2-Nitroaniline		µg/l	U	180	4188
88-75-5	2-Nitrophenol		µg/l	U	147	4188
99-09-2	3-Nitroaniline		µg/l	U	142	4188
101-55-3	4-Bromophenyl-phenylether		µg/l	U	151	4188
59-50-7	4-Chloro-3-methylphenol		µg/l	U	105	4188
106-47-8	4-Chloroaniline		µg/l	U	364	4188
7005-72-3	4-Chlorophenyl-phenylether		µg/l	U	323	4188
106-44-5	4-Methylphenol (p-Cresol)		µg/l	U	62.8	4188
100-01-6	4-Nitroaniline		µg/l	U	1479	4188
100-02-7	4-Nitrophenol		µg/l	U	339	4188
83-32-9	Acenaphthene		µg/l	U	75.4	4188
208-96-8	Acenaphthylene		µg/l	U	50.3	4188
120-12-7	Anthracene		µg/l	U	92.1	4188
56-55-3	Benzo(a)anthracene		µg/l	U	142	4188
50-32-8	Benzo(a)pyrene		µg/l	U	276	4188
205-99-2	Benzo(b)fluoranthene		µg/l	U	695	4188
191-24-2	Benzo(g,h,i)perylene		µg/l	U	1022	4188
207-08-9	Benzo(k)fluoranthene		µg/l	U	1265	4188

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I SVOA - Equivalent

1 - Equivalent

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: Tetra Tech

Matrix: W

Sample g/ml: 955

% Solids: not dec.

Instrument ID S5973A

Extract Volume: 20 (mL)

Dilution Factor: 20

Analytical Method: EPA 8270

Prep Method: EPA 3510

Sample ID: RADW-072602B

Project ID St Louis AAP

Project Num 967

Lab Sample ID: 96702

Analytical Batch 1109 Prep Batch 5815

Date Collected: 7/26/02 Time: 15:30

Date Received: 7/29/02 10:15:00 AM

Date Analyzed: 8/6/02 Time: 16:13

Date Prepared: 7/30/02 Time: 17:00

CAS NO.	COMPOUND	RESULT	Units	Q	RL	MQL
111-91-1	Bis(2-Chloroethoxy)methane		µg/l	U	88	4188
111-44-4	Bis(2-Chloroethyl)ether		µg/l	U	109	4188
108-60-1	bis(2-chloroisopropyl)ethe		µg/l	U	184	4188
117-81-7	bis(2-ethylhexyl)phthalate		µg/l	U	390	4188
85-68-7	Butylbenzylphthalate		µg/l	U	172	4188
218-01-9	Chrysene		µg/l	U	168	4188
53-70-3	Dibenz(a,h)anthracene		µg/l	U	947	4188
132-64-9	Dibenzofuran		µg/l	U	71.2	4188
84-66-2	Diethylphthalate		µg/l	U	172	4188
131-11-3	Dimethylphthalate		µg/l	U	130	4188
84-74-2	Di-n-butylphthalate		µg/l	U	92.1	4188
117-84-0	Di-n-octylphthalate		µg/l	U	787	4188
206-44-0	Fluoranthene		µg/l	U	92.1	4188
86-73-7	Fluorene		µg/l	U	176	4188
118-74-1	Hexachlorobenzene		µg/l	U	260	4188
87-68-3	Hexachlorobutadiene		µg/l	U	398	4188
77-47-4	Hexachlorocyclopentadiene		µg/l	U	134	4188
67-72-1	Hexachloroethane		µg/l	U	130	4188
193-39-5	Indeno(1,2,3-cd)pyrene		µg/l	U	1357	4188
78-59-1	Isophorone		µg/l	U	50.3	4188
91-20-3	Naphthalene		µg/l	U	101	4188
98-95-3	Nitrobenzene		µg/l	U	138	4188
621-64-7	N-Nitroso-di-n-propylamine		µg/l	U	151	4188
86-30-6	N-Nitrosodiphenylamine		µg/l	U	58.6	4188
87-86-5	Pentachlorophenol		µg/l	U	377	4188
85-01-8	Phenanthrene		µg/l	U	101	4188
108-95-2	Phenol		µg/l	U	50.3	4188
129-00-0	Pyrene		µg/l	U	168	4188

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I SVOA - Equivalent

PCB QAQC Sample Analysis

Quality Control Association Form

Lab Name Analytical Management Laboratories **Fraction** PEST

Analytical Batch	Prep Batch	Date Analyzed	Date Prepared	Lab Sample ID	Original Sample	Sample Type	Project Number
1147	5985	8/5/02	8/3/02	7339		MB	
1147	5985	8/5/02	8/3/02	7340		LCS	
1147	5985	8/5/02	8/3/02	7341		LCSD	
1147	5985	8/5/02	8/3/02	96701		SAMPLE	967
1147	5985	8/5/02	8/3/02	96702		SAMPLE	967

Batch Reviewed by _____ **Date Reviewed** 8-7-02 **Date Printed** *Wednesday, August 07, 2002*

2 - Equivalent

PESTICIDE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: Analytical Managment Laboratories

Analytical Batch 1147

Prep Batch 5985

No.	Lab Sample ID	DCB % Rec	DCB Low	DCB High	DCB F	TCMX % Rec	TCMX Low	TCMX High	TCMX F
1	7339	112.5	50	130		94.5	50	130	
2	7340	122	50	130		93.5	50	130	
3	7341	117	50	130		92	50	130	
4	96701	119	40	140		90	40	140	
5	96702		40	140			40	140	

1 - Equivalent

PESTICIDES ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 1000

% Solids: not dec. 100.0

Instrument ID P58902

Extract Volume: 5 (mL)

Analytical Method: EPA 8082

Prep Method: EPA 3510

Sample ID: MB for HBN 5985 [EXTR/1541]

Project ID

Project Num

Lab Sample ID: 7339

Analytical Batch 1147 Prep Batch 5985

Date Collected: Time:

Date Received: 8/3/02 2:56:28 PM

Date Analyzed: 8/5/02 Time: 14:58

Date Prepared: 8/3/02 Time: 14:56

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF	Date Analyzed
12674-11-2	Aroclor-1016		µg/l	U	0.2	1	1	8/5/02
11104-28-2	Aroclor-1221		µg/l	U	0.2	1	1	8/5/02
11141-16-5	Aroclor-1232		µg/l	U	0.2	1	1	8/5/02
53469-21-9	Aroclor-1242		µg/l	U	0.2	1	1	8/5/02
12672-29-6	Aroclor-1248		µg/l	U	0.2	1	1	8/5/02
11097-69-1	Aroclor-1254		µg/l	U	0.2	1	1	8/5/02
11096-82-5	Aroclor-1260		µg/l	U	0.2	1	1	8/5/02

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I PEST - Equivalent

1 - Equivalent

PESTICIDES ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 1000

% Solids: not dec. 100.0

Instrument ID P58902

Extract Volume: 5 (mL)

Analytical Method: EPA 8082

Prep Method: EPA 3510

Sample ID: LCS for HBN 5985 [EXTR/1541]

Project ID

Project Num

Lab Sample ID: 7340

Analytical Batch 1147 Prep Batch 5985

Date Collected: Time:

Date Received: 8/3/02 2:56:28 PM

Date Analyzed: 8/5/02 Time: 14:58

Date Prepared: 8/3/02 Time: 14:56

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF	Date Analyzed
12674-11-2	Aroclor-1016	2.6	µg/l		0.2	1	1	8/5/02
11104-28-2	Aroclor-1221		µg/l	U	0.2	1	1	8/5/02
11141-16-5	Aroclor-1232		µg/l	U	0.2	1	1	8/5/02
53469-21-9	Aroclor-1242		µg/l	U	0.2	1	1	8/5/02
12672-29-6	Aroclor-1248		µg/l	U	0.2	1	1	8/5/02
11097-69-1	Aroclor-1254		µg/l	U	0.2	1	1	8/5/02
11096-82-5	Aroclor-1260	2.53	µg/l		0.2	1	1	8/5/02

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I PEST - Equivalent

1 - Equivalent

PESTICIDES ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 1000

% Solids: not dec. 100.0

Instrument ID P58902

Extract Volume: 5 (mL)

Analytical Method: EPA 8082

Prep Method: EPA 3510

Sample ID: LCSD for HBN 5985 [EXTR/1541]

Project ID

Project Num

Lab Sample ID: 7341

Analytical Batch 1147 Prep Batch 5985

Date Collected: Time:

Date Received: 8/3/02 2:56:28 PM

Date Analyzed: 8/5/02 Time: 14:59

Date Prepared: 8/3/02 Time: 14:56

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF	Date Analyzed
12674-11-2	Aroclor-1016	2.56	µg/l		0.2	1	1	8/5/02
11104-28-2	Aroclor-1221		µg/l	U	0.2	1	1	8/5/02
11141-16-5	Aroclor-1232		µg/l	U	0.2	1	1	8/5/02
53469-21-9	Aroclor-1242		µg/l	U	0.2	1	1	8/5/02
12672-29-6	Aroclor-1248		µg/l	U	0.2	1	1	8/5/02
11097-69-1	Aroclor-1254		µg/l	U	0.2	1	1	8/5/02
11096-82-5	Aroclor-1260	2.41	µg/l		0.2	1	1	8/5/02

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I PEST - Equivalent

O&G QAQC Sample Analysis

Quality Control Association Form

Lab Name Analytical Management Laboratories **Fraction** WCGE

Analytical Batch	Prep Batch	Date Analyzed	Date Prepared	Lab Sample ID	Original Sample	Sample Type	Project Number
1587	5817	7/31/02	7/31/02	7128		MB	
1587	5817	7/31/02	7/31/02	7129		LCS	
1587	5817	7/31/02	7/31/02	96701		SAMPLE	967
1587	5817	7/31/02	7/31/02	96702		SAMPLE	967

Batch Reviewed by _____ Date Reviewed _____ Date Printed *Wednesday, August 07, 2002*

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 1000.00

% Solids: not dec. 100.0

Instrument ID

Dilution Factor: 1

Analytical Method: EPA 1664

Prep Method:

Sample ID: MB for HBN 5817 [WCGE/1587]

Project ID

Project Num

Lab Sample ID: 7128

Analytical Batch 1587 Prep Batch 5817

Date Collected: Time:

Date Received: 7/31/02 3:00:00 PM

Date Analyzed: 7/31/02

Date Prepared: 7/31/02

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL
OilGr	Oil and Grease	1.5	mg/L		0.5	1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 1000.00

% Solids: not dec. 100.0

Instrument ID

Dilution Factor: 1

Analytical Method: EPA 1664

Prep Method:

Sample ID: LCS for HBN 5817 [WCGE/1587]

Project ID

Project Num

Lab Sample ID: 7129

Analytical Batch 1587 Prep Batch 5817

Date Collected: Time:

Date Received: 7/31/02 3:00:00 PM

Date Analyzed: 7/31/02

Date Prepared: 7/31/02

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL
OilGr	Oil and Grease	38.7	mg/L		0.5	1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

3 - Equivalent

ORGANICS ANALYSIS DATA SHEET / Laboratory Control Sample Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1587

Fraction WCGE

Prep Batch 5817

LCS HSN : ***7129***

COMPOUND	*SPIKE ADDED*	*LCS Amount*	*LCS % REC #*	*LCS % REC# FLAG*	*QC. LIMITS LCL*	*UCL*
Oil and Grease	50	38.7	77.4		75	125

FORM III - Equivalent

TAL Metals QAQC Sample Analysis

6010

Quality Control Association Form

Lab Name Analytical Management Laboratories **Fraction** META

Analytical Batch	Prep Batch	Date Analyzed	Date Prepared	Lab Sample ID	Original Sample	Sample Type	Project Number
1568	5851	8/6/02	8/1/02	7156		MB	
1568	5851	8/6/02	8/1/02	7157		LCS	
1568	5851	8/6/02	8/1/02	7158		LCSD	
1568	5851	8/6/02	8/1/02	7159	96702	MS	
1568	5851	8/6/02	8/1/02	7160	96702	MSD	
1568	5851	8/6/02	8/1/02	7161	96702	PDS	
1568	5851	8/6/02	8/1/02	7162	96702	SD	
1568	5851	8/6/02	8/1/02	96701		SAMPLE	967
1568	5851	8/6/02	8/1/02	96702		SAMPLE	967

Batch Reviewed by _____ Date Reviewed _____ Date Printed *Wednesday, August 07, 2002*

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 50.00

% Solids: not dec. 100.0

Instrument ID MICPTJ

Sample ID: MB for HBN 5851 [MDIG/1589]

Project ID

Project Num

Lab Sample ID: 7156

Analytical Batch 1568 Prep Batch 5851

Date Collected: Time:

Date Received: 8/1/02 10:58:39 AM

Analytical Method: EPA 6010B

Prep Method: EPA 3010A

Date Analyzed: 8/6/02 Time: 10:58

Date Prepared: 8/1/02 Time: 10:58

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7429-90-5	Aluminum		mg/l	U	0.1	0.4	1
7440-36-0	Antimony		mg/l	U	0.1	0.2	1
7440-38-2	Arsenic		mg/l	U	0.15	0.3	1
7440-39-3	Barium		mg/l	U	0.005	0.01	1
7440-41-7	Beryllium		mg/l	U	0.005	0.01	1
7440-43-9	Cadmium		mg/l	U	0.005	0.02	1
7440-70-2	Calcium		mg/l	U	0.1	0.2	1
7440-47-3	Chromium		mg/l	U	0.01	0.02	1
7440-48-4	Cobalt		mg/l	U	0.01	0.02	1
7440-50-8	Copper		mg/l	U	0.01	0.02	1
7439-89-6	Iron		mg/l	U	0.1	0.2	1
7439-92-1	Lead		mg/l	U	0.05	0.2	1
7439-95-4	Magnesium		mg/l	U	0.1	0.2	1
7439-96-5	Manganese		mg/l	U	0.005	0.01	1
7440-02-0	Nickel		mg/l	U	0.015	0.05	1
7440-09-7	Potassium		mg/l	U	2.5	10	1
7782-49-2	Selenium		mg/l	U	0.15	0.3	1
7440-22-4	Silver		mg/l	U	0.01	0.03	1
7440-23-5	Sodium		mg/l	U	0.2	0.3	1
7440-28-0	Thallium		mg/l	U	0.2	0.3	1
7440-62-2	Vanadium		mg/l	U	0.007	0.02	1
7440-66-6	Zinc		mg/l	U	0.02	0.06	1

7 - Equivalent

INORGANIC ANALYSIS DATA SHEET / Laboratory Control Sample Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1568

Fraction META

Prep Batch 5851

Units mg/L

LCS HSN : ***7157***

LCSD HSN : ***7158***

COMPOUND	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC# FLAG	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC#	RPD	RPD FLAG	QC. LIMITS LCL	UCL	RPD
Aluminum	10	10.3	103		10	10.5	105		1.48		80	120	25
Antimony	1	1.06	106		1	1.08	108		2.13		80	120	25
Arsenic	1	1.03	103		1	1.05	105		2.2		80	120	25
Barium	2	2.04	102		2	2.07	103		1.53		80	120	25
Beryllium	0.5	0.514	103		0.5	0.522	104		1.49		80	120	25
Cadmium	0.5	0.514	103		0.5	0.513	102		0.261		80	120	25
Calcium	100	105	104		100	106	106		1.17		80	120	25
Chromium	0.5	0.52	104		0.5	0.524	105		0.648		80	120	25
Cobalt	0.5	0.538	108		0.5	0.54	108		0.402		80	120	25
Copper	1	1.02	102		1	1.03	103		1.18		80	120	25
Iron	20	20.3	101		20	20.6	103		1.78		80	120	25
Lead	1	1.07	107		1	1.05	105		1.63		80	120	25
Magnesium	100	99.7	99.7		100	102	102		2.04		80	120	25
Manganese	2	2.04	102		2	2.06	103		1.25		80	120	25
Nickel	0.5	0.533	107		0.5	0.542	108		1.66		80	120	25
Potassium	20	20.8	104		20	19.4	96.9		7.15		80	120	25
Selenium	1	1.08	108		1	1.07	107		1.44		80	120	25
Silver	0.5	0.51	102		0.5	0.511	102		0.196		80	120	25
Sodium	100	101	101		100	102	102		1.5		80	120	25
Thallium	1	1.02	102		1	1.07	107		4.66		80	120	25
Vanadium	0.5	0.51	102		0.5	0.517	103		1.28		80	120	25
Zinc	1	1.07	107		1	1.08	108		1.04		80	120	25

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 50.00

% Solids: not dec. 100.0

Instrument ID MICPTJ

Sample ID: LCS for HBN 5851 [MDIG/1589]

Project ID

Project Num

Lab Sample ID: 7157

Analytical Batch 1568 Prep Batch 5851

Date Collected: Time:

Date Received: 8/1/02 10:58:39 AM

Analytical Method: EPA 6010B

Prep Method: EPA 3010A

Date Analyzed: 8/6/02 Time: 11:07

Date Prepared: 8/1/02 Time: 10:58

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7429-90-5	Aluminum	10.3	mg/l		0.1	0.4	1
7440-36-0	Antimony	1.06	mg/l		0.1	0.2	1
7440-38-2	Arsenic	1.03	mg/l		0.15	0.3	1
7440-39-3	Barium	2.04	mg/l		0.005	0.01	1
7440-41-7	Beryllium	0.514	mg/l		0.005	0.01	1
7440-43-9	Cadmium	0.514	mg/l		0.005	0.02	1
7440-70-2	Calcium	105	mg/l		0.1	0.2	1
7440-47-3	Chromium	0.52	mg/l		0.01	0.02	1
7440-48-4	Cobalt	0.538	mg/l		0.01	0.02	1
7440-50-8	Copper	1.02	mg/l		0.01	0.02	1
7439-89-6	Iron	20.3	mg/l		0.1	0.2	1
7439-92-1	Lead	1.07	mg/l		0.05	0.2	1
7439-95-4	Magnesium	99.7	mg/l		0.1	0.2	1
7439-96-5	Manganese	2.04	mg/l		0.005	0.01	1
7440-02-0	Nickel	0.533	mg/l		0.015	0.05	1
7440-09-7	Potassium	20.8	mg/l		2.5	10	1
7782-49-2	Selenium	1.08	mg/l		0.15	0.3	1
7440-22-4	Silver	0.51	mg/l		0.01	0.03	1
7440-23-5	Sodium	101	mg/l		0.2	0.3	1
7440-28-0	Thallium	1.02	mg/l		0.2	0.3	1
7440-62-2	Vanadium	0.51	mg/l		0.007	0.02	1
7440-66-6	Zinc	1.07	mg/l		0.02	0.06	1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 50.00

% Solids: not dec. 100.0

Instrument ID MICPTJ

Sample ID: LCSD for HBN 5851 [MDIG/1589]

Project ID

Project Num

Lab Sample ID: 7158

Analytical Batch 1568 Prep Batch 5851

Date Collected: Time:

Date Received: 8/1/02 10:58:39 AM

Analytical Method: EPA 6010B

Prep Method: EPA 3010A

Date Analyzed: 8/6/02 Time: 11:13

Date Prepared: 8/1/02 Time: 10:58

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7429-90-5	Aluminum	10.5	mg/l		0.1	0.4	1
7440-36-0	Antimony	1.08	mg/l		0.1	0.2	1
7440-38-2	Arsenic	1.05	mg/l		0.15	0.3	1
7440-39-3	Barium	2.07	mg/l		0.005	0.01	1
7440-41-7	Beryllium	0.522	mg/l		0.005	0.01	1
7440-43-9	Cadmium	0.513	mg/l		0.005	0.02	1
7440-70-2	Calcium	106	mg/l		0.1	0.2	1
7440-47-3	Chromium	0.524	mg/l		0.01	0.02	1
7440-48-4	Cobalt	0.54	mg/l		0.01	0.02	1
7440-50-8	Copper	1.03	mg/l		0.01	0.02	1
7439-89-6	Iron	20.6	mg/l		0.1	0.2	1
7439-92-1	Lead	1.05	mg/l		0.05	0.2	1
7439-95-4	Magnesium	102	mg/l		0.1	0.2	1
7439-96-5	Manganese	2.06	mg/l		0.005	0.01	1
7440-02-0	Nickel	0.542	mg/l		0.015	0.05	1
7440-09-7	Potassium	19.4	mg/l		2.5	10	1
7782-49-2	Selenium	1.07	mg/l		0.15	0.3	1
7440-22-4	Silver	0.511	mg/l		0.01	0.03	1
7440-23-5	Sodium	102	mg/l		0.2	0.3	1
7440-28-0	Thallium	1.07	mg/l		0.2	0.3	1
7440-62-2	Vanadium	0.517	mg/l		0.007	0.02	1
7440-66-6	Zinc	1.08	mg/l		0.02	0.06	1

5 - Equivalent

INORGANIC ANALYSIS DATA SHEET / Matrix Spike Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1568

Prep Batch 5851

Fraction META

Units mg/L

Orig HSN : ***96702*** ***MS HSN :*** ***7159*** ***MSD HSN :*** ***7160***

COMPOUND	Original Amount	SPIKE ADDED	MS Amount	MS % REC #	MS % REC# FLAG	SPIKE ADDED	MSD Amount	MSD % REC #	MSD% REC# FLAG	RPD	RPD FLAG	QC. LIMITS LCL	UCL	RPD
Aluminum	0.081	10	9.66	95.8		10	10.3	102		6.51		75	125	25
Antimony	0.003	1	0.98	97.7		1	1.04	104		6.01		75	125	25
Arsenic	0.003	1	0.974	97.1		1	1.04	104		6.34		75	125	25
Barium	0.078	2	1.95	93.6		2	2.08	100		6.61		75	125	25
Beryllium	0.0002	0.5	0.478	95.6		0.5	0.508	102		6.09		75	125	25
Cadmium	0.003	0.5	0.472	93.9		0.5	0.504	100		6.46		75	125	25
Calcium	76.6	100	169	92.7		100	179	102		5.5		75	125	25
Chromium	0.051	0.5	0.496	89		0.5	0.519	93.7		4.58		75	125	25
Cobalt	0.007	0.5	0.5	98.6		0.5	0.528	104		5.5		75	125	25
Copper	0.171	1	0.985	81.4		1	1.06	88.5		6.98		75	125	25
Iron	35.96	20	22.8	-65.8	*	20	25.6	-51.7	*	0		75	125	25
Lead	0.123	1	1.01	89.1		1	1.07	94.3		5.01		75	125	25
Magnesium	19.32	100	112	92.9		100	120	101		6.84		75	125	25
Manganese	0.347	2	2.14	89.6		2	2.27	96		5.84		75	125	25
Nickel	0.021	0.5	0.492	94.3		0.5	0.532	102		7.69		75	125	25
Potassium	19.69	20	38.5	94.3		20	40.4	104		4.67		75	125	25
Selenium	0.016	1	0.926	90.9		1	1.04	102		11.7		75	125	25
Silver	0.006	0.5	0.469	92.6		0.5	0.5	98.8		6.47		75	125	25
Sodium	35.85	100	129	92.9		100	136	101		5.84		75	125	25
Thallium	-0.006	1	0.986	99.1		1	1.02	102		3.24		75	125	25
Vanadium	0.0007	0.5	0.475	94.8		0.5	0.506	101		6.5		75	125	25
Zinc	1.753	1	2.6	84.5		1	2.71	95.3		4.1		75	125	25

FORM V

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 50.00

% Solids: not dec.

Instrument ID MICPTJ

Sample ID: RADW-072602B(96702MS)

Project ID

Project Num

Lab Sample ID: 7159

Analytical Batch 1568 Prep Batch 5851

Date Collected: 7/26/02 Time: 15:30

Date Received: 7/29/02 10:15:00 AM

Analytical Method: EPA 6010B

Prep Method: EPA 3010A

Date Analyzed: 8/6/02 Time: 11:39

Date Prepared: 8/1/02 Time: 10:58

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7429-90-5	Aluminum	9.66	mg/l		0.1	0.4	1
7440-36-0	Antimony	0.98	mg/l		0.1	0.2	1
7440-38-2	Arsenic	0.974	mg/l		0.15	0.3	1
7440-39-3	Barium	1.95	mg/l		0.005	0.01	1
7440-41-7	Beryllium	0.478	mg/l		0.005	0.01	1
7440-43-9	Cadmium	0.472	mg/l		0.005	0.02	1
7440-70-2	Calcium	169	mg/l		0.1	0.2	1
7440-47-3	Chromium	0.496	mg/l		0.01	0.02	1
7440-48-4	Cobalt	0.5	mg/l		0.01	0.02	1
7440-50-8	Copper	0.985	mg/l		0.01	0.02	1
7439-89-6	Iron	22.8	mg/l		0.1	0.2	1
7439-92-1	Lead	1.01	mg/l		0.05	0.2	1
7439-95-4	Magnesium	112	mg/l		0.1	0.2	1
7439-96-5	Manganese	2.14	mg/l		0.005	0.01	1
7440-02-0	Nickel	0.492	mg/l		0.015	0.05	1
7440-09-7	Potassium	38.5	mg/l		2.5	10	1
7782-49-2	Selenium	0.926	mg/l		0.15	0.3	1
7440-22-4	Silver	0.469	mg/l		0.01	0.03	1
7440-23-5	Sodium	129	mg/l		0.2	0.3	1
7440-28-0	Thallium	0.986	mg/l		0.2	0.3	1
7440-62-2	Vanadium	0.475	mg/l		0.007	0.02	1
7440-66-6	Zinc	2.6	mg/l		0.02	0.06	1

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 50.00

% Solids: not dec.

Instrument ID MICPTJ

Sample ID: RADW-072602B(96702MSD)

Project ID

Project Num

Lab Sample ID: 7160

Analytical Batch 1568 Prep Batch 5851

Date Collected: 7/26/02 Time: 15:30

Date Received: 7/29/02 10:15:00 AM

Analytical Method: EPA 6010B

Prep Method: EPA 3010A

Date Analyzed: 8/6/02 Time: 11:45

Date Prepared: 8/1/02 Time: 10:58

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7429-90-5	Aluminum	10.3	mg/l		0.1	0.4	1
7440-36-0	Antimony	1.04	mg/l		0.1	0.2	1
7440-38-2	Arsenic	1.04	mg/l		0.15	0.3	1
7440-39-3	Barium	2.08	mg/l		0.005	0.01	1
7440-41-7	Beryllium	0.508	mg/l		0.005	0.01	1
7440-43-9	Cadmium	0.504	mg/l		0.005	0.02	1
7440-70-2	Calcium	179	mg/l		0.1	0.2	1
7440-47-3	Chromium	0.519	mg/l		0.01	0.02	1
7440-48-4	Cobalt	0.528	mg/l		0.01	0.02	1
7440-50-8	Copper	1.06	mg/l		0.01	0.02	1
7439-89-6	Iron	25.6	mg/l		0.1	0.2	1
7439-92-1	Lead	1.07	mg/l		0.05	0.2	1
7439-95-4	Magnesium	120	mg/l		0.1	0.2	1
7439-96-5	Manganese	2.27	mg/l		0.005	0.01	1
7440-02-0	Nickel	0.532	mg/l		0.015	0.05	1
7440-09-7	Potassium	40.4	mg/l		2.5	10	1
7782-49-2	Selenium	1.04	mg/l		0.15	0.3	1
7440-22-4	Silver	0.5	mg/l		0.01	0.03	1
7440-23-5	Sodium	136	mg/l		0.2	0.3	1
7440-28-0	Thallium	1.02	mg/l		0.2	0.3	1
7440-62-2	Vanadium	0.506	mg/l		0.007	0.02	1
7440-66-6	Zinc	2.71	mg/l		0.02	0.06	1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

5 - Equivalent

INORGANICS ANALYSIS DATA SHEET / Post Digestion Spike Summary Sheet

Lab Name: Analytical Management Laboratories

Analytical Batch 1568

Prep Batch 5851

Fraction META

Units mg/L

Orig HSN : ***96702*** ***PDS HSN :*** ***7161***

COMPOUND	*Original Amount*	*SPIKE ADDED*	*PDS Amount*	*PDS % REC #*	*PDS % REC# FLAG*	*QC. LIMITS LCL*	*UCL*
Aluminum	0.081	10	10.4	104		75	125
Antimony	0.003	1	1.05	105		75	125
Arsenic	0.003	1	1.03	103		75	125
Barium	0.078	2	2.07	99.7		75	125
Beryllium	0.0002	0.5	0.504	101		75	125
Cadmium	0.003	0.5	0.501	99.6		75	125
Calcium	76.6	100	175	98.2		75	125
Chromium	0.051	0.5	0.551	100		75	125
Cobalt	0.007	0.5	0.53	105		75	125
Copper	0.171	1	1.16	99.3		75	125
Iron	35.96	20	53.7	88.5		75	125
Lead	0.123	1	1.14	102		75	125
Magnesium	19.32	100	118	98.3		75	125
Manganese	0.347	2	2.32	98.8		75	125
Nickel	0.021	0.5	0.533	102		75	125
Potassium	19.69	20	38.9	95.8		75	125
Selenium	0.016	1	1.01	99		75	125
Silver	0.006	0.5	0.489	96.6		75	125
Sodium	35.85	100	134	98.2		75	125
Thallium	-0.006	1	1.03	104		75	125
Vanadium	0.0007	0.5	0.5	99.9		75	125
Zinc	1.753	1	2.71	95.8		75	125

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 50.00

% Solids: not dec.

Instrument ID MICPTJ

Sample ID: RADW-072602B(96702PDS)

Project ID

Project Num

Lab Sample ID: 7161

Analytical Batch 1568 Prep Batch 5851

Date Collected: 7/26/02 Time: 15:30

Date Received: 7/29/02 10:15:00 AM

Analytical Method: EPA 6010B

Prep Method: EPA 3010A

Date Analyzed: 8/6/02 Time: 11:52

Date Prepared: 8/1/02 Time: 10:58

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7429-90-5	Aluminum	10.4	mg/l		0.1	0.4	1
7440-36-0	Antimony	1.05	mg/l		0.1	0.2	1
7440-38-2	Arsenic	1.03	mg/l		0.15	0.3	1
7440-39-3	Barium	2.07	mg/l		0.005	0.01	1
7440-41-7	Beryllium	0.504	mg/l		0.005	0.01	1
7440-43-9	Cadmium	0.501	mg/l		0.005	0.02	1
7440-70-2	Calcium	175	mg/l		0.1	0.2	1
7440-47-3	Chromium	0.551	mg/l		0.01	0.02	1
7440-48-4	Cobalt	0.53	mg/l		0.01	0.02	1
7440-50-8	Copper	1.16	mg/l		0.01	0.02	1
7439-89-6	Iron	53.7	mg/l		0.1	0.2	1
7439-92-1	Lead	1.14	mg/l		0.05	0.2	1
7439-95-4	Magnesium	118	mg/l		0.1	0.2	1
7439-96-5	Manganese	2.32	mg/l		0.005	0.01	1
7440-02-0	Nickel	0.533	mg/l		0.015	0.05	1
7440-09-7	Potassium	38.9	mg/l		2.5	10	1
7782-49-2	Selenium	1.01	mg/l		0.15	0.3	1
7440-22-4	Silver	0.489	mg/l		0.01	0.03	1
7440-23-5	Sodium	134	mg/l		0.2	0.3	1
7440-28-0	Thallium	1.03	mg/l		0.2	0.3	1
7440-62-2	Vanadium	0.5	mg/l		0.007	0.02	1
7440-66-6	Zinc	2.71	mg/l		0.02	0.06	1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name:	Analytical Management Laboratories	Sample ID:	RADW-072602B(96702SD)
Client ID:	QC ACCOUNT	Project ID	
Matrix:	W	Project Num	
Sample g/ml:	50.00	Lab Sample ID:	7162
% Solids: not dec.		Analytical Batch	1568 Prep Batch 5851
Instrument ID	MICPTJ	Date Collected:	7/26/02 Time: 15:30
		Date Received:	7/29/02 10:15:00 AM
Analytical Method:	EPA 6010B	Date Analyzed:	8/6/02 Time: 11:33
Prep Method:	EPA 3010A	Date Prepared:	8/1/02 Time: 10:58

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7429-90-5	Aluminum		mg/l	U	0.5	2	5
7440-36-0	Antimony		mg/l	U	0.5	1	5
7440-38-2	Arsenic		mg/l	U	0.75	1.5	5
7440-39-3	Barium	0.0751	mg/l		0.025	0.05	5
7440-41-7	Beryllium		mg/l	U	0.025	0.05	5
7440-43-9	Cadmium		mg/l	U	0.025	0.1	5
7440-70-2	Calcium	75.9	mg/l		0.5	1	5
7440-47-3	Chromium		mg/l	U	0.05	0.1	5
7440-48-4	Cobalt		mg/l	U	0.05	0.1	5
7440-50-8	Copper	0.154	mg/l		0.05	0.1	5
7439-89-6	Iron	36	mg/l		0.5	1	5
7439-92-1	Lead		mg/l	U	0.25	1	5
7439-95-4	Magnesium	19.2	mg/l		0.5	1	5
7439-96-5	Manganese	0.347	mg/l		0.025	0.05	5
7440-02-0	Nickel		mg/l	U	0.075	0.25	5
7440-09-7	Potassium	20.4	mg/l	J	12.5	50	5
7782-49-2	Selenium		mg/l	U	0.75	1.5	5
7440-22-4	Silver		mg/l	U	0.05	0.15	5
7440-23-5	Sodium	35.8	mg/l		1	1.5	5
7440-28-0	Thallium		mg/l	U	1	1.5	5
7440-62-2	Vanadium		mg/l	U	0.035	0.1	5
7440-66-6	Zinc	1.81	mg/l		0.1	0.3	5

6020

Quality Control Association Form

Lab Name Analytical Management Laboratories **Fraction** META

Analytical Batch	Prep Batch	Date Analyzed	Date Prepared	Lab Sample ID	Original Sample	Sample Type	Project Number
1559	5853	8/7/02	8/1/02	7163		MB	
1559	5853	8/7/02	8/1/02	7164		LCS	
1559	5853	8/7/02	8/1/02	7165		LCSD	
1559	5853	8/7/02	8/1/02	7166	96702	MS	
1559	5853	8/7/02	8/1/02	7167	96702	MSD	
1559	5853	8/7/02	8/1/02	7168	96702	PDS	
1559	5853	8/7/02	8/1/02	7169	96702	SD	
1559	5853	8/7/02	8/1/02	96701		SAMPLE	967
1559	5853	8/7/02	8/1/02	96702		SAMPLE	967

Batch Reviewed by JPreheim Date Reviewed 8/7/02 Date Printed *Wednesday, August 07, 2002*

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 50.00

% Solids: not dec. 100.0

Instrument ID

Sample ID: MB for HBN 5853 [MDIG/1591]

Project ID

Project Num

Lab Sample ID: 7163

Analytical Batch 1559 Prep Batch 5853

Date Collected: Time:

Date Received: 8/1/02 10:59:20 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3015A

Date Analyzed: 8/7/02 Time: 9:01

Date Prepared: 8/1/02 Time: 10:59

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-36-0	Antimony		µg/l	U	1	2	1
7440-38-2	Arsenic		µg/l	U	1	2	1
7440-43-9	Cadmium		µg/l	U	0.5	1	1
7439-92-1	Lead		µg/l	U	0.5	1	1
7439-97-6	Mercury		µg/l	U	0.25	0.5	1
7782-49-2	Selenium		µg/l	U	1	2	1
7440-28-0	Thallium		µg/l	U	0.5	1	1

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 50.00

% Solids: not dec. 100.0

Instrument ID

Sample ID: LCS for HBN 5853 [MDIG/1591]

Project ID

Project Num

Lab Sample ID: 7164

Analytical Batch 1559 Prep Batch 5853

Date Collected: Time:

Date Received: 8/1/02 10:59:20 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3015A

Date Analyzed: 8/7/02 Time: 9:05

Date Prepared: 8/1/02 Time: 10:59

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-36-0	Antimony	54	µg/l		1	2	1
7440-38-2	Arsenic	55	µg/l		1	2	1
7440-43-9	Cadmium	52.9	µg/l		0.5	1	1
7439-92-1	Lead	496	µg/l		0.5	1	1
7439-97-6	Mercury	5.2	µg/l		0.25	0.5	1
7782-49-2	Selenium	58.3	µg/l		1	2	1
7440-28-0	Thallium	50.5	µg/l		0.5	1	1

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 50.00

% Solids: not dec. 100.0

Instrument ID

Sample ID: LCSD for HBN 5853 [MDIG/1591]

Project ID

Project Num

Lab Sample ID: 7165

Analytical Batch 1559 Prep Batch 5853

Date Collected: Time:

Date Received: 8/1/02 10:59:20 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3015A

Date Analyzed: 8/7/02 Time: 9:31

Date Prepared: 8/1/02 Time: 10:59

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-36-0	Antimony	53.1	µg/l		1	2	1
7440-38-2	Arsenic	53	µg/l		1	2	1
7440-43-9	Cadmium	50.3	µg/l		0.5	1	1
7439-92-1	Lead	472	µg/l		0.5	1	1
7439-97-6	Mercury	5.63	µg/l		0.25	0.5	1
7782-49-2	Selenium	55.2	µg/l		1	2	1
7440-28-0	Thallium	48	µg/l		0.5	1	1

7 - Equivalent

INORGANIC ANALYSIS DATA SHEET / Laboratory Control Sample Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1559

Prep Batch 5853

Fraction META

Units

LCS HSN : 7164

LCSD HSN : 7165

COMPOUND	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC# FLAG	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC#	RPD	RPD FLAG	QC. LIMITS LCL	UCL	RPD
Antimony	50	54	108		50	53.1	106		1.64		80	120	20
Arsenic	50	55	110		50	53	106		3.65		80	120	20
Cadmium	50	52.9	106		50	50.3	101		4.9		80	120	20
Lead	500	496	99.2		500	472	94.4		4.99		80	120	20
Mercury	5	5.2	104		5	5.63	113		7.96		80	120	20
Selenium	50	58.3	116		50	55.2	110		5.36		80	120	20
Thallium	50	50.5	101		50	48	96		5.11		80	120	20

FORM VII - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 50.00

% Solids: not dec.

Instrument ID

Sample ID: RADW-072602B(96702MS)

Project ID

Project Num

Lab Sample ID: 7166

Analytical Batch 1559 Prep Batch 5853

Date Collected: 7/26/02 Time: 15:30

Date Received: 7/29/02 10:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3015A

Date Analyzed: 8/7/02 Time: 9:47

Date Prepared: 8/1/02 Time: 10:59

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-36-0	Antimony	52.8	µg/l		1	2	1
7440-38-2	Arsenic	51.8	µg/l		1	2	1
7440-43-9	Cadmium	49.9	µg/l		0.5	1	1
7439-92-1	Lead	504	µg/l		0.5	1	1
7439-97-6	Mercury	5.2	µg/l		0.25	0.5	1
7782-49-2	Selenium	52.4	µg/l		1	2	1
7440-28-0	Thallium	47.7	µg/l		0.5	1	1

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 50.00

% Solids: not dec.

Instrument ID

Sample ID: RADW-072602B(96702MSD)

Project ID

Project Num

Lab Sample ID: 7167

Analytical Batch 1559 Prep Batch 5853

Date Collected: 7/26/02 Time: 15:30

Date Received: 7/29/02 10:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3015A

Date Analyzed: 8/7/02 Time: 9:52

Date Prepared: 8/1/02 Time: 10:59

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-36-0	Antimony	53.9	µg/l		1	2	1
7440-38-2	Arsenic	52.6	µg/l		1	2	1
7440-43-9	Cadmium	51.1	µg/l		0.5	1	1
7439-92-1	Lead	511	µg/l		0.5	1	1
7439-97-6	Mercury	5.37	µg/l		0.25	0.5	1
7782-49-2	Selenium	52.3	µg/l		1	2	1
7440-28-0	Thallium	48.4	µg/l		0.5	1	1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

5 - Equivalent

INORGANIC ANALYSIS DATA SHEET / Matrix Spike Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1559

Prep Batch 5853

Fraction META

Units

Orig HSN : ***96702*** ***MS HSN :*** ***7166*** ***MSD HSN :*** ***7167***

COMPOUND	Original Amount	SPIKE ADDED	MS Amount	MS % REC #	MS % REC# FLAG	SPIKE ADDED	MSD Amount	MSD % REC #	MSD% REC# FLAG	RPD	RPD FLAG	QC. LIMITS LCL	UCL	RPD
Antimony	0	50	52.8	106		50	53.9	108		2.05		75	125	25
Arsenic	0	50	51.8	104		50	52.6	105		1.43		75	125	25
Cadmium	2.432	50	49.9	94.9		50	51.1	97.3		2.36		75	125	25
Lead	45.43	500	504	91.7		500	511	93.1		1.38		75	125	25
Mercury	0.250	5	5.2	98.9		5	5.37	102		3.19		75	125	25
Selenium	0	50	52.4	105		50	52.3	105		0.225		75	125	25
Thallium	0	50	47.7	95.4		50	48.4	96.8		1.5		75	125	25

FORM V

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 50.00

% Solids: not dec.

Instrument ID

Sample ID: RADW-072602B(96702PDS)

Project ID

Project Num

Lab Sample ID: 7168

Analytical Batch 1559 Prep Batch 5853

Date Collected: 7/26/02 Time: 15:30

Date Received: 7/29/02 10:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3015A

Date Analyzed: 8/7/02 Time: 9:57

Date Prepared: 8/1/02 Time: 10:59

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-36-0	Antimony	45.6	µg/l		1	2	1
7440-38-2	Arsenic	43.9	µg/l		1	2	1
7440-43-9	Cadmium	42.7	µg/l		0.5	1	1
7439-92-1	Lead	443	µg/l		0.5	1	1
7439-97-6	Mercury	4.55	µg/l		0.25	0.5	1
7782-49-2	Selenium	43.1	µg/l		1	2	1
7440-28-0	Thallium	40.4	µg/l		0.5	1	1

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

5 - Equivalent

INORGANICS ANALYSIS DATA SHEET / Post Digestion Spike Summary Sheet

Lab Name: Analytical Management Laboratories

Analytical Batch 1559

Prep Batch 5853

Fraction META

Units

Orig HSN : ***96702*** ***PDS HSN :*** ***7168***

COMPOUND	*Original Amount*	*SPIKE ADDED*	*PDS Amount*	*PDS % REC #*	*PDS % REC# FLAG*	*QC. LIMITS LCL*	*UCL*
Antimony	0	50	45.6	91.2		75	125
Arsenic	0	50	43.9	87.9		75	125
Cadmium	2.432	50	42.7	80.6		75	125
Lead	45.43	500	443	79.6		75	125
Mercury	0.250	5	4.55	85.9		75	125
Selenium	0	50	43.1	86.1		75	125
Thallium	0	50	40.4	80.8		75	125

FORM V - Equivalent

1 - Equivalent

INORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Management Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 50.00

% Solids: not dec.

Instrument ID

Sample ID: RADW-072602B(96702SD)

Project ID

Project Num

Lab Sample ID: 7169

Analytical Batch 1559 Prep Batch 5853

Date Collected: 7/26/02 Time: 15:30

Date Received: 7/29/02 10:15:00 AM

Analytical Method: EPA 6020A

Prep Method: EPA 3015A

Date Analyzed: 8/7/02 Time: 9:43

Date Prepared: 8/1/02 Time: 10:59

CAS NO.	COMPOUND	RESULT	Units	Q	LLR	MQL	DF
7440-36-0	Antimony		µg/l	U	5	10	5
7440-38-2	Arsenic		µg/l	U	5	10	5
7440-43-9	Cadmium		µg/l	U	2.5	5	5
7439-92-1	Lead	46.4	µg/l		2.5	5	5
7439-97-6	Mercury		µg/l	U	1.25	2.5	5
7782-49-2	Selenium		µg/l	U	5	10	5
7440-28-0	Thallium		µg/l	U	2.5	5	5

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I IN - Equivalent

VOC QAQC Sample Analysis

Quality Control Association Form

Lab Name Analytical Management Laboratories **Fraction** VOC

Analytical Batch	Prep Batch	Date Analyzed	Date Prepared	Lab Sample ID	Original Sample	Sample Type	Project Number
1288	5947	8/5/02	8/5/02	7276		MB	
1288	5947	8/5/02	8/5/02	7277	94101	MS	
1288	5947	8/5/02	8/5/02	7278	94101	MSD	
1288	5947	8/5/02	8/5/02	7279		LCS	
1288	5947	8/5/02	8/5/02	7280		LCSD	
1288	5947	8/5/02	8/5/02	7281		CCAL	
1288	5947	8/5/02	8/5/02	94101		SAMPLE	941
1288	5947	8/5/02	8/5/02	94102		SAMPLE	941
1288	5947	8/5/02	8/5/02	94105		SAMPLE	941
1288	5947	8/5/02	8/5/02	94502		SAMPLE	945
1288	5947	8/5/02	8/5/02	94506		SAMPLE	945
1288	5947	8/5/02	8/5/02	94808		SAMPLE	948
1288	5947	8/5/02	8/5/02	94809		SAMPLE	948
1288	5947	8/5/02	8/5/02	94810		SAMPLE	948
1288	5947	8/5/02	8/5/02	94811		SAMPLE	948
1288	5947	8/5/02	8/5/02	96701		SAMPLE	967
1288	5947	8/5/02	8/5/02	96702		SAMPLE	967
1288	5947	8/5/02	8/5/02	97102		SAMPLE	971
1288	5947	8/5/02	8/5/02	97103		SAMPLE	971

Batch Reviewed by _____ **Date Reviewed** 8/6/02 **Date Printed** *Tuesday, August 06, 2002*

2A - Equivalent

VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: Analytical Managment Laboratories

Analytical Batch 1288

Prep Batch 5947

No.	Lab Sample ID	1,2-Dichloroethane-d4			F	Dibromofluoromethane			F	Toluene-d8			F	4-Bromofluorobenzene			F
		% Rec	Low	High		% Rec	Low	High		% Rec	Low	High		% Rec	Low	High	
1	7276	89.5	80	120		95.6	80	120		96.9	80	120		92.2	80	120	
2	7277	96.8	70	130		96	80	120		97.2	70	130		94.2	80	120	
3	7278	97.8	80	120		94.9	80	120		96.2	80	120		93.8	80	120	
4	7279	92.7	80	120		96.5	80	120		97.8	80	120		93.7	80	120	
5	7280	94.2	80	120		95.7	80	120		98.1	80	120		91.7	80	120	
6	94101	85.1	80	120		94.2	80	120		96.8	80	120		100.6	80	120	
7	94102	91.8	80	120		95.9	80	120		97.2	80	120		93.8	80	120	
8	94105	94.4	80	120		96.2	80	120		96.3	80	120		96.4	80	120	
9	94502	90.4	80	120		96.6	80	120		96.1	80	120		109.1	80	120	
10	94506	91.8	80	120		98.2	80	120		97.7	80	120		95.2	80	120	
11	94808	92.7	80	120		96.9	80	120		97.8	80	120		94.6	80	120	
12	94809	93.9	80	120		97	80	120		96.8	80	120		99.2	80	120	
13	94810	93.2	80	120		96.9	80	120		97.5	80	120		95	80	120	
14	94811	92.3	80	120		96.2	80	120		97.3	80	120		93.4	80	120	
15	96701	93	80	120		97.9	80	120		97.4	80	120		91.6	80	120	
16	96702	93.4	80	120		98	80	120		95.9	80	120		87.8	80	120	
17	97102	95	80	120		98.8	80	120		98	80	120		92	80	120	
18	97103	94.4	80	120		98.9	80	120		97.6	80	120		89.4	80	120	

FORM II VOA Equivalent

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 25

% Solids: not dec. 100.0

Instrument ID Instru

Analytical Method: 8260B

Prep Method: EPA 5030

Analytical Batch: 1288

Sample ID: MB for HBN 5947 [VOC/1288]

Project ID

Project Num

Lab Sample ID: 7276

Date Collected: Time:

Dilution Factor: 1

Date Analyzed: 8/5/02 Time: 12:35

Date Received: 8/5/02 12:35:00 PM

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
630-20-6	1,1,1,2-Tetrachloroethane		µg/l	U	0.222	2
71-55-6	1,1,1-Trichloroethane		µg/l	U	0.18	2
79-34-5	1,1,2,2-Tetrachloroethane		µg/l	U	0.1	2
79-00-5	1,1,2-Trichloroethane		µg/l	U	0.143	2
75-34-3	1,1-Dichloroethane		µg/l	U	0.214	2
75-35-4	1,1-Dichloroethene		µg/l	U	0.183	2
563-58-6	1,1-Dichloropropene		µg/l	U	0.1	2
87-61-6	1,2,3-Trichlorobenzene		µg/l	U	0.142	2
120-82-1	1,2,4-Trichlorobenzene		µg/l	U	0.108	2
95-63-6	1,2,4-Trimethylbenzene		µg/l	U	0.111	2
106-93-4	1,2-Dibromoethane		µg/l	U	0.117	2
95-50-1	1,2-Dichlorobenzene		µg/l	U	0.141	2
107-06-2	1,2-Dichloroethane		µg/l	U	0.182	2
78-87-5	1,2-Dichloropropane		µg/l	U	0.119	2
108-67-8	1,3,5-Trimethylbenzene		µg/l	U	0.113	2
541-73-1	1,3-Dichlorobenzene		µg/l	U	0.189	2
142-28-9	1,3-Dichloropropane		µg/l	U	0.107	2
106-46-7	1,4-Dichlorobenzene		µg/l	U	0.15	2
590-20-7	2,2-Dichloropropane		µg/l	U	0.108	2
78-93-3	2-Butanone		µg/l	U	0.481	2
95-49-8	2-Chlorotoluene		µg/l	U	0.106	2
591-78-6	2-Hexanone		µg/l	U	0.163	2
106-43-4	4-Chlorotoluene		µg/l	U	0.1	2
99-87-6	4-Isopropyltoluene		µg/l	U	0.1	2
108-10-1	4-Methyl-2-pentanone		µg/l	U	0.128	2
67-64-1	Acetone		µg/l	U	0.612	2
71-43-2	Benzene		µg/l	U	0.139	2
108-86-1	Bromobenzene		µg/l	U	0.156	2
74-97-5	Bromochloromethane		µg/l	U	0.165	2
75-27-4	Bromodichloromethane		µg/l	U	0.135	2
75-25-2	Bromoform		µg/l	U	0.163	2
74-83-9	Bromomethane		µg/l	U	0.201	2
75-15-0	Carbon disulfide		µg/l	U	0.183	2
56-23-5	Carbon tetrachloride		µg/l	U	0.137	2
108-90-7	Chlorobenzene		µg/l	U	0.156	2
75-00-3	Chloroethane		µg/l	U	0.207	2
67-66-3	Chloroform		µg/l	U	0.214	2
74-87-3	Chloromethane		µg/l	U	0.173	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 25

% Solids: not dec. 100.0

Instrument ID Instru

Analytical Method: 8260B

Prep Method: EPA 5030

Analytical Batch: 1288

Sample ID: MB for HBN 5947 [VOC/1288]

Project ID

Project Num

Lab Sample ID: 7276

Date Collected: Time:

Dilution Factor: 1

Date Analyzed: 8/5/02 Time: 12:35

Date Received: 8/5/02 12:35:00 PM

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
156-59-2	cis-1,2-Dichloroethene		µg/l	U	0.151	2
10061-01-5	cis-1,3-Dichloropropene		µg/l	U	0.1	2
124-48-1	Dibromochloromethane		µg/l	U	0.133	2
74-95-3	Dibromomethane		µg/l	U	0.1	2
75-71-8	Dichlorodifluoromethane		µg/l	U	0.5	2
100-41-4	Ethylbenzene		µg/l	U	0.1	2
87-68-3	Hexachlorobutadiene		µg/l	U	0.192	2
98-82-8	Isopropylbenzene		µg/l	U	0.1	2
75-09-2	Methylene chloride	0.63	µg/l	J	0.398	2
1634-04-4	Methyl-tert-butyl-ether		µg/l	U	0.1	2
m+p xylene	m-Xylene and p-Xylene		µg/l	U	0.216	2
91-20-3	Naphthalene		µg/l	U	0.139	2
104-51-8	n-Butylbenzene		µg/l	U	0.14	2
103-65-1	n-Propylbenzene		µg/l	U	0.1	2
95-47-6	o-Xylene		µg/l	U	0.102	2
135-98-8	sec-Butylbenzene		µg/l	U	0.133	2
100-42-5	Styrene		µg/l	U	0.1	2
98-06-6	tert-Butylbenzene		µg/l	U	0.17	2
127-18-4	Tetrachloroethene		µg/l	U	0.115	2
108-88-3	Toluene		µg/l	U	0.105	2
156-60-5	trans-1,2-Dichloroethene		µg/l	U	0.152	2
10061-02-6	trans-1,3-Dichloropropene		µg/l	U	0.1	2
79-01-6	Trichloroethene		µg/l	U	0.151	2
75-01-4	Vinyl chloride		µg/l	U	0.239	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 25

% Solids: not dec. 100.0

Instrument ID Instru

Analytical Method: 8260B

Prep Method: EPA 5030

Analytical Batch: 1288

Sample ID: LCS for HBN 5947 [VOC/1288]

Project ID

Project Num

Lab Sample ID: 7279

Date Collected: Time:

Dilution Factor: 1

Date Analyzed: 8/5/02 Time: 13:05

Date Received: 8/5/02 1:05:00 PM

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
630-20-6	1,1,1,2-Tetrachloroethane	4.53	µg/l		0.222	2
71-55-6	1,1,1-Trichloroethane	5.45	µg/l		0.18	2
79-34-5	1,1,2,2-Tetrachloroethane	5.12	µg/l		0.1	2
79-00-5	1,1,2-Trichloroethane	5.5	µg/l		0.143	2
75-34-3	1,1-Dichloroethane	5.44	µg/l		0.214	2
75-35-4	1,1-Dichloroethene	5.44	µg/l		0.183	2
563-58-6	1,1-Dichloropropene	5.51	µg/l		0.1	2
87-61-6	1,2,3-Trichlorobenzene	4.67	µg/l		0.142	2
120-82-1	1,2,4-Trichlorobenzene	4.68	µg/l		0.108	2
95-63-6	1,2,4-Trimethylbenzene	4.97	µg/l		0.111	2
106-93-4	1,2-Dibromoethane	4.27	µg/l		0.117	2
95-50-1	1,2-Dichlorobenzene	5.46	µg/l		0.141	2
107-06-2	1,2-Dichloroethane	5.54	µg/l		0.182	2
78-87-5	1,2-Dichloropropane	5.49	µg/l		0.119	2
108-67-8	1,3,5-Trimethylbenzene	5.63	µg/l		0.113	2
541-73-1	1,3-Dichlorobenzene	5.2	µg/l		0.189	2
142-28-9	1,3-Dichloropropane	4.37	µg/l		0.107	2
106-46-7	1,4-Dichlorobenzene	5.71	µg/l		0.15	2
590-20-7	2,2-Dichloropropane	4.61	µg/l		0.108	2
78-93-3	2-Butanone	4.74	µg/l		0.481	2
95-49-8	2-Chlorotoluene	5.22	µg/l		0.106	2
591-78-6	2-Hexanone	4.28	µg/l		0.163	2
106-43-4	4-Chlorotoluene	5.45	µg/l		0.1	2
99-87-6	4-Isopropyltoluene	4.93	µg/l		0.1	2
108-10-1	4-Methyl-2-pentanone	5.13	µg/l		0.128	2
67-64-1	Acetone	5.67	µg/l		0.612	2
71-43-2	Benzene	5.42	µg/l		0.139	2
108-86-1	Bromobenzene	5.59	µg/l		0.156	2
74-97-5	Bromochloromethane	5.52	µg/l		0.165	2
75-27-4	Bromodichloromethane	5.3	µg/l		0.135	2
75-25-2	Bromoform	5.25	µg/l		0.163	2
74-83-9	Bromomethane	5.36	µg/l		0.201	2
75-15-0	Carbon disulfide	5.54	µg/l		0.183	2
56-23-5	Carbon tetrachloride	5.48	µg/l		0.137	2
108-90-7	Chlorobenzene	4.53	µg/l		0.156	2
75-00-3	Chloroethane	5.59	µg/l		0.207	2
67-66-3	Chloroform	5.54	µg/l		0.214	2
74-87-3	Chloromethane	5.59	µg/l		0.173	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 25

% Solids: not dec. 100.0

Instrument ID Instru

Analytical Method: 8260B

Prep Method: EPA 5030

Analytical Batch: 1288

Sample ID: LCS for HBN 5947 [VOC/1288]

Project ID

Project Num

Lab Sample ID: 7279

Date Collected: Time:

Dilution Factor: 1

Date Analyzed: 8/5/02 Time: 13:05

Date Received: 8/5/02 1:05:00 PM

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
156-59-2	cis-1,2-Dichloroethene	5.48	µg/l		0.151	2
10061-01-5	cis-1,3-Dichloropropene	5.32	µg/l		0.1	2
124-48-1	Dibromochloromethane	4.31	µg/l		0.133	2
74-95-3	Dibromomethane	5.36	µg/l		0.1	2
75-71-8	Dichlorodifluoromethane	5.52	µg/l		0.5	2
100-41-4	Ethylbenzene	4.18	µg/l		0.1	2
87-68-3	Hexachlorobutadiene	5.08	µg/l		0.192	2
98-82-8	Isopropylbenzene	4.38	µg/l		0.1	2
75-09-2	Methylene chloride	5.85	µg/l		0.398	2
1634-04-4	Methyl-tert-butyl-ether	5.48	µg/l		0.1	2
m+p xylene	m-Xylene and p-Xylene	8.71	µg/l		0.216	2
91-20-3	Naphthalene	5.41	µg/l		0.139	2
104-51-8	n-Butylbenzene	4.58	µg/l		0.14	2
103-65-1	n-Propylbenzene	5.06	µg/l		0.1	2
95-47-6	o-Xylene	4.32	µg/l		0.102	2
135-98-8	sec-Butylbenzene	5.28	µg/l		0.133	2
100-42-5	Styrene	4.3	µg/l		0.1	2
98-06-6	tert-Butylbenzene	5.21	µg/l		0.17	2
127-18-4	Tetrachloroethene	4.48	µg/l		0.115	2
108-88-3	Toluene	5.39	µg/l		0.105	2
156-60-5	trans-1,2-Dichloroethene	5.54	µg/l		0.152	2
10061-02-6	trans-1,3-Dichloropropene	5.08	µg/l		0.1	2
79-01-6	Trichloroethene	5.58	µg/l		0.151	2
75-01-4	Vinyl chloride	5.52	µg/l		0.239	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 25

% Solids: not dec. 100.0

Instrument ID Instru

Analytical Method: 8260B

Prep Method: EPA 5030

Analytical Batch: 1288

Sample ID: LCSD for HBN 5947 [VOC/1288]

Project ID

Project Num

Lab Sample ID: 7280

Date Collected: Time:

Dilution Factor: 1

Date Analyzed: 8/5/02 Time: 13:35

Date Received: 8/5/02 1:35:00 PM

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
630-20-6	1,1,1,2-Tetrachloroethane	4.45	µg/l		0.222	2
71-55-6	1,1,1-Trichloroethane	5.13	µg/l		0.18	2
79-34-5	1,1,2,2-Tetrachloroethane	5.37	µg/l		0.1	2
79-00-5	1,1,2-Trichloroethane	5.57	µg/l		0.143	2
75-34-3	1,1-Dichloroethane	5.27	µg/l		0.214	2
75-35-4	1,1-Dichloroethene	5.06	µg/l		0.183	2
563-58-6	1,1-Dichloropropene	5.13	µg/l		0.1	2
87-61-6	1,2,3-Trichlorobenzene	4.88	µg/l		0.142	2
120-82-1	1,2,4-Trichlorobenzene	4.75	µg/l		0.108	2
95-63-6	1,2,4-Trimethylbenzene	4.84	µg/l		0.111	2
106-93-4	1,2-Dibromoethane	4.35	µg/l		0.117	2
95-50-1	1,2-Dichlorobenzene	5.4	µg/l		0.141	2
107-06-2	1,2-Dichloroethane	5.5	µg/l		0.182	2
78-87-5	1,2-Dichloropropane	5.39	µg/l		0.119	2
108-67-8	1,3,5-Trimethylbenzene	4.8	µg/l		0.113	2
541-73-1	1,3-Dichlorobenzene	5.21	µg/l		0.189	2
142-28-9	1,3-Dichloropropane	4.46	µg/l		0.107	2
106-46-7	1,4-Dichlorobenzene	5.42	µg/l		0.15	2
590-20-7	2,2-Dichloropropane	4.25	µg/l		0.108	2
78-93-3	2-Butanone	5.61	µg/l		0.481	2
95-49-8	2-Chlorotoluene	5	µg/l		0.106	2
591-78-6	2-Hexanone	4.29	µg/l		0.163	2
106-43-4	4-Chlorotoluene	5.09	µg/l		0.1	2
99-87-6	4-Isopropyltoluene	4.76	µg/l		0.1	2
108-10-1	4-Methyl-2-pentanone	5.45	µg/l		0.128	2
67-64-1	Acetone	5.87	µg/l		0.612	2
71-43-2	Benzene	5.26	µg/l		0.139	2
108-86-1	Bromobenzene	5.36	µg/l		0.156	2
74-97-5	Bromochloromethane	5.56	µg/l		0.165	2
75-27-4	Bromodichloromethane	5.36	µg/l		0.135	2
75-25-2	Bromoform	5.33	µg/l		0.163	2
74-83-9	Bromomethane	5.17	µg/l		0.201	2
75-15-0	Carbon disulfide	5.06	µg/l		0.183	2
56-23-5	Carbon tetrachloride	5.08	µg/l		0.137	2
108-90-7	Chlorobenzene	4.33	µg/l		0.156	2
75-00-3	Chloroethane	5.15	µg/l		0.207	2
67-66-3	Chloroform	5.34	µg/l		0.214	2
74-87-3	Chloromethane	5.24	µg/l		0.173	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 25

% Solids: not dec. 100.0

Instrument ID Instru

Analytical Method: 8260B

Prep Method: EPA 5030

Analytical Batch: 1288

Sample ID: LCSD for HBN 5947 [VOC/1288]

Project ID

Project Num

Lab Sample ID: 7280

Date Collected: Time:

Dilution Factor: 1

Date Analyzed: 8/5/02 Time: 13:35

Date Received: 8/5/02 1:35:00 PM

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
156-59-2	cis-1,2-Dichloroethene	5.25	µg/l		0.151	2
10061-01-5	cis-1,3-Dichloropropene	5.31	µg/l		0.1	2
124-48-1	Dibromochloromethane	4.37	µg/l		0.133	2
74-95-3	Dibromomethane	5.31	µg/l		0.1	2
75-71-8	Dichlorodifluoromethane	5.2	µg/l		0.5	2
100-41-4	Ethylbenzene	4.13	µg/l		0.1	2
87-68-3	Hexachlorobutadiene	4.9	µg/l		0.192	2
98-82-8	Isopropylbenzene	4.19	µg/l		0.1	2
75-09-2	Methylene chloride	5.91	µg/l		0.398	2
1634-04-4	Methyl-tert-butyl-ether	5.53	µg/l		0.1	2
m+p xylene	m-Xylene and p-Xylene	8.9	µg/l		0.216	2
91-20-3	Naphthalene	5.63	µg/l		0.139	2
104-51-8	n-Butylbenzene	4.46	µg/l		0.14	2
103-65-1	n-Propylbenzene	4.85	µg/l		0.1	2
95-47-6	o-Xylene	4.21	µg/l		0.102	2
135-98-8	sec-Butylbenzene	5.01	µg/l		0.133	2
100-42-5	Styrene	4.27	µg/l		0.1	2
98-06-6	tert-Butylbenzene	5.03	µg/l		0.17	2
127-18-4	Tetrachloroethene	4.26	µg/l		0.115	2
108-88-3	Toluene	5.28	µg/l		0.105	2
156-60-5	trans-1,2-Dichloroethene	5.17	µg/l		0.152	2
10061-02-6	trans-1,3-Dichloropropene	5.22	µg/l		0.1	2
79-01-6	Trichloroethene	5.23	µg/l		0.151	2
75-01-4	Vinyl chloride	5.04	µg/l		0.239	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 25

% Solids: not dec.

Instrument ID Instru

Analytical Method: 8260B

Prep Method: EPA 5030

Analytical Batch: 1288

Sample ID: KAFS02-SL-SW-02(94101MS)

Project ID

Project Num

Lab Sample ID: 7277

Date Collected: 7/24/02 Time: 8:30

Dilution Factor: 1

Date Analyzed: 8/5/02 Time: 16:11

Date Received: 7/25/02 9:30:00 AM

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
630-20-6	1,1,1,2-Tetrachloroethane	9.24	µg/l		0.222	2
71-55-6	1,1,1-Trichloroethane	11.4	µg/l		0.18	2
79-34-5	1,1,2,2-Tetrachloroethane	9.99	µg/l		0.1	2
79-00-5	1,1,2-Trichloroethane	10.8	µg/l		0.143	2
75-34-3	1,1-Dichloroethane	11.1	µg/l		0.214	2
75-35-4	1,1-Dichloroethene	11.1	µg/l		0.183	2
563-58-6	1,1-Dichloropropene	11.3	µg/l		0.1	2
87-61-6	1,2,3-Trichlorobenzene	9.2	µg/l		0.142	2
120-82-1	1,2,4-Trichlorobenzene	9.45	µg/l		0.108	2
95-63-6	1,2,4-Trimethylbenzene	9.97	µg/l		0.111	2
106-93-4	1,2-Dibromoethane	9.64	µg/l		0.117	2
95-50-1	1,2-Dichlorobenzene	10.4	µg/l		0.141	2
107-06-2	1,2-Dichloroethane	10.7	µg/l		0.182	2
78-87-5	1,2-Dichloropropane	10.8	µg/l		0.119	2
108-67-8	1,3,5-Trimethylbenzene	9.77	µg/l		0.113	2
541-73-1	1,3-Dichlorobenzene	10.4	µg/l		0.189	2
142-28-9	1,3-Dichloropropane	9.88	µg/l		0.107	2
106-46-7	1,4-Dichlorobenzene	10.4	µg/l		0.15	2
590-20-7	2,2-Dichloropropane	11.6	µg/l		0.108	2
78-93-3	2-Butanone	9.97	µg/l		0.481	2
95-49-8	2-Chlorotoluene	10.6	µg/l		0.106	2
591-78-6	2-Hexanone	8.42	µg/l		0.163	2
106-43-4	4-Chlorotoluene	10.9	µg/l		0.1	2
99-87-6	4-Isopropyltoluene	10.6	µg/l		0.1	2
108-10-1	4-Methyl-2-pentanone	10	µg/l		0.128	2
67-64-1	Acetone	9.46	µg/l		0.612	2
71-43-2	Benzene	11.2	µg/l		0.139	2
108-86-1	Bromobenzene	10.9	µg/l		0.156	2
74-97-5	Bromochloromethane	10.6	µg/l		0.165	2
75-27-4	Bromodichloromethane	9.8	µg/l		0.135	2
75-25-2	Bromoform	7.31	µg/l		0.163	2
74-83-9	Bromomethane	8.84	µg/l		0.201	2
75-15-0	Carbon disulfide	11.5	µg/l		0.183	2
56-23-5	Carbon tetrachloride	9.94	µg/l		0.137	2
108-90-7	Chlorobenzene	10.4	µg/l		0.156	2
75-00-3	Chloroethane	11.1	µg/l		0.207	2
67-66-3	Chloroform	11	µg/l		0.214	2
74-87-3	Chloromethane	11.8	µg/l		0.173	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 25

% Solids: not dec.

Instrument ID Instru

Analytical Method: 8260B

Prep Method: EPA 5030

Analytical Batch: 1288

Sample ID: KAFS02-SL-SW-02(94101MS)

Project ID

Project Num

Lab Sample ID: 7277

Date Collected: 7/24/02 Time: 8:30

Dilution Factor: 1

Date Analyzed: 8/5/02 Time: 16:11

Date Received: 7/25/02 9:30:00 AM

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
156-59-2	cis-1,2-Dichloroethene	11.5	µg/l		0.151	2
10061-01-5	cis-1,3-Dichloropropene	8.9	µg/l		0.1	2
124-48-1	Dibromochloromethane	8.09	µg/l		0.133	2
74-95-3	Dibromomethane	11.2	µg/l		0.1	2
75-71-8	Dichlorodifluoromethane	11.9	µg/l		0.5	2
100-41-4	Ethylbenzene	10.5	µg/l		0.1	2
87-68-3	Hexachlorobutadiene	10.3	µg/l		0.192	2
98-82-8	Isopropylbenzene	10.6	µg/l		0.1	2
75-09-2	Methylene chloride	11.2	µg/l		0.398	2
1634-04-4	Methyl-tert-butyl-ether	10.3	µg/l		0.1	2
m+p xylene	m-Xylene and p-Xylene	20.3	µg/l		0.216	2
91-20-3	Naphthalene	8.86	µg/l		0.139	2
104-51-8	n-Butylbenzene	10.4	µg/l		0.14	2
103-65-1	n-Propylbenzene	10.9	µg/l		0.1	2
95-47-6	o-Xylene	10.3	µg/l		0.102	2
135-98-8	sec-Butylbenzene	8.76	µg/l		0.133	2
100-42-5	Styrene	8.44	µg/l		0.1	2
98-06-6	tert-Butylbenzene	11	µg/l		0.17	2
127-18-4	Tetrachloroethene	11	µg/l		0.115	2
108-88-3	Toluene	13.5	µg/l		0.105	2
156-60-5	trans-1,2-Dichloroethene	11.2	µg/l		0.152	2
10061-02-6	trans-1,3-Dichloropropene	8.16	µg/l		0.1	2
79-01-6	Trichloroethene	11.7	µg/l		0.151	2
75-01-4	Vinyl chloride	11.6	µg/l		0.239	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 25

% Solids: not dec.

Instrument ID Instru

Analytical Method: 8260B

Prep Method: EPA 5030

Analytical Batch: 1288

Sample ID: KAFS02-SL-SW-02(94101MSD)

Project ID

Project Num

Lab Sample ID: 7278

Date Collected: 7/24/02 Time: 8:30

Dilution Factor: 1

Date Analyzed: 8/5/02 Time: 16:41

Date Received: 7/25/02 9:30:00 AM

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
630-20-6	1,1,1,2-Tetrachloroethane	9.24	µg/l		0.222	2
71-55-6	1,1,1-Trichloroethane	11	µg/l		0.18	2
79-34-5	1,1,2,2-Tetrachloroethane	9.94	µg/l		0.1	2
79-00-5	1,1,2-Trichloroethane	10.3	µg/l		0.143	2
75-34-3	1,1-Dichloroethane	11	µg/l		0.214	2
75-35-4	1,1-Dichloroethene	11	µg/l		0.183	2
563-58-6	1,1-Dichloropropene	11	µg/l		0.1	2
87-61-6	1,2,3-Trichlorobenzene	9.43	µg/l		0.142	2
120-82-1	1,2,4-Trichlorobenzene	9.41	µg/l		0.108	2
95-63-6	1,2,4-Trimethylbenzene	9.56	µg/l		0.111	2
106-93-4	1,2-Dibromoethane	9.85	µg/l		0.117	2
95-50-1	1,2-Dichlorobenzene	10.1	µg/l		0.141	2
107-06-2	1,2-Dichloroethane	10.6	µg/l		0.182	2
78-87-5	1,2-Dichloropropane	10.8	µg/l		0.119	2
108-67-8	1,3,5-Trimethylbenzene	9.44	µg/l		0.113	2
541-73-1	1,3-Dichlorobenzene	9.92	µg/l		0.189	2
142-28-9	1,3-Dichloropropane	9.94	µg/l		0.107	2
106-46-7	1,4-Dichlorobenzene	8.57	µg/l		0.15	2
590-20-7	2,2-Dichloropropane	11.2	µg/l		0.108	2
78-93-3	2-Butanone	10.4	µg/l		0.481	2
95-49-8	2-Chlorotoluene	10	µg/l		0.106	2
591-78-6	2-Hexanone	8.09	µg/l		0.163	2
106-43-4	4-Chlorotoluene	10.4	µg/l		0.1	2
99-87-6	4-Isopropyltoluene	10	µg/l		0.1	2
108-10-1	4-Methyl-2-pentanone	9.76	µg/l		0.128	2
67-64-1	Acetone	9.09	µg/l		0.612	2
71-43-2	Benzene	10.9	µg/l		0.139	2
108-86-1	Bromobenzene	10.6	µg/l		0.156	2
74-97-5	Bromochloromethane	10.7	µg/l		0.165	2
75-27-4	Bromodichloromethane	9.71	µg/l		0.135	2
75-25-2	Bromoform	7.02	µg/l		0.163	2
74-83-9	Bromomethane	8.92	µg/l		0.201	2
75-15-0	Carbon disulfide	11.5	µg/l		0.183	2
56-23-5	Carbon tetrachloride	9.53	µg/l		0.137	2
108-90-7	Chlorobenzene	10.4	µg/l		0.156	2
75-00-3	Chloroethane	10.8	µg/l		0.207	2
67-66-3	Chloroform	10.8	µg/l		0.214	2
74-87-3	Chloromethane	11.1	µg/l		0.173	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

1A - Equivalent

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name:	Analytical Managment Laboratories	Sample ID:	KAFS02-SL-SW-02(94101MSD)
Client ID:	QC ACCOUNT	Project ID	
Matrix:	W	Project Num	
Sample g/ml:	25	Lab Sample ID:	7278
% Solids: not dec.		Date Collected:	7/24/02 Time: 8:30
Instrument ID	Instru	Dilution Factor:	1
Analytical Method:	8260B	Date Analyzed:	8/5/02 Time: 16:41
Prep Method:	EPA 5030	Date Received:	7/25/02 9:30:00 AM
Analytical Batch:	1288		

CAS NO.	COMPOUND	RESULT	Units	Q	MDL	MQL
156-59-2	cis-1,2-Dichloroethene	11.5	µg/l		0.151	2
10061-01-5	cis-1,3-Dichloropropene	8.71	µg/l		0.1	2
124-48-1	Dibromochloromethane	8.08	µg/l		0.133	2
74-95-3	Dibromomethane	10.2	µg/l		0.1	2
75-71-8	Dichlorodifluoromethane	11.1	µg/l		0.5	2
100-41-4	Ethylbenzene	10	µg/l		0.1	2
87-68-3	Hexachlorobutadiene	9.47	µg/l		0.192	2
98-82-8	Isopropylbenzene	10.4	µg/l		0.1	2
75-09-2	Methylene chloride	11.1	µg/l		0.398	2
1634-04-4	Methyl-tert-butyl-ether	10.5	µg/l		0.1	2
m+p xylene	m-Xylene and p-Xylene	20.1	µg/l		0.216	2
91-20-3	Naphthalene	9.45	µg/l		0.139	2
104-51-8	n-Butylbenzene	10	µg/l		0.14	2
103-65-1	n-Propylbenzene	10.4	µg/l		0.1	2
95-47-6	o-Xylene	9.89	µg/l		0.102	2
135-98-8	sec-Butylbenzene	8.5	µg/l		0.133	2
100-42-5	Styrene	8.37	µg/l		0.1	2
98-06-6	tert-Butylbenzene	10.5	µg/l		0.17	2
127-18-4	Tetrachloroethene	10.7	µg/l		0.115	2
108-88-3	Toluene	13.1	µg/l		0.105	2
156-60-5	trans-1,2-Dichloroethene	11.1	µg/l		0.152	2
10061-02-6	trans-1,3-Dichloropropene	8.47	µg/l		0.1	2
79-01-6	Trichloroethene	11.3	µg/l		0.151	2
75-01-4	Vinyl chloride	11.2	µg/l		0.239	2

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I VOA - Equivalent

3 - Equivalent

ORGANIC ANALYSIS DATA SHEET / Laboratory Control Sample Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1288

Prep Batch 5947

Fraction VOC

LCS HSN : 7279

LCSD HSN : 7280

COMPOUND	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC# FLAG	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC#	RPD	RPD FLAG	QC. LIMITS LCL	UCL	RPD
1,1,1,2-Tetrachloroethane	5	4.53	91		5	4.45	89		1.78		80	120	20
1,1,1-Trichloroethane	5	5.45	109		5	5.13	103		6.05		80	120	20
1,1,2,2-Tetrachloroethane	5	5.12	102		5	5.37	107		4.77		80	120	20
1,1,2-Trichloroethane	5	5.5	110		5	5.57	111		1.26		80	120	20
1,1-Dichloroethane	5	5.44	109		5	5.27	105		3.17		80	120	20
1,1-Dichloroethene	5	5.44	109		5	5.06	101		7.24		80	120	20
1,1-Dichloropropene	5	5.51	110		5	5.13	103		7.14		80	120	20
1,2,3-Trichlorobenzene	5	4.67	93		5	4.88	98		4.4		80	120	20
1,2,4-Trichlorobenzene	5	4.68	94		5	4.75	95		1.48		80	120	20
1,2,4-Trimethylbenzene	5	4.97	99		5	4.84	97		2.65		80	120	20
1,2-Dibromoethane	5	4.27	85		5	4.35	87		1.86		80	120	20
1,2-Dichlorobenzene	5	5.46	109		5	5.4	108		1.1		80	120	20
1,2-Dichloroethane	5	5.54	111		5	5.5	110		0.725		80	120	20
1,2-Dichloropropane	5	5.49	110		5	5.39	108		1.84		80	120	20
1,3,5-Trimethylbenzene	5	5.63	113		5	4.8	96		15.9		80	120	20
1,3-Dichlorobenzene	5	5.2	104		5	5.21	104		0.192		80	120	20
1,3-Dichloropropane	5	4.37	87		5	4.46	89		2.04		80	120	20
1,4-Dichlorobenzene	5	5.71	114		5	5.42	108		5.21		80	120	20
2,2-Dichloropropane	5	4.61	92		5	4.25	85		8.13		80	120	20
2-Butanone	5	4.74	95		5	5.61	112		16.8		80	120	20
2-Chlorotoluene	5	5.22	104		5	5	100		4.31		80	120	20
2-Hexanone	5	4.28	86		5	4.29	86		0.233		80	120	20
4-Chlorotoluene	5	5.45	109		5	5.09	102		6.83		80	120	20
4-Isopropyltoluene	5	4.93	99		5	4.76	95		3.51		80	120	20
4-Methyl-2-pentanone	5	5.13	103		5	5.45	109		6.05		80	120	20
Acetone	5	5.67	113		5	5.87	117		3.47		80	120	20
Benzene	5	5.42	108		5	5.26	105		3		80	120	20
Bromobenzene	5	5.59	112		5	5.36	107		4.2		80	120	20
Bromochloromethane	5	5.52	110		5	5.56	111		0.722		80	120	20
Bromodichloromethane	5	5.3	106		5	5.36	107		1.13		80	120	20
Bromoform	5	5.25	105		5	5.33	107		1.51		80	120	20
Bromomethane	5	5.36	107		5	5.17	103		3.61		80	120	20
Carbon disulfide	5	5.54	111		5	5.06	101		9.06		80	120	20
Carbon tetrachloride	5	5.48	110		5	5.08	102		7.58		80	120	20
Chlorobenzene	5	4.53	91		5	4.33	87		4.51		80	120	20
Chloroethane	5	5.59	112		5	5.15	103		8.19		80	120	20
Chloroform	5	5.54	111		5	5.34	107		3.68		80	120	20
Chloromethane	5	5.59	112		5	5.24	105		6.46		80	120	20
cis-1,2-Dichloroethene	5	5.48	110		5	5.25	105		4.29		80	120	20
cis-1,3-Dichloropropene	5	5.32	106		5	5.31	106		0.188		80	120	20

FORM III - Equivalent

3 - Equivalent

ORGANIC ANALYSIS DATA SHEET / Laboratory Control Sample Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1288

Fraction VOC

Prep Batch 5947

LCS HSN : ***7279***

LCSD HSN : ***7280***

COMPOUND	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC# FLAG	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC#	RPD	RPD FLAG	QC. LIMITS LCL	UCL	RPD
Dibromochloromethane	5	4.31	86		5	4.37	87		1.38		80	120	20
Dibromomethane	5	5.36	107		5	5.31	106		0.937		80	120	20
Dichlorodifluoromethane	5	5.52	110		5	5.2	104		5.97		80	120	20
Ethylbenzene	5	4.18	84		5	4.13	83		1.2		80	120	20
Hexachlorobutadiene	5	5.08	102		5	4.9	98		3.61		80	120	20
Isopropylbenzene	5	4.38	88		5	4.19	84		4.43		80	120	20
Methylene chloride	5	5.85	117		5	5.91	118		1.02		80	120	20
Methyl-tert-butyl-ether	5	5.48	110		5	5.53	111		0.908		80	120	20
m-Xylene and p-Xylene	10	8.71	87		10	8.9	89		2.16		80	120	20
Naphthalene	5	5.41	108		5	5.63	113		3.99		80	120	20
n-Butylbenzene	5	4.58	92		5	4.46	89		2.65		80	120	20
n-Propylbenzene	5	5.06	101		5	4.85	97		4.24		80	120	20
o-Xylene	5	4.32	86		5	4.21	84		2.58		80	120	20
sec-Butylbenzene	5	5.28	106		5	5.01	100		5.25		80	120	20
Styrene	5	4.3	86		5	4.27	85		0.7		80	120	20
tert-Butylbenzene	5	5.21	104		5	5.03	101		3.52		80	120	20
Tetrachloroethene	5	4.48	90		5	4.26	85		5.03		80	120	20
Toluene	5	5.39	108		5	5.28	106		2.06		80	120	20
trans-1,2-Dichloroethene	5	5.54	111		5	5.17	103		6.91		80	120	20
trans-1,3-Dichloropropene	5	5.08	102		5	5.22	104		2.72		80	120	20
Trichloroethene	5	5.58	112		5	5.23	105		6.48		80	120	20
Vinyl chloride	5	5.52	110		5	5.04	101		9.09		80	120	20

FORM III - Equivalent

3 - Equivalent

Organic ANALYSIS DATA SHEET / Matrix Spike Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1288

Fraction VOC

Prep Batch 5947

Orig HSN : ***94101*** ***MS HSN :*** ***7277*** ***MSD HSN :*** ***7278***

COMPOUND	Original Amount	SPIKE ADDED	MS Amount	MS % REC #	MS % REC# FLAG	SPIKE ADDED	MSD Amount	MSD % REC #	MSD% REC# FLAG	RPD	RPD FLAG	QC. LIMITS LCL	UCL	RPD
1,1,1,2-Tetrachloroethane	0	10	9.24	92.4		10	9.24	92.4		0		70	130	30
1,1,1-Trichloroethane	0	10	11.4	114		10	11	110		3.04		70	130	30
1,1,2,2-Tetrachloroethane	0	10	9.99	99.9		10	9.94	99.4		0.502		70	130	30
1,1,2-Trichloroethane	0	10	10.8	108		10	10.3	103		3.98		70	130	30
1,1-Dichloroethane	0	10	11.1	111		10	11	110		0.542		70	130	30
1,1-Dichloroethene	0	10	11.1	111		10	11	110		1.45		70	130	30
1,1-Dichloropropene	0	10	11.3	113		10	11	110		2.5		70	130	30
1,2,3-Trichlorobenzene	0	10	9.2	92		10	9.43	94.3		2.47		70	130	30
1,2,4-Trichlorobenzene	0	10	9.45	94.5		10	9.41	94.1		0.424		70	130	30
1,2,4-Trimethylbenzene	0	10	9.97	99.7		10	9.56	95.6		4.2		70	130	30
1,2-Dibromoethane	0	10	9.64	96.4		10	9.85	98.5		2.15		70	130	30
1,2-Dichlorobenzene	0	10	10.4	104		10	10.1	101		2.92		70	130	30
1,2-Dichloroethane	0	10	10.7	107		10	10.6	106		0.842		70	130	30
1,2-Dichloropropane	0	10	10.8	108		10	10.8	108		0.557		70	130	30
1,3,5-Trimethylbenzene	0	10	9.77	97.7		10	9.44	94.4		3.44		70	130	30
1,3-Dichlorobenzene	0	10	10.4	104		10	9.92	99.2		4.63		70	130	30
1,3-Dichloropropane	0	10	9.88	98.8		10	9.94	99.4		0.605		70	130	30
1,4-Dichlorobenzene	0	10	10.4	104		10	8.57	85.7		19.5		70	130	30
2,2-Dichloropropane	0	10	11.6	116		10	11.2	112		3.16		70	130	30
2-Butanone	0	10	9.97	99.7		10	10.4	104		4.13		70	130	30
2-Chlorotoluene	0	10	10.6	106		10	10	100		5.64		70	130	30
2-Hexanone	0	10	8.42	84.2		10	8.09	80.9		4		70	130	30
4-Chlorotoluene	0	10	10.9	109		10	10.4	104		4.51		70	130	30
4-Isopropyltoluene	0	10	10.6	106		10	10	100		5.62		70	130	30
4-Methyl-2-pentanone	0	10	10	100		10	9.76	97.6		2.53		70	130	30
Acetone	0	10	9.46	94.6		10	9.09	90.9		3.99		70	130	30
Benzene	0	10	11.2	112		10	10.9	109		2.98		70	130	30
Bromobenzene	0	10	10.9	109		10	10.6	106		2.87		70	130	30
Bromochloromethane	0	10	10.6	106		10	10.7	107		1.22		70	130	30
Bromodichloromethane	0	10	9.8	98		10	9.71	97.1		0.923		70	130	30
Bromoform	0	10	7.31	73.1		10	7.02	70.2		4.05		70	130	30
Bromomethane	0	10	8.84	88.4		10	8.92	89.2		0.901		70	130	30
Carbon disulfide	0	10	11.5	115		10	11.5	115		0.26		70	130	30
Carbon tetrachloride	0	10	9.94	99.4		10	9.53	95.3		4.21		70	130	30
Chlorobenzene	0	10	10.4	104		10	10.4	104		0.0963		70	130	30
Chloroethane	0	10	11.1	111		10	10.8	108		3.19		70	130	30
Chloroform	0	10	11	110		10	10.8	108		1.19		70	130	30
Chloromethane	0	10	11.8	118		10	11.1	111		5.77		70	130	30
cis-1,2-Dichloroethene	0	10	11.5	115		10	11.5	115		0.0871		70	130	30
cis-1,3-Dichloropropene	0	10	8.9	89		10	8.71	87.1		2.16		70	130	30

FORM III

3 - Equivalent

Organic ANALYSIS DATA SHEET / Matrix Spike Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1288

Fraction VOC

Prep Batch 5947

Orig HSN : ***94101*** ***MS HSN :*** ***7277*** ***MSD HSN :*** ***7278***

COMPOUND	Original Amount	SPIKE ADDED	MS Amount	MS % REC #	MS % REC# FLAG	SPIKE ADDED	MSD Amount	MSD % REC #	MSD% REC# FLAG	RPD	RPD FLAG	QC. LIMITS LCL	UCL	RPD
Dibromochloromethane	0	10	8.09	80.9		10	8.08	80.8		0.124		70	130	30
Dibromomethane	0	10	11.2	112		10	10.2	102		9.48		70	130	30
Dichlorodifluoromethane	0	10	11.9	119		10	11.1	111		7.02		70	130	30
Ethylbenzene	0	10	10.5	104		10	10	100		4.2		70	130	30
Hexachlorobutadiene	0	10	10.3	103		10	9.47	94.7		8.3		70	130	30
Isopropylbenzene	0	10	10.6	106		10	10.4	104		1.81		70	130	30
Methylene chloride	0	10	11.2	112		10	11.1	111		0.985		70	130	30
Methyl-tert-butyl-ether	0	10	10.3	103		10	10.5	105		1.83		70	130	30
m-Xylene and p-Xylene	0	20	20.3	102		20	20.1	100		1.14		70	130	30
Naphthalene	0	10	8.86	88.6		10	9.45	94.5		6.44		70	130	30
n-Butylbenzene	0	10	10.4	104		10	10	100		3.52		70	130	30
n-Propylbenzene	0	10	10.9	109		10	10.4	104		4.42		70	130	30
o-Xylene	0	10	10.3	103		10	9.89	98.9		3.87		70	130	30
sec-Butylbenzene	0	10	8.76	87.6		10	8.5	85		3.01		70	130	30
Styrene	0	10	8.44	84.4		10	8.37	83.7		0.833		70	130	30
tert-Butylbenzene	0	10	11	110		10	10.5	105		4.66		70	130	30
Tetrachloroethene	0	10	11	110		10	10.7	107		2.4		70	130	30
Toluene	2.450	10	13.5	110		10	13.1	106		2.71		70	130	30
trans-1,2-Dichloroethene	0	10	11.2	112		10	11.1	111		1.43		70	130	30
trans-1,3-Dichloropropene	0	10	8.16	81.6		10	8.47	84.7		3.73		70	130	30
Trichloroethene	0	10	11.7	117		10	11.3	113		3.04		70	130	30
Vinyl chloride	0	10	11.6	116		10	11.2	112		3.78		70	130	30

FORM III

SVOC QAQC
Sample Analysis

Quality Control Association Form

Lab Name Analytical Management Laboratories **Fraction** SVOC

Analytical Batch	Prep Batch	Date Analyzed	Date Prepared	Lab Sample ID	Original Sample	Sample Type	Project Number
1109	5815	8/5/02	7/30/02	7125		MB	
1109	5815	8/6/02	7/30/02	7126		LCS	
1109	5815	8/6/02	7/30/02	7127		LCSD	
1109	5815	8/6/02	7/30/02	96701		SAMPLE	967
1109	5815	8/6/02	7/30/02	96702		SAMPLE	967

Batch Reviewed by _____ Date Reviewed 8/7/02 Date Printed *Wednesday, August 07, 2002*

Form 2 - Equivalent

SEMI-VOLATILE SYSTEM MONITORING COMPOUND RECOVERY

Lab Name: Analytical Managment Laboratories

Analytical Batch 1109

Prep Batch 5815

No.	Lab Sample ID	2-Fluorophenol				Phenol-d5				Nitrobenzene-d5				2-Fluorobiphenyl				2,4,6-Tribromophenol				Terphenyl-d14			
		% Rec	Low	High	F	% Rec	Low	High	F	% Rec	Low	High	F	% Rec	Low	High	F	% Rec	Low	High	F	% Rec	Low	High	F
1	7125	53	45	135		57.5	45	135		70.8	45	135		82.2	45	135		60.3	45	135		104.5	60	120	
2	7126	73.1	45	135		72	45	135		99.9	45	135		100.6	45	135		81.1	45	135		107.1	60	120	
3	7127	69.1	45	135		68.1	45	135		98.3	45	135		96.9	45	135		76.7	45	135		107.2	60	120	
4	96701	45	45	135		35.9	45	135	*	73.5	45	135		88	45	135		70.7	45	135		101.7	45	135	
5	96702		45	135			45	135			45	135			45	135			45	135			45	135	

3 - Equivalent

ORGANIC ANALYSIS DATA SHEET / Laboratory Control Sample Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1109

Fraction SVOC

Prep Batch 5815

LCS HSN : 7126

LCSD HSN : 7127

COMPOUND	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC# FLAG	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC#	RPD	RPD FLAG	QC. LIMITS LCL	UCL	RPD
1,2,4-Trichlorobenzene	50	46.1	92.1		50	44.6	89.2		3.22		45	135	50
1,2-Dichlorobenzene	50	44.8	89.5		50	43.4	86.9		2.99		45	135	50
1,3-Dichlorobenzene	50	45.2	90.4		50	43.3	86.5		4.39		45	135	50
1,4-Dichlorobenzene	50	43.2	86.5		50	44.7	89.4		3.32		45	135	50
2,4,5-Trichlorophenol	50	48.6	97.1		50	46.2	92.4		4.96		45	135	50
2,4,6-Trichlorophenol	50	48.1	96.3		50	44.6	89.3		7.54		45	135	50
2,4-Dichlorophenol	50	46.3	92.5		50	43.7	87.5		5.62		45	135	50
2,4-Dimethylphenol	50	40.6	81.1		50	38.4	76.9		5.34		45	135	50
2,4-Dinitrophenol	50	34.6	69.2		50	22.3	44.6	*	43.2		45	135	50
2,4-Dinitrotoluene	50	51.1	102		50	45.6	91.2		11.5		45	135	50
2,6-Dinitrotoluene	50	49.4	98.9		50	44.2	88.4		11.2		45	135	50
2-Chloronaphthalene	50	46.6	93.2		50	45.5	91		2.35		45	135	50
2-Chlorophenol	50	45.6	91.3		50	43.3	86.6		5.29		45	135	50
2-Methyl-4,6-dinitrophenol	50	38.4	76.9		50	34.2	68.5		11.5		45	135	50
2-Methylnaphthalene	50	45.4	90.9		50	44.5	88.9		2.18		45	135	50
2-Methylphenol (o-Cresol)	50	43.5	86.9		50	41.2	82.3		5.46		45	135	50
2-Nitroaniline	50	49.7	99.3		50	46.7	93.4		6.14		45	135	50
2-Nitrophenol	50	45.1	90.2		50	42.9	85.7		5.09		45	135	50
3-Nitroaniline	50	46	92.1		50	42.7	85.4		7.55		45	135	50
4-Bromophenyl-phenylether	50	46.8	93.7		50	45.6	91.2		2.7		45	135	50
4-Chloro-3-methylphenol	50	48.8	97.7		50	46.1	92.1		5.86		45	135	50
4-Chloroaniline	50	31.7	63.5		50	33.7	67.3		5.93		45	135	50
4-Chlorophenyl-phenylether	50	50.4	101		50	47.3	94.5		6.39		45	135	50
4-Methylphenol (p-Cresol)	50	44.4	88.8		50	41.3	82.5		7.33		45	135	50
4-Nitroaniline	50	53.1	106		50	48.1	96.1		9.96		45	135	50
4-Nitrophenol	50	63.8	128		50	59.5	119		6.86		45	135	50
Acenaphthene	50	48.2	96.5		50	48.3	96.6		.062		45	135	50
Acenaphthylene	50	54.8	110		50	53.3	107		2.78		45	135	50
Anthracene	50	45.8	91.6		50	46.3	92.6		1.04		45	135	50
Benzo(a)anthracene	50	50.2	100		50	46.7	93.4		7.28		45	135	50
Benzo(a)pyrene	50	46.6	93.2		50	45.9	91.8		1.49		45	135	50
Benzo(b)fluoranthene	50	50.8	102		50	50.7	101		0.237		45	135	50
Benzo(g,h,i)perylene	50	52	104		50	51.7	103		0.714		45	135	50
Benzo(k)fluoranthene	50	49.6	99.3		50	50.3	101		1.42		45	135	50
Bis(2-Chloroethoxy)methane	50	55.5	111		50	53.1	106		4.44		45	135	50
Bis(2-Chloroethyl)ether	50	44.6	89.1		50	41.2	82.4		7.76		45	135	50
bis(2-chloroisopropyl)ethe	50	46.3	92.6		50	43.1	86.1		7.21		45	135	50
bis(2-ethylhexyl)phthalate	50	42.4	84.8		50	36.3	72.7		15.4		45	135	50
Butylbenzylphthalate	50	44.9	89.9		50	40.5	81		10.4		45	135	50
Chrysene	50	50.3	101		50	50.7	102		0.811		45	135	50

FORM III - Equivalent

3 - Equivalent

ORGANIC ANALYSIS DATA SHEET / Laboratory Control Sample Summary Sheet

Lab Name: Analytical Managment Laboratories

Analytical Batch 1109

Fraction SVOC

Prep Batch 5815

LCS HSN : ***7126***

LCSD HSN : ***7127***

COMPOUND	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC# FLAG	SPIKE ADDED	LCS Amount	LCS % REC #	LCS % REC#	RPD	RPD FLAG	QC. LIMITS LCL	UCL	RPD
Dibenz(a,h)anthracene	50	51.1	102		50	49.1	98.2		3.87		45	135	50
Dibenzofuran	50	50.4	101		50	49	98		2.68		45	135	50
Diethylphthalate	50	51.8	104		50	46	91.9		11.9		45	135	50
Dimethylphthalate	50	48.4	96.7		50	43.7	87.4		10.1		45	135	50
Di-n-butylphthalate	50	48.7	97.5		50	43.4	86.9		11.5		45	135	50
Di-n-octylphthalate	50	42.6	85.3		50	35	70		19.6		45	135	50
Fluoranthene	50	54	108		50	54	108		0.148		45	135	50
Fluorene	50	51.6	103		50	50.5	101		2.04		45	135	50
Hexachlorobenzene	50	49.1	98.2		50	49.9	99.8		1.58		45	135	50
Hexachlorobutadiene	50	46	91.9		50	44.6	89.3		2.89		45	135	50
Hexachlorocyclopentadiene	50	55.2	110		50	50.7	102		8.38		45	135	50
Hexachloroethane	50	44.9	89.8		50	45	90		0.267		45	135	50
Indeno(1,2,3-cd)pyrene	50	52.5	105		50	49.4	98.7		6.24		45	135	50
Isophorone	50	62.4	125		50	59.6	119		4.61		45	135	50
Naphthalene	50	45.9	91.7		50	45.5	91.1		0.722		45	135	50
Nitrobenzene	50	45.5	90.9		50	45.8	91.6		0.789		45	135	50
N-Nitroso-di-n-propylamine	50	44.7	89.5		50	39.9	79.8		11.4		45	135	50
Pentachlorophenol	50	46.2	92.3		50	45.4	90.7		1.77		45	135	50
Phenanthrene	50	49.4	98.7		50	50.9	102		3.01		45	135	50
Phenol	50	45	89.9		50	42.9	85.7		4.8		45	135	50
Pyrene	50	46.8	93.5		50	48.6	97.2		3.84		45	135	50

FORM III - Equivalent

1 - Equivalent

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 1000

% Solids: not dec. 100.00

Instrument ID S5973A

Extract Volume: 1 (mL)

Dilution Factor: 1

Analytical Method: EPA 8270

Prep Method: EPA 3510

Sample ID: MB for HBN 5815 [EXTR/1519]

Project ID

Project Num

Lab Sample ID: 7125

Analytical Batch 1109 Prep Batch 5815

Date Collected: Time:

Date Received: 7/30/02 5:00:00 PM

Date Analyzed: 8/5/02 Time: 22:15

Date Prepared: 7/30/02 Time: 17:00

CAS NO.	COMPOUND	RESULT	Units	Q	RL	MQL
120-82-1	1,2,4-Trichlorobenzene		µg/l	U	0.25	10
95-50-1	1,2-Dichlorobenzene		µg/l	U	0.23	10
541-73-1	1,3-Dichlorobenzene		µg/l	U	0.36	10
106-46-7	1,4-Dichlorobenzene		µg/l	U	0.2	10
95-95-4	2,4,5-Trichlorophenol		µg/l	U	0.86	10
88-06-2	2,4,6-Trichlorophenol		µg/l	U	0.67	10
120-83-2	2,4-Dichlorophenol		µg/l	U	0.36	10
105-67-9	2,4-Dimethylphenol		µg/l	U	0.26	10
51-28-5	2,4-Dinitrophenol		µg/l	U	1.59	10
121-14-2	2,4-Dinitrotoluene		µg/l	U	0.35	10
606-20-2	2,6-Dinitrotoluene		µg/l	U	0.24	10
91-58-7	2-Chloronaphthalene		µg/l	U	0.16	10
95-57-8	2-Chlorophenol		µg/l	U	0.12	10
534-52-1	2-Methyl-4,6-dinitrophenol		µg/l	U	1	10
91-57-6	2-Methylnaphthalene		µg/l	U	2.62	10
95-48-7	2-Methylphenol (o-Cresol)		µg/l	U	0.31	10
88-74-4	2-Nitroaniline		µg/l	U	0.43	10
88-75-5	2-Nitrophenol		µg/l	U	0.35	10
99-09-2	3-Nitroaniline		µg/l	U	0.34	10
101-55-3	4-Bromophenyl-phenylether		µg/l	U	0.36	10
59-50-7	4-Chloro-3-methylphenol		µg/l	U	0.25	10
106-47-8	4-Chloroaniline		µg/l	U	0.87	10
7005-72-3	4-Chlorophenyl-phenylether		µg/l	U	0.77	10
106-44-5	4-Methylphenol (p-Cresol)		µg/l	U	0.15	10
100-01-6	4-Nitroaniline		µg/l	U	3.53	10
100-02-7	4-Nitrophenol		µg/l	U	0.81	10
83-32-9	Acenaphthene		µg/l	U	0.18	10
208-96-8	Acenaphthylene		µg/l	U	0.12	10
120-12-7	Anthracene		µg/l	U	0.22	10
56-55-3	Benzo(a)anthracene		µg/l	U	0.34	10
50-32-8	Benzo(a)pyrene		µg/l	U	0.66	10
205-99-2	Benzo(b)fluoranthene		µg/l	U	1.66	10
191-24-2	Benzo(g,h,i)perylene		µg/l	U	2.44	10
207-08-9	Benzo(k)fluoranthene		µg/l	U	3.02	10

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I SVOA - Equivalent

1 - Equivalent

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 1000

% Solids: not dec. 100.00

Instrument ID S5973A

Extract Volume: 1 (mL)

Dilution Factor: 1

Analytical Method: EPA 8270

Prep Method: EPA 3510

Sample ID: MB for HBN 5815 [EXTR/1519]

Project ID

Project Num

Lab Sample ID: 7125

Analytical Batch 1109 Prep Batch 5815

Date Collected: Time:

Date Received: 7/30/02 5:00:00 PM

Date Analyzed: 8/5/02 Time: 22:15

Date Prepared: 7/30/02 Time: 17:00

CAS NO.	COMPOUND	RESULT	Units	Q	RL	MQL
111-91-1	Bis(2-Chloroethoxy)methane		µg/l	U	0.21	10
111-44-4	Bis(2-Chloroethyl)ether		µg/l	U	0.26	10
108-60-1	bis(2-chloroisopropyl)ethe		µg/l	U	0.44	10
117-81-7	bis(2-ethylhexyl)phthalate		µg/l	U	0.93	10
85-68-7	Butylbenzylphthalate		µg/l	U	0.41	10
218-01-9	Chrysene		µg/l	U	0.4	10
53-70-3	Dibenz(a,h)anthracene		µg/l	U	2.26	10
132-64-9	Dibenzofuran		µg/l	U	0.17	10
84-66-2	Diethylphthalate		µg/l	U	0.41	10
131-11-3	Dimethylphthalate		µg/l	U	0.31	10
84-74-2	Di-n-butylphthalate		µg/l	U	0.22	10
117-84-0	Di-n-octylphthalate		µg/l	U	1.88	10
206-44-0	Fluoranthene		µg/l	U	0.22	10
86-73-7	Fluorene		µg/l	U	0.42	10
118-74-1	Hexachlorobenzene		µg/l	U	0.62	10
87-68-3	Hexachlorobutadiene		µg/l	U	0.95	10
77-47-4	Hexachlorocyclopentadiene		µg/l	U	0.32	10
67-72-1	Hexachloroethane		µg/l	U	0.31	10
193-39-5	Indeno(1,2,3-cd)pyrene		µg/l	U	3.24	10
78-59-1	Isophorone		µg/l	U	0.12	10
91-20-3	Naphthalene		µg/l	U	0.24	10
98-95-3	Nitrobenzene		µg/l	U	0.33	10
621-64-7	N-Nitroso-di-n-propylamine		µg/l	U	0.36	10
86-30-6	N-Nitrosodiphenylamine		µg/l	U	0.14	10
87-86-5	Pentachlorophenol		µg/l	U	0.9	10
85-01-8	Phenanthrene		µg/l	U	0.24	10
108-95-2	Phenol		µg/l	U	0.12	10
129-00-0	Pyrene		µg/l	U	0.4	10

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I SVOA - Equivalent

1 - Equivalent

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 1000

% Solids: not dec. 100.00

Instrument ID S5973A

Extract Volume: 1 (mL)

Dilution Factor: 1

Analytical Method: EPA 8270

Prep Method: EPA 3510

Sample ID: LCS for HBN 5815 [EXTR/1519]

Project ID

Project Num

Lab Sample ID: 7126

Analytical Batch 1109 Prep Batch 5815

Date Collected: Time:

Date Received: 7/30/02 5:00:00 PM

Date Analyzed: 8/6/02 Time: 0:46

Date Prepared: 7/30/02 Time: 17:00

CAS NO.	COMPOUND	RESULT	Units	Q	RL	MQL
120-82-1	1,2,4-Trichlorobenzene	46.1	µg/l		0.25	10
95-50-1	1,2-Dichlorobenzene	44.8	µg/l		0.23	10
541-73-1	1,3-Dichlorobenzene	45.2	µg/l		0.36	10
106-46-7	1,4-Dichlorobenzene	43.2	µg/l		0.2	10
95-95-4	2,4,5-Trichlorophenol	48.6	µg/l		0.86	10
88-06-2	2,4,6-Trichlorophenol	48.1	µg/l		0.67	10
120-83-2	2,4-Dichlorophenol	46.3	µg/l		0.36	10
105-67-9	2,4-Dimethylphenol	40.6	µg/l		0.26	10
51-28-5	2,4-Dinitrophenol	34.6	µg/l		1.59	10
121-14-2	2,4-Dinitrotoluene	51.1	µg/l		0.35	10
606-20-2	2,6-Dinitrotoluene	49.4	µg/l		0.24	10
91-58-7	2-Chloronaphthalene	46.6	µg/l		0.16	10
95-57-8	2-Chlorophenol	45.6	µg/l		0.12	10
534-52-1	2-Methyl-4,6-dinitrophenol	38.4	µg/l		1	10
91-57-6	2-Methylnaphthalene	45.4	µg/l		2.62	10
95-48-7	2-Methylphenol (o-Cresol)	43.5	µg/l		0.31	10
88-74-4	2-Nitroaniline	49.7	µg/l		0.43	10
88-75-5	2-Nitrophenol	45.1	µg/l		0.35	10
99-09-2	3-Nitroaniline	46	µg/l		0.34	10
101-55-3	4-Bromophenyl-phenylether	46.8	µg/l		0.36	10
59-50-7	4-Chloro-3-methylphenol	48.8	µg/l		0.25	10
106-47-8	4-Chloroaniline	31.7	µg/l		0.87	10
7005-72-3	4-Chlorophenyl-phenylether	50.4	µg/l		0.77	10
106-44-5	4-Methylphenol (p-Cresol)	44.4	µg/l		0.15	10
100-01-6	4-Nitroaniline	53.1	µg/l		3.53	10
100-02-7	4-Nitrophenol	63.8	µg/l		0.81	10
83-32-9	Acenaphthene	48.2	µg/l		0.18	10
208-96-8	Acenaphthylene	54.8	µg/l		0.12	10
120-12-7	Anthracene	45.8	µg/l		0.22	10
56-55-3	Benzo(a)anthracene	50.2	µg/l		0.34	10
50-32-8	Benzo(a)pyrene	46.6	µg/l		0.66	10
205-99-2	Benzo(b)fluoranthene	50.8	µg/l		1.66	10
191-24-2	Benzo(g,h,i)perylene	52	µg/l		2.44	10
207-08-9	Benzo(k)fluoranthene	49.6	µg/l		3.02	10

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I SVOA - Equivalent

1 - Equivalent

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 1000

% Solids: not dec. 100.00

Instrument ID S5973A

Extract Volume: 1 (mL)

Dilution Factor: 1

Analytical Method: EPA 8270

Prep Method: EPA 3510

Sample ID: LCS for HBN 5815 [EXTR/1519]

Project ID

Project Num

Lab Sample ID: 7126

Analytical Batch 1109 Prep Batch 5815

Date Collected: Time:

Date Received: 7/30/02 5:00:00 PM

Date Analyzed: 8/6/02 Time: 0:46

Date Prepared: 7/30/02 Time: 17:00

CAS NO.	COMPOUND	RESULT	Units	Q	RL	MQL
111-91-1	Bis(2-Chloroethoxy)methane	55.5	µg/l		0.21	10
111-44-4	Bis(2-Chloroethyl)ether	44.6	µg/l		0.26	10
108-60-1	bis(2-chloroisopropyl)ethe	46.3	µg/l		0.44	10
117-81-7	bis(2-ethylhexyl)phthalate	42.4	µg/l		0.93	10
85-68-7	Butylbenzylphthalate	44.9	µg/l		0.41	10
218-01-9	Chrysene	50.3	µg/l		0.4	10
53-70-3	Dibenz(a,h)anthracene	51.1	µg/l		2.26	10
132-64-9	Dibenzofuran	50.4	µg/l		0.17	10
84-66-2	Diethylphthalate	51.8	µg/l		0.41	10
131-11-3	Dimethylphthalate	48.4	µg/l		0.31	10
84-74-2	Di-n-butylphthalate	48.7	µg/l		0.22	10
117-84-0	Di-n-octylphthalate	42.6	µg/l		1.88	10
206-44-0	Fluoranthene	54	µg/l		0.22	10
86-73-7	Fluorene	51.6	µg/l		0.42	10
118-74-1	Hexachlorobenzene	49.1	µg/l		0.62	10
87-68-3	Hexachlorobutadiene	46	µg/l		0.95	10
77-47-4	Hexachlorocyclopentadiene	55.2	µg/l		0.32	10
67-72-1	Hexachloroethane	44.9	µg/l		0.31	10
193-39-5	Indeno(1,2,3-cd)pyrene	52.5	µg/l		3.24	10
78-59-1	Isophorone	62.4	µg/l		0.12	10
91-20-3	Naphthalene	45.9	µg/l		0.24	10
98-95-3	Nitrobenzene	45.5	µg/l		0.33	10
621-64-7	N-Nitroso-di-n-propylamine	44.7	µg/l		0.36	10
86-30-6	N-Nitrosodiphenylamine		µg/l	U	0.14	10
87-86-5	Pentachlorophenol	46.2	µg/l		0.9	10
85-01-8	Phenanthrene	49.4	µg/l		0.24	10
108-95-2	Phenol	45	µg/l		0.12	10
129-00-0	Pyrene	46.8	µg/l		0.4	10

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I SVOA - Equivalent

1 - Equivalent

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 1000

% Solids: not dec. 100.00

Instrument ID S5973A

Extract Volume: 1 (mL)

Dilution Factor: 1

Analytical Method: EPA 8270

Prep Method: EPA 3510

Sample ID: LCSD for HBN 5815 [EXTR/1519]

Project ID

Project Num

Lab Sample ID: 7127

Analytical Batch 1109 Prep Batch 5815

Date Collected: Time:

Date Received: 7/30/02 5:00:00 PM

Date Analyzed: 8/6/02 Time: 1:16

Date Prepared: 7/30/02 Time: 17:00

CAS NO.	COMPOUND	RESULT	Units	Q	RL	MQL
120-82-1	1,2,4-Trichlorobenzene	44.6	µg/l		0.25	10
95-50-1	1,2-Dichlorobenzene	43.4	µg/l		0.23	10
541-73-1	1,3-Dichlorobenzene	43.3	µg/l		0.36	10
106-46-7	1,4-Dichlorobenzene	44.7	µg/l		0.2	10
95-95-4	2,4,5-Trichlorophenol	46.2	µg/l		0.86	10
88-06-2	2,4,6-Trichlorophenol	44.6	µg/l		0.67	10
120-83-2	2,4-Dichlorophenol	43.7	µg/l		0.36	10
105-67-9	2,4-Dimethylphenol	38.4	µg/l		0.26	10
51-28-5	2,4-Dinitrophenol	22.3	µg/l		1.59	10
121-14-2	2,4-Dinitrotoluene	45.6	µg/l		0.35	10
606-20-2	2,6-Dinitrotoluene	44.2	µg/l		0.24	10
91-58-7	2-Chloronaphthalene	45.5	µg/l		0.16	10
95-57-8	2-Chlorophenol	43.3	µg/l		0.12	10
534-52-1	2-Methyl-4,6-dinitrophenol	34.2	µg/l		1	10
91-57-6	2-Methylnaphthalene	44.5	µg/l		2.62	10
95-48-7	2-Methylphenol (o-Cresol)	41.2	µg/l		0.31	10
88-74-4	2-Nitroaniline	46.7	µg/l		0.43	10
88-75-5	2-Nitrophenol	42.9	µg/l		0.35	10
99-09-2	3-Nitroaniline	42.7	µg/l		0.34	10
101-55-3	4-Bromophenyl-phenylether	45.6	µg/l		0.36	10
59-50-7	4-Chloro-3-methylphenol	46.1	µg/l		0.25	10
106-47-8	4-Chloroaniline	33.7	µg/l		0.87	10
7005-72-3	4-Chlorophenyl-phenylether	47.3	µg/l		0.77	10
106-44-5	4-Methylphenol (p-Cresol)	41.3	µg/l		0.15	10
100-01-6	4-Nitroaniline	48.1	µg/l		3.53	10
100-02-7	4-Nitrophenol	59.5	µg/l		0.81	10
83-32-9	Acenaphthene	48.3	µg/l		0.18	10
208-96-8	Acenaphthylene	53.3	µg/l		0.12	10
120-12-7	Anthracene	46.3	µg/l		0.22	10
56-55-3	Benzo(a)anthracene	46.7	µg/l		0.34	10
50-32-8	Benzo(a)pyrene	45.9	µg/l		0.66	10
205-99-2	Benzo(b)fluoranthene	50.7	µg/l		1.66	10
191-24-2	Benzo(g,h,i)perylene	51.7	µg/l		2.44	10
207-08-9	Benzo(k)fluoranthene	50.3	µg/l		3.02	10

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I SVOA - Equivalent

1 - Equivalent

SEMI-VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: Analytical Managment Laboratories

Client ID: QC ACCOUNT

Matrix: W

Sample g/ml: 1000

% Solids: not dec. 100.00

Instrument ID S5973A

Extract Volume: 1 (mL)

Dilution Factor: 1

Analytical Method: EPA 8270

Prep Method: EPA 3510

Sample ID: LCSD for HBN 5815 [EXTR/1519]

Project ID

Project Num

Lab Sample ID: 7127

Analytical Batch 1109 Prep Batch 5815

Date Collected: Time:

Date Received: 7/30/02 5:00:00 PM

Date Analyzed: 8/6/02 Time: 1:16

Date Prepared: 7/30/02 Time: 17:00

CAS NO.	COMPOUND	RESULT	Units	Q	RL	MQL
111-91-1	Bis(2-Chloroethoxy)methane	53.1	µg/l		0.21	10
111-44-4	Bis(2-Chloroethyl)ether	41.2	µg/l		0.26	10
108-60-1	bis(2-chloroisopropyl)ethe	43.1	µg/l		0.44	10
117-81-7	bis(2-ethylhexyl)phthalate	36.3	µg/l		0.93	10
85-68-7	Butylbenzylphthalate	40.5	µg/l		0.41	10
218-01-9	Chrysene	50.7	µg/l		0.4	10
53-70-3	Dibenz(a,h)anthracene	49.1	µg/l		2.26	10
132-64-9	Dibenzofuran	49	µg/l		0.17	10
84-66-2	Diethylphthalate	46	µg/l		0.41	10
131-11-3	Dimethylphthalate	43.7	µg/l		0.31	10
84-74-2	Di-n-butylphthalate	43.4	µg/l		0.22	10
117-84-0	Di-n-octylphthalate	35	µg/l		1.88	10
206-44-0	Fluoranthene	54	µg/l		0.22	10
86-73-7	Fluorene	50.5	µg/l		0.42	10
118-74-1	Hexachlorobenzene	49.9	µg/l		0.62	10
87-68-3	Hexachlorobutadiene	44.6	µg/l		0.95	10
77-47-4	Hexachlorocyclopentadiene	50.7	µg/l		0.32	10
67-72-1	Hexachloroethane	45	µg/l		0.31	10
193-39-5	Indeno(1,2,3-cd)pyrene	49.4	µg/l		3.24	10
78-59-1	Isophorone	59.6	µg/l		0.12	10
91-20-3	Naphthalene	45.5	µg/l		0.24	10
98-95-3	Nitrobenzene	45.8	µg/l		0.33	10
621-64-7	N-Nitroso-di-n-propylamine	39.9	µg/l		0.36	10
86-30-6	N-Nitrosodiphenylamine		µg/l	U	0.14	10
87-86-5	Pentachlorophenol	45.4	µg/l		0.9	10
85-01-8	Phenanthrene	50.9	µg/l		0.24	10
108-95-2	Phenol	42.9	µg/l		0.12	10
129-00-0	Pyrene	48.6	µg/l		0.4	10

EPA Lab Code:KS00902

Kansas Certification:E-10254

FORM I SVOA - Equivalent

Analytical Management Laboratories, Inc.
15130 B South Keeler
Olathe, Kansas 66062
Phone (913) 829-0101
Fax (913) 829-1181

14652

Chain of Custody Record / Request for Analysis

Client Contact Name: Scott Siegwald
Company Name: Arrow Head Contracting, Inc.
Address: 12520 Metcalf Ave, Suite 160
City, State, Zip: Overland Park, KS 66213
Phone #: (913) 814-9554
Fax #: (913) 814-5597
(314) 381-5079

Project Name: St. Louis AAP
Project Number: 00-215
Purchase Order Number:
Project Due Date: 12/1/02
Project Comments: 7-day TAT
Sampler's Signature:

Laboratory Project Number: 1588

Analyses/Method to be Performed (Check all that apply)

Lab ID	Sample Description	Date	Time	Matrix	Total # Containers	HCl	HNO_3	NaOH	H_2SO_4	Unpreserved	4° C	TPH Diesel	TPH Gasoline	BTEX	MTBE	Volatiles (VOCs) 8260	BNAs (SVOCs) 8270	Pesticides/PCBs 8082	PCBs	TCLP Metals 6010, 7470	Lead	Flash Point	Paint Filter	pH	Oil & Grease 1664	160.2	410.4	Total Cyanide 335.2	Comments:
1588-01	RADW-112102	11/21/02	0500	Water	11	X	X		X		X					X	X		X	X					X	X	X	X	
1588-02	OIL LINES	11/21/02	1010	Oil	1						X								X										
3																													
4																													
5																													
6																													
7																													
8																													
9																													
10																													

Preservative: List total number of bottles for each preservative type.

Please include any information that may be useful in the analysis of the sample. Example: high concentration

CUSTODY						
Relinquished By: Scott Siegwald	Date/Time: 11/21/02 1900	Received By:	Date/Time: 11/22/02 09:45am
Relinquished By:	Date/Time:	Received By:	Date/Time:

By signing the request (chain of custody) you are ordering work from Analytical Management Laboratories, Inc. which constitutes the acceptance of the terms and conditions on the back of this form.

Delivery Method	Custody Seals	Coolant	Cooler Temp.	Receiving Comments:
☐ Delivered ☐ Courier EX ☐ Airbill #: 0004866637602	☑ Yes ☐ No ☑ Intact ☐ Broken	☑ Ice ☐ Blue Ice ☐ None	2.7 °C ☐ Temp. Blank ☑ Cooler	

APPENDIX F
ASBESTOS AIR CLEARANCE SAMPLE RESULTS

FINAL AIR CLEARANCE RESULTS

Clearance Samples - Basement

A-34209

Asbestos Consulting & Testing

14953 W. 101st Terr.
Lenexa, Kansas 66215
913-492-1337 Fax 913-492-1392

PCM ANALYSIS OF AIR SAMPLES

CLIENT NAME: Arrowhead Contracting Inc.
ADDRESS: 12920 Metcalf, Suite 150, Overland Park, Kansas 66213
PROJECT NAME: St. Louis Army Ammunition Plant
4800 Goodfellow - Building 3
St. Louis, Missouri 63120

Sample Date: 8/8/02
Analysis Date: 8/ /02

FILTER TYPE: 25mm, 0.8 um MCE ANALYTICAL METHOD: NIOSH 7400 Blank Average = 0

Client Sample ID	Activity/ Location	Sample Type	Pump ID	Flow Rate (l/min) Start	End	Avg	Running Time Start	Stop	Total Minutes	Volume Liters	Fibers	Fields	Fibers/ mm2	Fibers/ cc
FB-360	Field Blank	BLK									0	100	0.0	NA
FB-361	Field Blank	BLK									0	100	0.0	
St.LA-362	G-13	CL	HV-009	15.00	15.00	15.00	7:15	10:35	200	3000	5	100	<7.01	<0.001
St.LA-363	G-17	CL	HV-228	15.00	15.00	15.00	7:16	10:36	200	3000	3.5	100	<7.01	<0.001
St.LA-364	J-20	CL	MD-12	15.00	15.00	15.00	7:17	10:37	200	3000	4.5	100	<7.01	<0.001
St.LA-365	E-5	CL	HV-956	15.00	15.00	15.00	7:18	10:38	200	3000	6	100	7.64	<0.001
St.LA-366	B-21	CL	HV-217	15.00	15.00	15.00	7:19	10:39	200	3000	4.5	100	<7.01	<0.001
St.LA-367	H-5	CL	HV-223	15.00	15.00	15.00	7:20	10:40	200	3000	3	100	<7.01	<0.001
St.LA-368	F-19	CL	HV-302	15.00	15.00	15.00	7:21	10:41	200	3000	2	100	<7.01	<0.001
St.LA-369	C-13	CL	HV-689	15.00	15.00	15.00	7:22	10:42	200	3000	3.5	100	<7.01	<0.001
St.LA-370	J-31	CL	HV-201	15.00	15.00	15.00	7:23	10:43	200	3000	1.5	100	<7.01	<0.001
St.LA-371	C-41	CL	HV-303	15.00	15.00	15.00	7:24	10:44	200	3000	2	100	<7.01	<0.001
St.LA-372	K-27	CL	HV-993	15.00	15.00	15.00	7:25	10:45	200	3000	4.5	100	<7.01	<0.001
St.LA-373	H-41	CL	HV-291	15.00	15.00	15.00	7:26	10:46	200	3000	5	100	<7.01	<0.001
St.LA-374	G-30	CL	HV-301	15.00	15.00	15.00	7:27	10:47	200	3000	2.5	100	<7.01	<0.001
St.LA-375	F-24	CL	HV-232	15.00	15.00	15.00	7:28	10:48	200	3000	3.5	100	<7.01	<0.001

SAMPLE TYPE

PRS=personal	IWA=inside work area
BLK= blank	OWA=outside work area
CL=clearance	BGD=background

ACTIVITY

PREP=site prep.	BGLO=bag load out
GLBG=glovebag	CLN=clean up
GREM=gross removal	EXC=excursion

RESPIRATOR TYPE

HM=half mask	APR=air purifying resp.
FF=full face	SA=supplied air
P=powered	PD=pressure demand

Analyzed By: Jami Van #5764 8/8/02

The NIOSH 7400 counting rules A does not distinguish between asbestos and non-asbestos fibers.
The NIOSH 7400 method assumes the lowest quantitative concentration is 5.5 fibers / 100 fields at 95% confidence level and is volume dependent.
Samples proceeded by a < sign are calculated using a count of 5.5 fibers per 100 fields.
This report should not be reproduced except in full. AIHA PAT Lab #: 101282
The estimated intracounter coefficient of variation (CV) for this laboratory is 0.45. The estimated interlaboratory CV for the quality control program that this laboratory participates in is 0.45.

RECEIVED AUG - 8 2002

AUG. 8. 2002 3:58PM ACT NO. 299 P. 1

APPENDIX G
ST. LOUIS METROPOLITAN SEWER DISTRICT WASTEWATER DISCHARGE PERMITS

Metropolitan
St. Louis Sewer
District

Office of Environmental Compliance
10 East Grand Avenue
St. Louis, MO 63147-2913
(314) 436-8710
FAX (314) 436-8753

October 17, 2001

Scott Siegwald
ARROWHEAD CONTRACTING, INC.
12920 Metcalf, Suite 150
Overland Park, KS 66213

Dear Mr. Siegwald:

We have reviewed your application dated October 8, 2001 requesting approval to discharge 1,200 gallons of wastewater to the Metropolitan St. Louis Sewer District for treatment. This wastewater is cooling water from concrete core sampling and sampling equipment decontamination water at the building No. 3 of the St. Louis Army Ammunition Plant located at 4800 Goodfellow Boulevard, St. Louis, Missouri.

Based on the analytical results, this wastewater meets MSD Ordinance 8472 standards and is approved for discharge into a sanitary sewer on site, subject to filtration by the 15 micron fabric filter as indicated in your application. The discharge into the sewer must be controlled at a rate that will not surcharge the lines in that area. This approval is valid for 30 days from the date of this letter.

You must be certain the waste is discharged into a sanitary or combined sewer inlet only. This letter does not authorize any discharge to a separate storm sewer, or to any watercourse, as any such discharge would be in violation of state and federal laws. **Please notify me at the number below when the discharge is to commence.**

This discharge has been approved based upon the information and sample analysis you provided, and is subject to the conditions stated above. This approval may be revoked by the District at any time if any of the information is found to be incorrect, or if the conditions of this approval are violated. Also, if the discharge causes any operational or maintenance problem within the District's collection or treatment system, or results in violations of any conditions of the District's NPDES permit, Arrowhead Contracting, Inc. and the property owner, U.S. Army Corp of Engineers Aviation Missile Command, will be considered responsible for damages.

If you have any questions, please call me at (314)436-8742.

Sincerely,
METROPOLITAN ST. LOUIS SEWER DISTRICT

Roland A. Biehl
Environmental Associate Engineer

bv

pc: Bernie Rains

File: SD, St. Louis Army Ammunition Plant, 4800 Goodfellow Boulevard, St. Louis, Missouri

Metropolitan
St. Louis Sewer
District

Office of Environmental Compliance
10 East Grand Avenue
St. Louis, MO 63147-2913
(314) 436-8710
FAX (314) 436-8753

December 9, 2002

Scott Siegwald
ARROWHEAD CONTRACTING, INC.
12920 Metcalf Ave., Suite 150
Overland Park, KS 66213

RECEIVED DEC 1 3 2002

Dear Mr. Siegwald:

We have reviewed your application dated December 9, 2002 requesting approval to discharge 20,000 gallons of wastewater to the Metropolitan St. Louis Sewer District for treatment. This wastewater is stormwater encountered during the Building No. 3 demolition excavation at the St. Louis Army Ammunition Plant located at 4800 Goodfellow Boulevard, St. Louis, Missouri.

Based on the analytical results, this wastewater meets MSD Ordinance 8472 standards and is approved for discharge into a sanitary sewer on site, subject to filtration by a 10 micron fabric filter as indicated in your application. This approval is valid for 30 days from the date of this letter.

You must be certain the waste is discharged into a sanitary or combined sewer inlet only. This letter does not authorize any discharge to a separate storm sewer, or to any watercourse, as any such discharge would be in violation of state and federal laws. **Please notify me at the number below when the discharge is to commence.**

For billing purposes, you must confirm the volume of this wastewater discharged to us, in writing, at the completion of the discharge. This report is due no later than 28 days after this approval expires. Please refer to this letter and include the date of the discharge when providing that figure. You will be billed by invoice at the billing rate in effect at the time of discharge. The current rate, contained in MSD Ordinance 11066, is $1.05 per hundred cubic feet ($1.40 per thousand gallons). Please do not pay until you receive our invoice.

This discharge has been approved based upon the information and sample analysis you provided, and is subject to the conditions stated above. This approval may be revoked by the District at any time if any of the information is found to be incorrect, or if the conditions of this approval are violated. Also, if the discharge causes any operational or maintenance problem within the District's collection or treatment system, or results in violations of any conditions of the District's NPDES permit, Arrowhead Contracting, Inc. and the property owner, U.S. Army Corps of Engineers, will be considered responsible for damages.

If you have any questions, please call me at (314)436-8742.

Sincerely,
METROPOLITAN ST. LOUIS SEWER DISTRICT

Roland A. Biehl
Environmental Associate Engineer

bv

pc Bernie Rains

File: SD, St. Louis Army Ammunition Plant, 4800 Goodfellow Boulevard, St. Louis, Missouri

Metropolitan
St. Louis Sewer
District

Office of Environmental Compliance
10 East Grand Avenue
St. Louis, MO 63147-2913
(314) 436-8710
FAX (314) 436-8753

January 3, 2002

RECEIVED JAN 1 8 2002

Scott Siegwald
ARROWHEAD CONTRACTING, INC.
12920 Metcalf, Suite 150
Overland Park, KS 66213

Dear Mr. Siegwald:

We have reviewed your application dated January 2, 2002 requesting approval to discharge 3,000 gallons of wastewater to the Metropolitan St. Louis Sewer District for treatment. This wastewater is cooling water from concrete core sampling and sampling equipment decontamination water at the building No. 3 of the St. Louis Army Ammunition Plant located at 4800 Goodfellow Boulevard, St. Louis, Missouri.

Based on the analytical results, this wastewater meets MSD Ordinance 8472 standards and is approved for discharge into a sanitary sewer on site, subject to filtration by a 15 micron fabric filter as indicated in your application. The discharge into the sewer must be controlled at a rate that will not surcharge the lines in that area. This approval is valid for 30 days from the date of this letter.

You must be certain the waste is discharged into a sanitary or combined sewer inlet only. This letter does not authorize any discharge to a separate storm sewer, or to any watercourse, as any such discharge would be in violation of state and federal laws. **Please notify me at the number below when the discharge is to commence.**

This discharge has been approved based upon the information and sample analysis you provided, and is subject to the conditions stated above. This approval may be revoked by the District at any time if any of the information is found to be incorrect, or if the conditions of this approval are violated. Also, if the discharge causes any operational or maintenance problem within the District's collection or treatment system, or results in violations of any conditions of the District's NPDES permit, Arrowhead Contracting, Inc. and the property owner, U.S. Army Corp of Engineers Aviation Missile Command, will be considered responsible for damages.

If you have any questions, please call me at (314)436-8742.

Sincerely,
METROPOLITAN ST. LOUIS SEWER DISTRICT

Roland A. Biehl
Environmental Associate Engineer

pc Bernie Rains
File: SD, St. Louis Army Ammunition Plant, 4800 Goodfellow Boulevard, St. Louis, Missouri

APPENDIX H
BACKFILL SOIL SUITABILITY TESTING RESULTS

Certificate of Analysis

October 10, 2002

Scott Siegwald
Arrowhead Contracting
12920 Metcalf Suite 160
Overland Park, KS 66213
Phone: 913-814-9994
Fax: 913-814-9997

Client Project ID : SLAAP/00-215
Chain of Custody #: 14640

Laboratory Work Order # 1354

Dear Mr. Siegwald:

Included are the analytical results for the samples received on October 08, 2002. All analyses were prepared and analyzed within analytical holding time.

Data qualifiers are as follows:

ND = Not detected at or above the reporting limit.
B = Some level of the compound was present in the method blank.
J = Compound results are an estimated concentration.
E = Compound present in levels greater than the instrument calibration range.

If you have any questions regarding this report, feel free to contact me at (913) 829-0101.

Kendall L. Lindquist, MBA
Operations Manager

Certificate of Analysis

Arrowhead Contracting

Client Project ID : SLAAP/00-215
Chain of Custody #: 14640

Laboratory Work Order # 1354

Client Sample ID:	BA1-01	Date Collected:	10/07/02
Lab Sample ID:	135401	Date Received	10/08/02

BTEX/TPH-Gas Date Analyzed: 10/08/02 Analyst: JM Method 8260B/OA1

Analyte	Results	Units	Reporting Limit
Benzene	ND	mg/kg	0.01
Toluene	ND	mg/kg	0.01
Ethyl Benzene	ND	mg/kg	0.01
Xylenes (Total)	ND	mg/kg	0.01
Total BTEX	ND	mg/kg	
MTBE	ND	mg/kg	0.01
4-Bromofluorobenzene (surrogate)	92	%	57-146
TPH-Gasoline	ND	mg/kg	1

TPH-Diesel Range Date Analyzed: 10/08/02 Analyst: JM Method: OA2
Date Extracted: 10/08/02 Analyst: tm

Analyte	Results	Units	Reporting Limit
TPH-Diesel Range	ND	mg/kg	13
Terphenyl-d14 (surrogate)	61	%	18-162

PCBs Date Analyzed: 10/09/02 Analyst: RRH Method: 8082

Analyte	Results	Units	Detection Limit
PCB-1016	ND	mg/kg	0.065
PCB-1221	ND	mg/kg	0.065
PCB-1232	ND	mg/kg	0.065
PCB-1242	ND	mg/kg	0.065
PCB-1254	ND	mg/kg	0.065
PCB-1260	ND	mg/kg	0.065
DCB (surrogate)	98	%	

Certificate of Analysis

Arrowhead Contracting

Client Project ID : SLAAP/00-215
Chain of Custody #: 14640

Laboratory Work Order # 1354

Client Sample ID: BA1-01
Lab Sample ID: 135401

BNAs Date Analyzed: 10/08/02 Analyst: KLL Method: 8270
Date Extracted: 10/08/02 Analyst: Tm

Analyte	Results	Units	Reporting Limit
Phenol	ND	µg/kg	727
bis (2-Chloroethyl) Ether	ND	µg/kg	727
2-Chlorophenol	ND	µg/kg	727
1,3-Dichlorobenzene	ND	µg/kg	727
1,4-Dichlorobenzene	ND	µg/kg	727
1,2-Dichlorobenzene	ND	µg/kg	727
2-Methylphenol	ND	µg/kg	727
bis (2-chloroisopropyl) ether	ND	µg/kg	727
4-Methylphenol	ND	µg/kg	727
n-Nitroso-di-Propylamine	ND	µg/kg	727
Hexachloroethane	ND	µg/kg	727
Nitrobenzene	ND	µg/kg	727
Isophorone	ND	µg/kg	727
2-Nitrophenol	ND	µg/kg	727
2,4-Dimethylphenol	ND	µg/kg	727
bis (2-chloroethoxy) Methane	ND	µg/kg	727
2,4-Dichloropehnol	ND	µg/kg	727
1,2,4-Trichlorobenzene	ND	µg/kg	727
Naphthalene	ND	µg/kg	727
4-Chloroaniline	ND	µg/kg	727
Hexachlorocyclopentadiene	ND	µg/kg	727
2,4,6-Trichlorophenol	ND	µg/kg	727
2,4,5-Trichlorophenol	ND	µg/kg	727
2-Chloronaphthalene	ND	µg/kg	727
2-Nitroaniline	ND	µg/kg	727
Dimethylphthalate	ND	µg/kg	727
Acenaphthylene	ND	µg/kg	727
3-Nitroaniline	ND	µg/kg	727
Acenaphthene	ND	µg/kg	727
2,4-Dinitrophenol	ND	µg/kg	727
4-Nitrophenol	ND	µg/kg	727
Dibenzofuran	ND	µg/kg	727
2,4-Dinitrotoluene	ND	µg/kg	727
Diethylphthalate	ND	µg/kg	727
4-Chlorophenyl-phenylether	ND	µg/kg	727
Fluorene	ND	µg/kg	727

Certificate of Analysis

Arrowhead Contracting

Client Project ID : SLAAP/00-215
Chain of Custody #: 14640

Laboratory Work Order # 1354

Client Sample ID: BA1-01
Lab Sample ID: 135401

BNAs Date Analyzed: 10/08/02 Analyst: KLL Method: 8270
Date Extracted: 10/08/02 Analyst: Tm

Analyte	Results	Units	Reporting Limit
4-Nitroaniline	ND	µg/kg	727
4,6-Dinitro-2-Methylphenol	ND	µg/kg	727
n-Nitrosodiphenylamine	ND	µg/kg	727
4-Bromophenyl-Phenylether	ND	µg/kg	727
Hexachlorobenzene	ND	µg/kg	727
Pentachlorophenol	ND	µg/kg	727
Phenanthrene	ND	µg/kg	727
Anthracene	ND	µg/kg	727
Di-n-butyl Phthalate	ND	µg/kg	727
4-Chloro-3-methyl phenol	ND	µg/kg	727
Hexachlorobutadiene	ND	µg/kg	727
2,6-Dinitrotoluene	ND	µg/kg	727
2-Methylnaphthalene	ND	µg/kg	727
Chrysene	ND	µg/kg	727
Di-octyl Phthalate	ND	µg/kg	727
Fluoranthene	ND	µg/kg	727
Pyrene	ND	µg/kg	727
Butylbenzylphthalate	ND	µg/kg	727
Benzo (a) Anthracene	ND	µg/kg	727
bis (2-ethylhexyl) Phthalate	ND	µg/kg	727
Benzo (b) Fluoranthene	ND	µg/kg	727
Benzo (k) Fluoranthene	ND	µg/kg	727
Benzo (a) Pyrene	ND	µg/kg	727
Indeno (1,2,3-cd) Pyrene	ND	µg/kg	727
Benzo (a,h) Anthracene	ND	µg/kg	727
Benzo (g,h,i) Perylene	ND	µg/kg	727
2-Fluorophenol (surrogate)	95	%	30-115
Phenol-d6 (surrogate)	108	%	24-113
Nitrobenzene-d5 (surrogate)	69	%	23-120
2-Fluorobiphenyl (surrogate)	84	%	25-121
2,4,6-Tribromophenol (surrogate)	114	%	19-122
Terpheyl-d14 (surrogate)	81	%	18-137

Certificate of Analysis

Arrowhead Contracting

Client Project ID : SLAAP/00-215
Chain of Custody #: 14640

Laboratory Work Order # 1354

Client Sample ID: BA1-01
Lab Sample ID: 135401

TCLP Semi-Volatiles Date Analyzed: 10/10/02 Analyst: RRH Method 8270
Date Extracted: 10/09/02 Analyst: RRH

Analyte	Results	Units	Action Level	Reporting Limit
2-Methylphenol (o-Cresol)	ND	mg/L	200	0.05
3-Methylphenol (m-Cresol)	ND	mg/L	200	0.05
4-Methylphenol (p-Cresol)	ND	mg/L	200	0.05
1,4-Dichlorobenzene	ND	mg/L	7.5	0.05
2,4-Dinitrotoluene	ND	mg/L	0.13	0.05
Hexachlorobenzene	ND	mg/L	0.13	0.05
Hexachlorobutadiene	ND	mg/L	0.5	0.05
Hexachloroethane	ND	mg/L	3.0	0.05
Nitrobenzene	ND	mg/L	2.0	0.05
Pentachlorophenol	ND	mg/L	100	0.05
Pyridine	ND	mg/L	5.0	0.05
2,4,5-Trichlorophenol	ND	mg/L	400	0.05
2,4,6-Trichlorophenol	ND	mg/L	2.0	0.05
2-Fluorophenol (surrogate)	47	%		
Phenol-d6 (surrogate)	51	%		
Nitrobenzene-d5 (surrogate)	89	%		
2-Fluorobiphenyl (surrogate)	75	%		
2,4,6-Tribromophenol (surrogate)	66	%		
Terphenol-d14 (surrogate)	103	%		

Certificate of Analysis

Arrowhead Contracting

Client Project ID : SLAAP/00-215
Chain of Custody #: 14640

Laboratory Work Order # 1354

Client Sample ID: BA1-01
Lab Sample ID: 135401

TAL Metals

Analyte	Results	Units	Reporting Limit	Analyst	Date Analyzed	Method
Aluminum	4874	mg/kg	19.1	JP	10/09/02	6010B
Antimony	ND	mg/kg	9.57	JP	10/09/02	6010B
Arsenic	ND	mg/kg	14.4	JP	10/09/02	6010B
Barium	78.1	mg/kg	0.479	JP	10/09/02	6010B
Beryllium	0.284 J	mg/kg	0.479	JP	10/09/02	6010B
Cadmium	0.413 J	mg/kg	0.957	JP	10/09/02	6010B
Calcium	2926	mg/kg	47.9	JP	10/09/02	6010B
Chromium	9.73	mg/kg	0.957	JP	10/09/02	6010B
Cobalt	8.03	mg/kg	0.957	JP	10/09/02	6010B
Copper	13.7	mg/kg	0.957	JP	10/09/02	6010B
Iron	13834	mg/kg	9.57	JP	10/09/02	6010B
Lead	16.03	mg/kg	9.57	JP	10/09/02	6010B
Magnesium	2225	mg/kg	9.57	JP	10/09/02	6010B
Manganese	565	mg/kg	0.479	JP	10/09/02	6010B
Mercury	ND	mg/kg	0.05	JP	10/09/02	6020
Nickel	17.5	mg/kg	2.39	JP	10/09/02	6010B
Potassium	346.7	mg/kg	239	JP	10/09/02	6010B
Selenium	16.04	mg/kg	14.4	JP	10/09/02	6010B
Silver	ND	mg/kg	1.44	JP	10/09/02	6010B
Sodium	1338	mg/kg	14.4	JP	10/09/02	6010B
Thallium	ND	mg/kg	14.4	JP	10/09/02	6010B
Vanadium	17.79	mg/kg	0.957	JP	10/09/02	6010B
Zinc	41.01	mg/kg	2.87	JP	10/09/02	6010B

TCLP Metals

Analyte	Results	Units	Reporting Limit	Action Level	Analyst	Date Analyzed	Method
Arsenic	ND	mg/L	0.40	5.0	JP	10/09/02	1311/6010
Barium	0.971	mg/L	0.80	100	JP	10/09/02	1311/6010
Cadmium	ND	mg/L	0.02	1.0	JP	10/09/02	1311/6010
Chromium	ND	mg/L	0.04	5.0	JP	10/09/02	1311/6010
Lead	ND	mg/L	0.40	5.0	JP	10/09/02	1311/6010
Mercury	ND	mg/L	0.0005	0.2	JP	10/09/02	1311/6020
Selenium	ND	mg/L	0.40	1.0	JP	10/09/02	1311/6010
Silver	ND	mg/L	0.04	5.0	JP	10/09/02	1311/6010

Certificate of Analysis

Arrowhead Contracting

Client Project ID : SLAAP/00-215
Chain of Custody #: 14640

Laboratory Work Order # 1354

Client Sample ID:	BA2-01	Date Collected:	10/07/02
Lab Sample ID:	135402	Date Received	10/08/02

BTEX/TPH-Gas Date Analyzed: 10/08/02 Analyst: JM Method 8260B/OA1

Analyte	Results	Units	Reporting Limit
Benzene	ND	mg/kg	0.01
Toluene	ND	mg/kg	0.01
Ethyl Benzene	ND	mg/kg	0.01
Xylenes (Total)	ND	mg/kg	0.01
Total BTEX	ND	mg/kg	
MTBE	ND	mg/kg	0.01
4-Bromofluorobenzene (surrogate)	85	%	57-146
TPH-Gasoline	ND	mg/kg	1

TPH-Diesel Range Date Analyzed: 10/08/02 Analyst: JM Method: OA2
Date Extracted: 10/08/02 Analyst: tm

Analyte	Results	Units	Reporting Limit
TPH-Diesel Range	ND	mg/kg	13
Terphenyl-d14 (surrogate)	102	%	18-162

PCBs Date Analyzed: 10/09/02 Analyst: RRH Method: 8082

Analyte	Results	Units	Detection Limit
PCB-1016	ND	mg/kg	0.063
PCB-1221	ND	mg/kg	0.063
PCB-1232	ND	mg/kg	0.063
PCB-1242	ND	mg/kg	0.063
PCB-1254	ND	mg/kg	0.063
PCB-1260	ND	mg/kg	0.063
DCB (surrogate)	116	%	

Certificate of Analysis

Arrowhead Contracting

Client Project ID : SLAAP/00-215
Chain of Custody #: 14640

Laboratory Work Order # 1354

Client Sample ID: BA2-01
Lab Sample ID: 135402

BNAs Date Analyzed: 10/08/02 Analyst: KLL Method: 8270
Date Extracted: 10/08/02 Analyst: Tm

Analyte	Results	Units	Reporting Limit
Phenol	ND	µg/kg	727
bis (2-Chloroethyl) Ether	ND	µg/kg	727
2-Chlorophenol	ND	µg/kg	727
1,3-Dichlorobenzene	ND	µg/kg	727
1,4-Dichlorobenzene	ND	µg/kg	727
1,2-Dichlorobenzene	ND	µg/kg	727
2-Methylphenol	ND	µg/kg	727
bis (2-chloroisopropyl) ether	ND	µg/kg	727
4-Methylphenol	ND	µg/kg	727
n-Nitroso-di-Propylamine	ND	µg/kg	727
Hexachloroethane	ND	µg/kg	727
Nitrobenzene	ND	µg/kg	727
Isophorone	ND	µg/kg	727
2-Nitrophenol	ND	µg/kg	727
2,4-Dimethylphenol	ND	µg/kg	727
bis (2-chloroethoxy) Methane	ND	µg/kg	727
2,4-Dichloropehnol	ND	µg/kg	727
1,2,4-Trichlorobenzene	ND	µg/kg	727
Naphthalene	ND	µg/kg	727
4-Chloroaniline	ND	µg/kg	727
Hexachlorocyclopentadiene	ND	µg/kg	727
2,4,6-Trichlorophenol	ND	µg/kg	727
2,4,5-Trichlorophenol	ND	µg/kg	727
2-Chloronaphthalene	ND	µg/kg	727
2-Nitroaniline	ND	µg/kg	727
Dimethylphthalate	ND	µg/kg	727
Acenaphthylene	ND	µg/kg	727
3-Nitroaniline	ND	µg/kg	727
Acenaphthene	ND	µg/kg	727
2,4-Dinitrophenol	ND	µg/kg	727
4-Nitrophenol	ND	µg/kg	727
Dibenzofuran	ND	µg/kg	727
2,4-Dinitrotoluene	ND	µg/kg	727
Diethylphthalate	ND	µg/kg	727
4-Chlorophenyl-phenylether	ND	µg/kg	727
Fluorene	ND	µg/kg	727

Certificate of Analysis

Arrowhead Contracting

Client Project ID : SLAAP/00-215
Chain of Custody #: 14640

Laboratory Work Order # 1354

Client Sample ID: BA2-01
Lab Sample ID: 135402

BNAs Date Analyzed: 10/08/02 Analyst: KLL Method: 8270
Date Extracted: 10/08/02 Analyst: Tm

Analyte	Results	Units	Reporting Limit
4-Nitroaniline	ND	µg/kg	727
4,6-Dinitro-2-Methylphenol	ND	µg/kg	727
n-Nitrosodiphenylamine	ND	µg/kg	727
4-Bromophenyl-Phenylether	ND	µg/kg	727
Hexachlorobenzene	ND	µg/kg	727
Pentachlorophenol	ND	µg/kg	727
Phenanthrene	ND	µg/kg	727
Anthracene	ND	µg/kg	727
Di-n-butyl Phthalate	ND	µg/kg	727
4-Chloro-3-methyl phenol	ND	µg/kg	727
Hexachlorobutadiene	ND	µg/kg	727
2,6-Dinitrotoluene	ND	µg/kg	727
2-Methylnaphthalene	ND	µg/kg	727
Chrysene	ND	µg/kg	727
Di-octyl Phthalate	ND	µg/kg	727
Fluoranthene	ND	µg/kg	727
Pyrene	ND	µg/kg	727
Butylbenzylphthalate	ND	µg/kg	727
Benzo (a) Anthracene	ND	µg/kg	727
bis (2-ethylhexyl) Phthalate	ND	µg/kg	727
Benzo (b) Fluoranthene	ND	µg/kg	727
Benzo (k) Fluoranthene	ND	µg/kg	727
Benzo (a) Pyrene	ND	µg/kg	727
Indeno (1,2,3-cd) Pyrene	ND	µg/kg	727
Benzo (a,h) Anthracene	ND	µg/kg	727
Benzo (g,h,i) Perylene	ND	µg/kg	727
2-Fluorophenol (surrogate)	95	%	30-115
Phenol-d6 (surrogate)	104	%	24-113
Nitrobenzene-d5 (surrogate)	73	%	23-120
2-Fluorobiphenyl (surrogate)	88	%	25-121
2,4,6-Tribromophenol (surrogate)	99	%	19-122
Terpheyl-d14 (surrogate)	85	%	18-137

Certificate of Analysis

Arrowhead Contracting

Client Project ID : SLAAP/00-215
Chain of Custody #: 14640

Laboratory Work Order # 1354

Client Sample ID: BA2-01
Lab Sample ID: 135402

TCLP Semi-Volatiles Date Analyzed: 10/10/02 Analyst: RRH Method 8270
Date Extracted: 10/09/02 Analyst: RRH

Analyte	Results	Units	Action Level	Reporting Limit
2-Methylphenol (o-Cresol)	ND	mg/L	200	0.05
3-Methylphenol (m-Cresol)	ND	mg/L	200	0.05
4-Methylphenol (p-Cresol)	ND	mg/L	200	0.05
1,4-Dichlorobenzene	ND	mg/L	7.5	0.05
2,4-Dinitrotoluene	ND	mg/L	0.13	0.05
Hexachlorobenzene	ND	mg/L	0.13	0.05
Hexachlorobutadiene	ND	mg/L	0.5	0.05
Hexachloroethane	ND	mg/L	3.0	0.05
Nitrobenzene	ND	mg/L	2.0	0.05
Pentachlorophenol	ND	mg/L	100	0.05
Pyridine	ND	mg/L	5.0	0.05
2,4,5-Trichlorophenol	ND	mg/L	400	0.05
2,4,6-Trichlorophenol	ND	mg/L	2.0	0.05
2-Fluorophenol (surrogate)	45	%		
Phenol-d6 (surrogate)	49	%		
Nitrobenzene-d5 (surrogate)	85	%		
2-Fluorobiphenyl (surrogate)	79	%		
2,4,6-Tribromophenol (surrogate)	65	%		
Terphenol-d14 (surrogate)	101	%		

Certificate of Analysis

Arrowhead Contracting

Client Project ID : SLAAP/00-215
Chain of Custody #: 14640

Laboratory Work Order # 1354

Client Sample ID: BA2-01
Lab Sample ID: 135402

TAL Metals

Analyte	Results	Units	Reporting Limit	Analyst	Date Analyzed	Method
Aluminum	6167	mg/kg	19.1	JP	10/09/02	6010B
Antimony	ND	mg/kg	9.57	JP	10/09/02	6010B
Arsenic	7.20 J	mg/kg	14.4	JP	10/09/02	6010B
Barium	123.9	mg/kg	0.479	JP	10/09/02	6010B
Beryllium	0.395 J	mg/kg	0.479	JP	10/09/02	6010B
Cadmium	0.396 J	mg/kg	0.957	JP	10/09/02	6010B
Calcium	5102	mg/kg	47.9	JP	10/09/02	6010B
Chromium	10.55	mg/kg	0.957	JP	10/09/02	6010B
Cobalt	9.806	mg/kg	0.957	JP	10/09/02	6010B
Copper	14.45	mg/kg	0.957	JP	10/09/02	6010B
Iron	15325	mg/kg	9.57	JP	10/09/02	6010B
Lead	21.14	mg/kg	9.57	JP	10/09/02	6010B
Magnesium	2349	mg/kg	9.57	JP	10/09/02	6010B
Manganese	734	mg/kg	0.479	JP	10/09/02	6010B
Mercury	ND	mg/kg	0.05	JP	10/09/02	6020
Nickel	19.3	mg/kg	2.39	JP	10/09/02	6010B
Potassium	690	mg/kg	239	JP	10/09/02	6010B
Selenium	13.99	mg/kg	14.4	JP	10/09/02	6010B
Silver	ND	mg/kg	1.44	JP	10/09/02	6010B
Sodium	295	mg/kg	14.4	JP	10/09/02	6010B
Thallium	ND	mg/kg	14.4	JP	10/09/02	6010B
Vanadium	22.2	mg/kg	0.957	JP	10/09/02	6010B
Zinc	53.9	mg/kg	2.87	JP	10/09/02	6010B

TCLP Metals

Analyte	Results	Units	Reporting Limit	Action Level	Analyst	Date Analyzed	Method
Arsenic	ND	mg/L	0.40	5.0	JP	10/09/02	1311/6010
Barium	1.17	mg/L	0.80	100	JP	10/09/02	1311/6010
Cadmium	ND	mg/L	0.02	1.0	JP	10/09/02	1311/6010
Chromium	ND	mg/L	0.04	5.0	JP	10/09/02	1311/6010
Lead	ND	mg/L	0.40	5.0	JP	10/09/02	1311/6010
Mercury	ND	mg/L	0.0005	0.2	JP	10/09/02	1311/6020
Selenium	ND	mg/L	0.40	1.0	JP	10/09/02	1311/6010
Silver	ND	mg/L	0.04	5.0	JP	10/09/02	1311/6010

Analytical Management Laboratories, Inc.
15130 B South Keeler
Olathe, Kansas 66062
Phone (913) 829-0101
Fax (913) 829-1181

14640

Chain of Custody Record / Request for Analysis

Client Contact Name: Scott Siegwald
Company Name: Arrowhead Contracting, Inc.
Address: 12920 Metcalf, Suite 150
City, State, Zip: Overland Park, KS 66213
Phone #: (913) 814-9994
Fax #: (913) 814-9997

Project Name: St. Louis Army Ammunition Plant
Project Number: 00-215
Purchase Order Number: —
Project Due Date: 10/9/02
Project Comments: 24 hr TAT
Sampler's Signature: [signature]

Laboratory Project Number: 1354

Method # ---> | Analyses/Method to be Performed (Check all that apply)

Preservative: List total number of bottles for each preservative type.

Lab ID	Sample Description	Date	Time	Matrix	Total # Containers	HCl	HNO_3	NaOH	H_2SO_4	Unpreserved	4 °C		TPH Diesel	TPH Gasoline	BTEX (5035-8260)	MTBE	Volatiles (VOCs)	BNAs (SVOCs) (8270)	Pesticides/PCBs	PCBs (8082)	RCRA8 Metals	Lead	Flash Point	Paint Filter	pH	TPH(OA1,OA2)* (418.1)	Total Metals (6010 7420)	TCLP-Metals (1311)	TCLP-SVOCs (1311)	Comments:
1354-01	BA1-01	10/7/02	1300	Soil	4						X				X			X		X						X	X	X	X	
1354-02	BA2-01	10/7/02	1330	Soil	4						X				X			X		X						X	X	X	X	
3																														
4																														
5																														
6																														
7																														
8																														
9																														
10																														

Please include any information that may be useful in the analysis of the sample.
Example: high concentration

CUSTODY							
Relinquished By:	[signature]	Date/Time:	10/7/02 1200	Received By:	[signature]	Date/Time:	10/08/02 1000am
Relinquished By:		Date/Time:		Received By:		Date/Time:	

By signing the request (chain of custody) you are ordering work from Analytical Management Laboratories, Inc. which constitutes the acceptance of the terms and conditions on the back of this form.

Delivery Method	Custody Seals	Coolant	Cooler Temp.	Receiving Comments:
☐ Delivered in Person ☑ Courier Fedex ☐ Airbill #: 5769577286	☑ Yes ☐ No ☑ Intact ☐ Broken	☑ Ice ☐ Blue Ice ☐ None	3.8 °C ☐ Temp. Blank ☑ Cooler	* both OA1 & OA2 sch'd per client request 10-8-02 102, (RS)

ical Management Laboratories,

AML - Sample Condition Upon Receipt Report

Client ID: Arrowhead

Project ID: St Louis Army Ammunition Plant

AML Work Order Number: 1354

Cooler ID: _____

Delivery Method

Delivery Method: Courier

Couirer ID: Federal Express

Name of Person Receiving Samples: NS

Airbill Number: 835769577286

Custody Seals

Were Custody Seals Present? ☑

Were Custody Seals Intact? ☑

Number of Custody Seals: 2

Cooler Opened By: NS

Date Opened: 10/8/02

Coolant / Temperature

Type of Coolant Used: Ice

Temperature Taken From: Cooler

Temperature of Cooler: 3.8

Chain of Custody

Was Chain of Custody filled out properly? ☑

Do Chain of Custody and Sample Labels agree? ☑

Comments

Type of Packing Used? Bubble Wrap

Were all sample labels complete? ☑

Were all bottles sealed in separate plastic bags? ☑

Were correct preservatives added to the samples? ☑

Did all the bottles arrive unbroken? ☑

Were air bubbles absent in VOA samples? ☐ N/A ☑

Was a sufficient amount of sample sent for analysis? ☑

Was project manager contacted about any "out of control" issues? ☐

EDD (if applicable) Type: _____

☑ None ☐ ERPMS ☐ Excel

☐ ITEMS ☐ Access 97 ☐ Access 2000

Samples Received by: *NS*

Date: 10/8/02

Project Manager Review: JG

Date: 10/8/02

APPENDIX I
BACKFILL SOIL GEOTECHNICAL AND FIELD TESTING RESULTS

GEOTECHNOLOGY, INC.
MATERIALS TESTING DIVISION

October 29, 2002

Report No. A-448290
0672401.2117.3300L

Mr. Aaron Mathena
Arrowhead Contracting, Inc.
12920 Metcalf, Suite 150
Overland Park, Kansas 66213

Re: SLAAP, St. Louis, Missouri
PCB Waste Removal Acation and Demolition
St. Louis, Missouri

Dear Mr. Mathena:

We report herewith the result of one (1) standard Proctor test and one (1) Atterberg limits test performed on a sample of brown low plastic clay sampled from the above referenced project.

Please contact either of the undersigned if you have any questions or need additional assistance.

Very truly yours,

GEOTECHNOLOGY, INC.
Materials Testing Division

John A. Baker, P.E.
Division Manager

Samuel J. Klucker
Materials Engineer

SJK/JAB:de

Copies Submitted: (1)

printed on recycled paper

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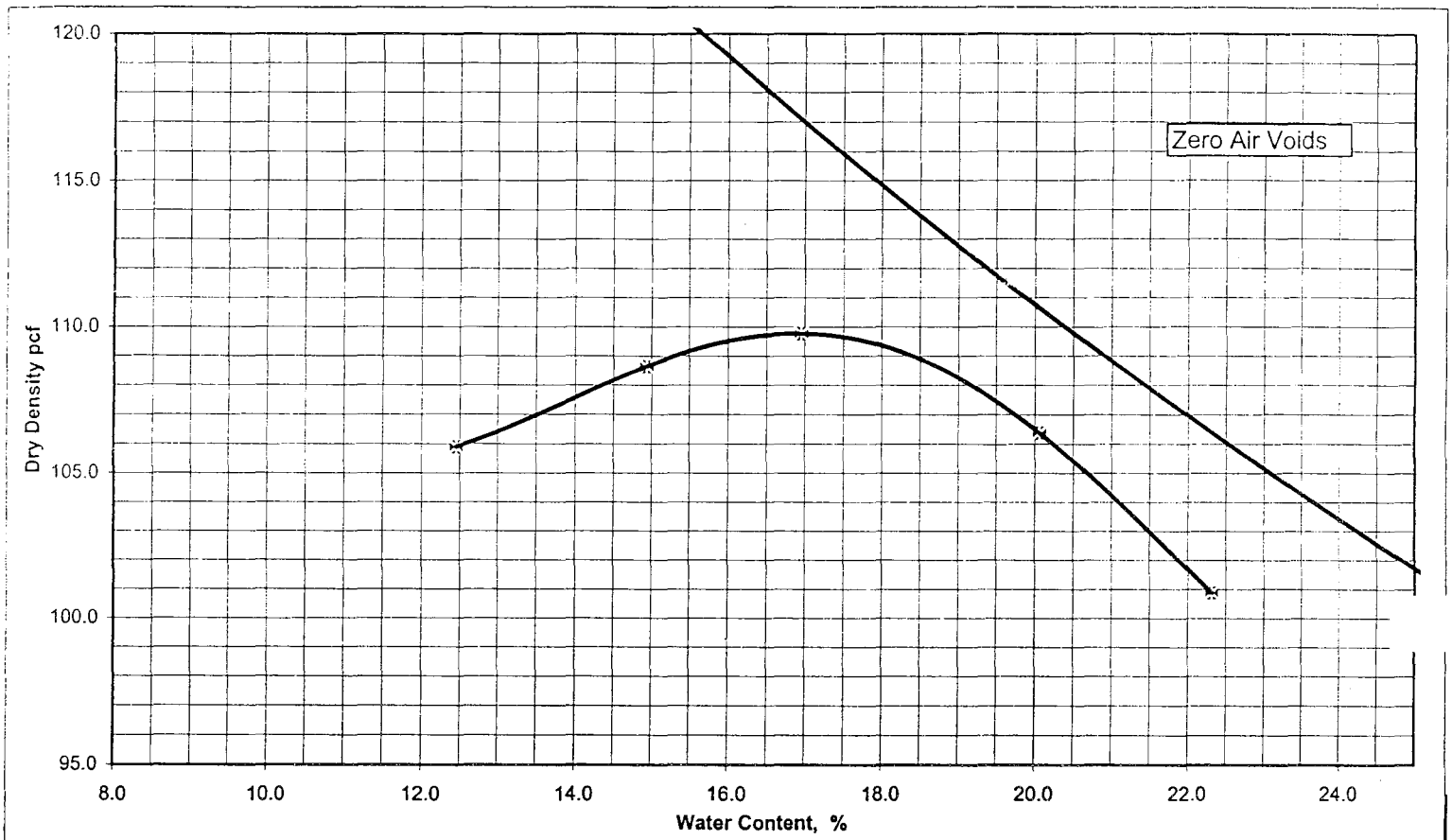
GEOTECHNOLOGY, INC.
MATERIALS TESTING DIVISION

MOISTURE / DENSITY RELATIONSHIP REPORT



CLASSIFICATION		Natural	Specific	Liquid	Plastic	Plasticity	% >	% <
USCS	AASHTO	Moist.	Gravity	Limit	Limit	Index	No. 4	No. 200
CL	NA	10	2.75	36	22	13	NA	NA

Test Results	Material Description
Maximum Dry Density, pcf: 110.0 Optimum Moisture,%: 17.0	Description: Brown low plastic CLAY
Test Method: ASTM D698/A Remarks: Proctor Number 1	Sample Location: Site Stock Report No.: 448290 Client: Arrowhead
Figure No.: 1 October 23, 2002	Army Munitions Reclamation 6724.01.2117.3300L

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GEOTECHNOLOGY, INC.
MATERIALS TESTING DIVISION

November 1, 2002

Report No. A-448732
0672401.2117.3300L

Mr. Aaron Mathena
Arrowhead Contracting, Inc.
12920 Metcalf, Suite 150
Overland Park, Kansas 66213

Re: SLAAP, St. Louis, Missouri
PCB Waste Removal Acation and Demolition
St. Louis, Missouri

Dear Mr. Mathena:

We report herewith the result of one (1) standard Proctor test and one (1) Atterberg limits test performed on a sample of brown low plastic clay sampled from the above referenced project.

Please contact either of the undersigned if you have any questions or need additional assistance.

Very truly yours,

GEOTECHNOLOGY, INC.
Materials Testing Division

John A. Baker, P.E.
Division Manager

Samuel J. Klucker
Materials Engineer

SJK/JAB:de

Copies Submitted: (1)

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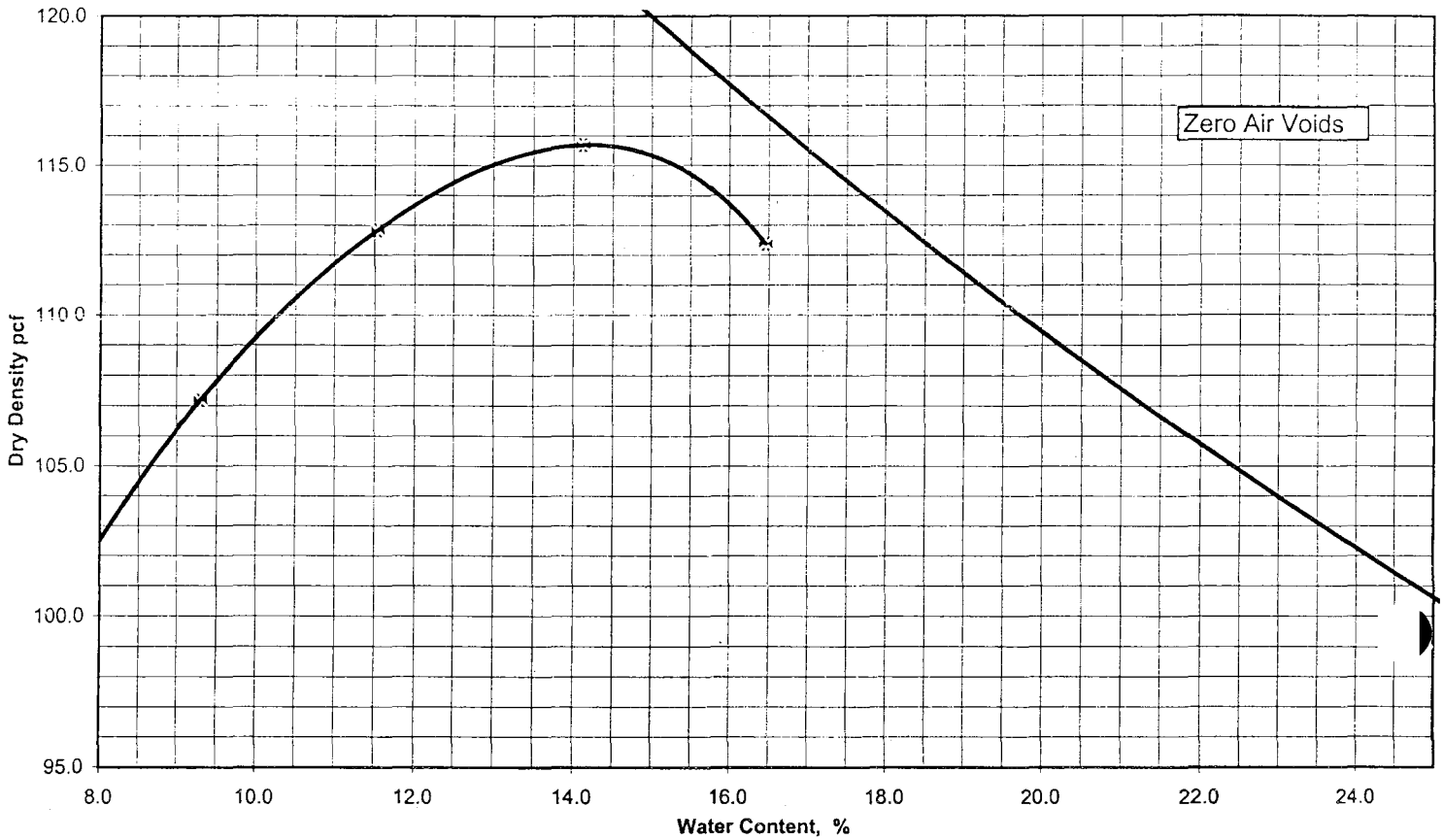
GEOTECHNOLOGY, INC.
MATERIALS TESTING DIVISION

MOISTURE / DENSITY RELATIONSHIP REPORT



CLASSIFICATION		Natural	Specific	Liquid	Plastic	Plasticity	% >	% <
USCS	AASHTO	Moist.	Gravity	Limit	Limit	Index	No. 4	No. 200
CL	NA	10	2.70	37	22	15	NA	NA

Test Results	Material Description
Maximum Dry Density, pcf: 116.0 Optimum Moisture,%: 14.0	Description: Brown low plastic CLAY

Test Method: ASTM D698/A

Remarks: Proctor Number 2

Figure No.: 1 October 24, 2002

Sample Location: Site Stock

Report No.: 448732

Client: Arrowhead Munitions Plant

6724.01.2117.3300L

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GEOTECHNOLOGY, INC.
MATERIALS TESTING DIVISION

November 1, 2002

Report No. A-448739
0672401.2117.3300L

RECEIVED NOV 2 2002

Mr. Aaron Mathena
Arrowhead Contracting, Inc.
12920 Metcalf, Suite 150
Overland Park, Kansas 66213

Re: SLAAP, St. Louis, Missouri
PCB Waste Removal Acation and Demolition
St. Louis, Missouri

Dear Mr. Mathena:

We report herewith the result of one (1) standard Proctor test and one (1) Atterberg limits test performed on a sample of brown low plastic clay sampled from the above referenced project.

Please contact either of the undersigned if you have any questions or need additional assistance.

Very truly yours,

GEOTECHNOLOGY, INC.
Materials Testing Division

John A. Baker, P.E.
Division Manager

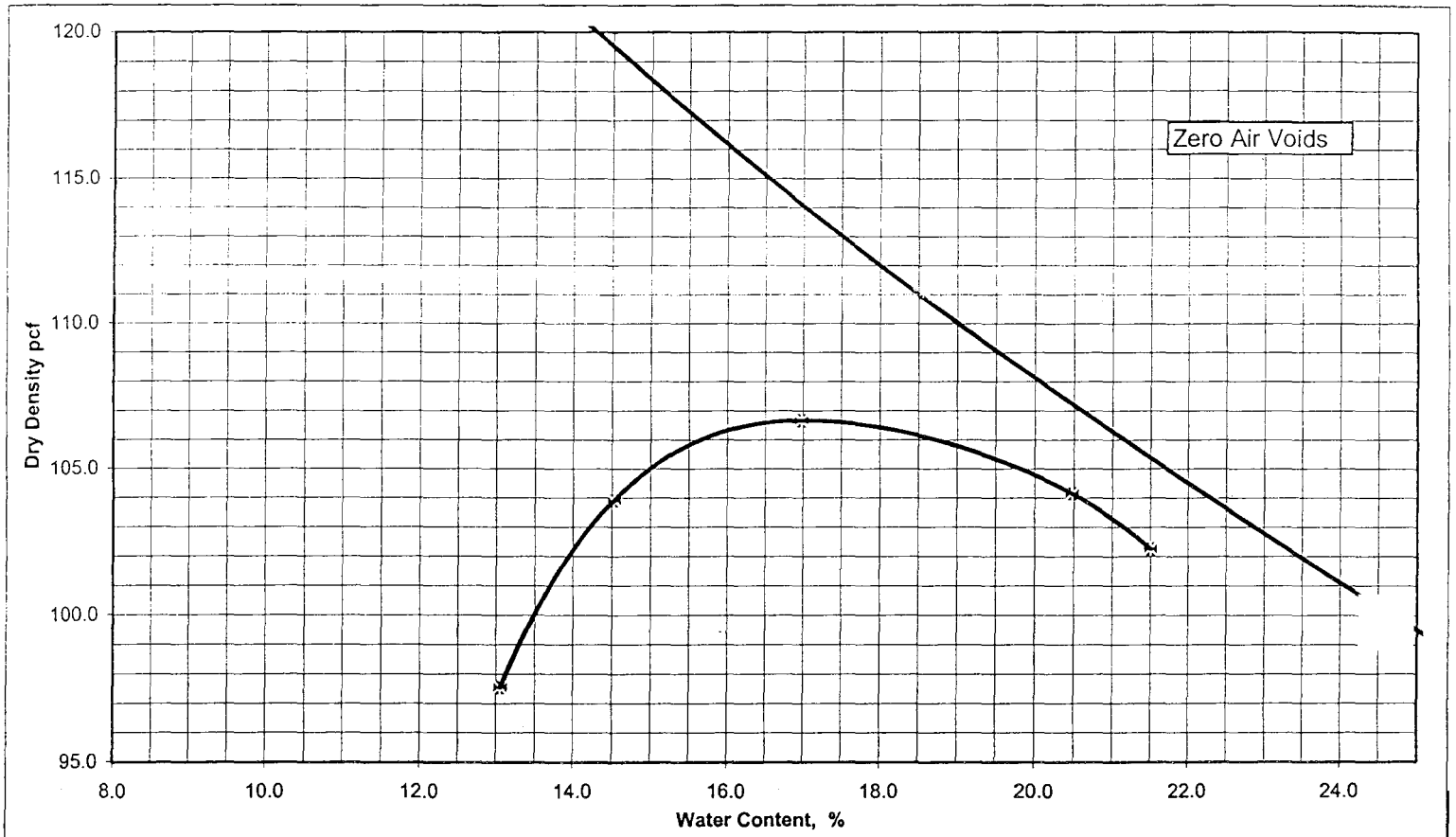
Samuel J. Klucker
Materials Engineer

SJK/JAB:de

Copies Submitted: (1)

GEOTECHNOLOGY, INC.
MATERIALS TESTING DIVISION

MOISTURE / DENSITY RELATIONSHIP REPORT



CLASSIFICATION		Natural	Specific	Liquid	Plastic	Plasticity	% >	% <
USCS	AASHTO	Moist.	Gravity	Limit	Limit	Index	No. 4	No. 200
CL	NA	25	2.65	36	21	15	NA	NA

Test Results	Material Description
Maximum Dry Density, pcf: 107.0 Optimum Moisture, %: 17.0	Description: Brown low plastic CLAY
Test Method: ASTM D698/A Remarks: Proctor Number 3 Figure No.: 1 October 30, 2002	Sample Location: Site Stock Report No.: 448739 Client: Arrowhead Munitions Plant 6724.01.2117.3300L

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GEOTECHNOLOGY, INC.
MATERIALS TESTING DIVISION

December 13, 2002

Report No. A-449257
0672401.2117.3300L

Mr. Aaron Mathena
Arrowhead Contracting, Inc.
12920 Metcalf, Suite 150
Overland Park, Kansas 66213

Re: SLAAP, St. Louis, Missouri
PCB Waste Removal Acation and Demolition
St. Louis, Missouri

Dear Mr. Mathena:

We report herewith the result of one (1) standard Proctor test and one (1) Atterberg limits test performed on a sample of brown low plastic clay sampled from the above referenced project.

Please contact either of the undersigned if you have any questions or need additional assistance.

Very truly yours,

GEOTECHNOLOGY, INC.
Materials Testing Division

John A. Baker, P.E.
Division Manager

Samuel J. Klucker
Materials Engineer

SJK/JAB:de

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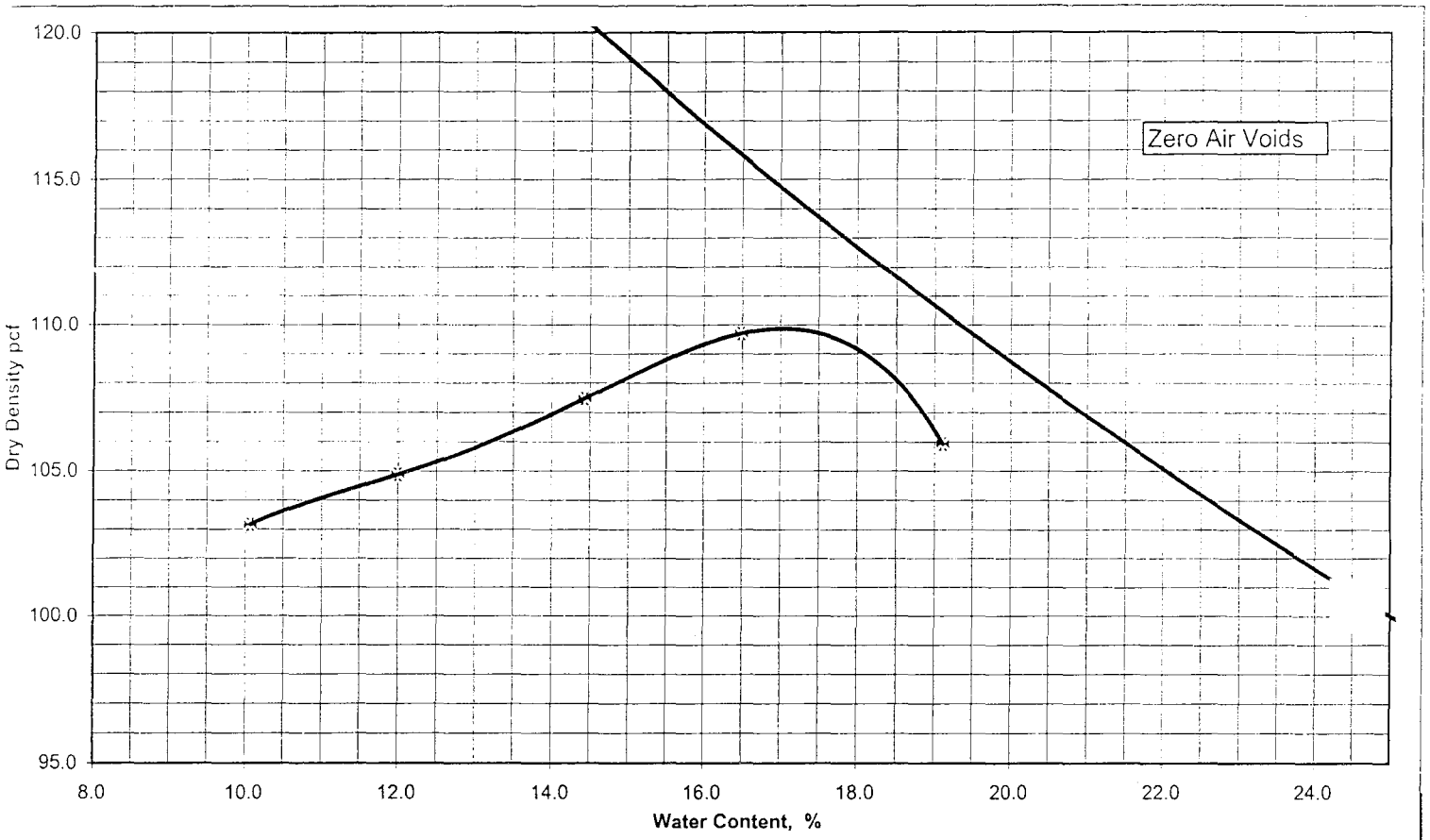
MOISTURE / DENSITY RELATIONSHIP REPORT



CLASSIFICATION		Natural	Specific	Liquid	Plastic	Plasticity	% >	% <
USCS	AASHTO	Moist.	Gravity	Limit	Limit	Index	No. 4	No. 200
CL	NA	12	2.67	34	21	12	NA	NA

Test Results		Material Description
Maximum Dry Density, p	**110.0**	Description: Brown low plastic CLAY
Optimum Moisture,%:	**17.0**	

Test Method: ASTM D698/A

Sample Location: Site Stock

Remarks: Proctor Number 3

Report No.: 449257

Client: Arrowhead

SLAAPS

Figure No.: 1

December 10, 2002

6724.01.2117.3300

GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 448654

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page 1 of 1

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Michael McKinney
Project No.: _____ Task: _____
Equipment & ID No.: CPN MC-3 # 8908
Project Name: Sloop
Vehicle: personal Zone: 2
Client: Arrowhead Date: 10-18-02

TIME: Arrive: 10:45 Depart: 11:15 Travel: 0.5 Total: _____
Weather: cloudy Contractor: Arrowhead Subcontr./Supplier: _____
Equipment Working: _____

Site Activity / Observations / Contacts / Notes: density tests on soil fill.

add. tests 1025 back/ontbed/page.

Materials / Sources: _____
Corrective Action Suggested / Taken: _____

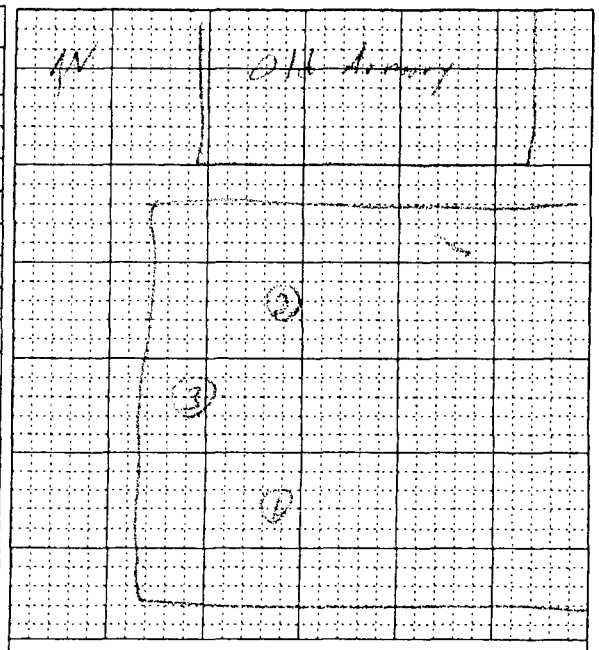
DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	*Max γ	Comp %	*P/F
1			19.3	103.4	107.0	96.6	P
2			16.8	106.7	107.0	99.8	P
3			17.1	107.5	107.0	100.5	P

Compaction Requirements: ☐ Modified ☑ Standard
Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements
Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: * Max γ used is an assumed value and possibly not a reference of 1.0 ft

Gregg B. Westall — Contractor Representative
Arrowhead — Company
Signature — Date 10/18/02
Geotechnology, Inc. — Date
Engineers's Signature

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 446654

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Oth

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: 2 Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1			[illegible]	[illegible]	[illegible]	[illegible]	P
2			16.9	[illegible]	[illegible]	99.2	P
			17.1	[illegible]	[illegible]	[illegible]	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Additional Comments: _____

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 448732

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Michael McKinney Project No.: _____ Task: _____

Equipment & ID No.: CPN MC-3 # 8908 Project Name: Slaap

Vehicle: personal Zone: 2 Client: Arrowhead Date: 10-21-02

TIME: Arrive: 11:00 Depart: 11:30 Travel: 0.5 Total: 1.25

Weather: P. Cloudy Contractor: Arrowhead Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: density tests on soil fill.

add. time: +0.25 load/unload/prep

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	* Max γ	Comp %	P/F
1			21.4	100.2	107.0	93.7	
2			21.5	99.4	107.0	92.9	

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Ad[illegible]al Comments: _____

Contractor Representative Company 10/21/02

Signature Date

Geotechnology, Inc. Date

Engineers's Signature

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. [illegible]

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Oth

Representative: [illegible] Project No.: ___ Task: ___

Equipment & ID No.: [illegible] Project Name: [illegible]

Vehicle: [illegible] Zone: 2 Client: [illegible] Date: 10-21-[illegible]

TIME: Arrive: [illegible] Depart: [illegible] Travel: [illegible] Total: [illegible]

Weather: [illegible] Contractor: [illegible] Subcontr./Supplier: ___

Equipment Working: ___

Site Activity / Observations / Contacts / Notes: [illegible]

[illegible]

Materials / Sources: ___

Corrective Action Suggested / Taken: ___

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	% Max γ	Comp %	P/F
1			21.4	102.2	110.0	93.7	
1			21.5	99.4	107.0	92.7	

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: ___

Contractor Representative ___ Company ___

Signature ___ Date ___

Geotechnology, Inc. ___ Date ___

Engineers's Signature ___

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 448735

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page 1 of 1

☑ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Michael McKinney
Project No.: 0614701 117
Task: 3100
Equipment & ID No.: CPN MC 3 # 8968
Project Name: SLAAP
Vehicle: personal
Zone: 2
Client: Arrowhead
Date: 10-22-02

TIME: Arrive: 3:00 Depart: 3:45 Travel: 0.5 Total: 1.25 hours

Weather: clear Contractor: Arrowhead Subcontr./Supplier:

Equipment Working: TR 70 compactor

Site Activity / Observations / Contacts / Notes: density tests on soil fill.

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

110.0 OM ± 17.0

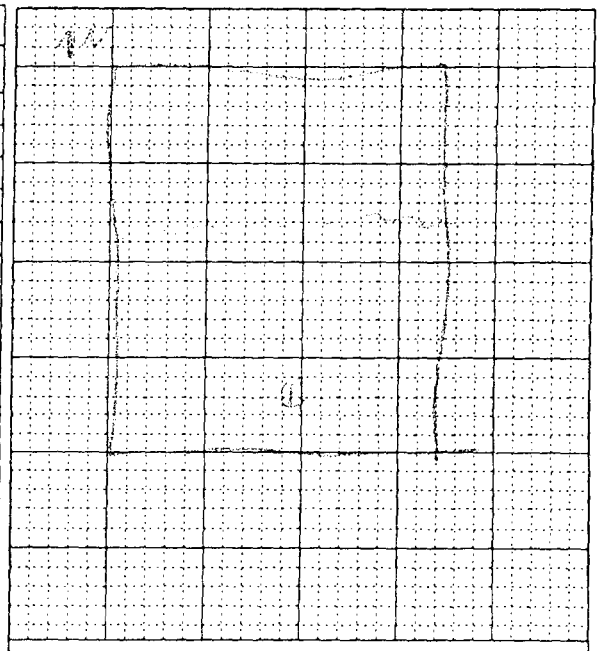
Test #	Location	~~Elevation~~ 1.0	MC %	Dry γ	Max γ	Comp %	P/F
1		4	20.1	100.5	110.0	91.3	F
1		4	19.0	105.0	110.0	95.4	P

Compaction Requirements: ☐ Modified ☑ Standard

Percent Compaction: 95% Moisture Control: OM ± 3

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative: [signature] Company: ACI

Signature: [signature] Date: 10/22/02

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Ot

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Additional Comments: _____

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 448734

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Michael McKinney
Project No.:
Task:
Equipment & ID No.: CPM MC-3 #8908
Project Name: SLAAP
Vehicle: personal
Zone: 2
Client: Arrowhead
Date: 10-22-02

TIME: Arrive: 8:30 Depart: 10:00 Travel: 0:15 Total: 2.5
Weather: clear
Contractor: Arrowhead
Subcontr./Supplier:
Equipment Working: JR 80 compactor

Site Activity / Observations / Contacts / Notes: density tests on soil fill new locations determined by client.

add 1 more test 225 to fill in the hole

Materials / Sources:
Corrective Action Suggested / Taken:

DENSITY TESTS

110.0 OMC 17%

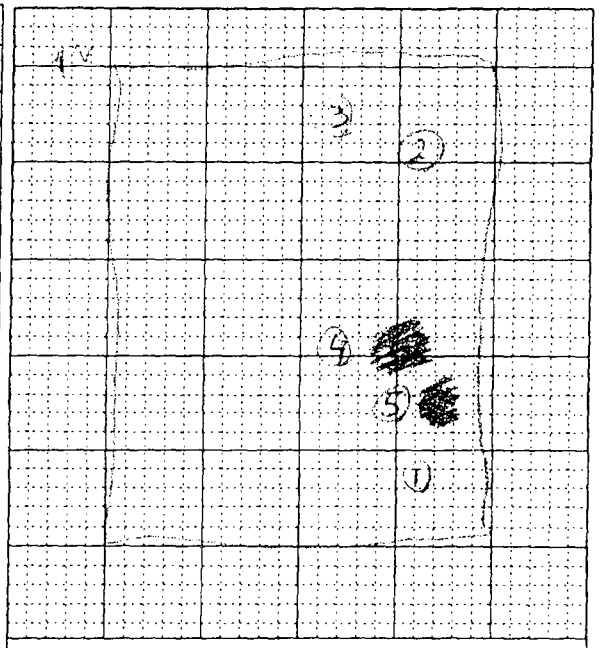
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1			17.4	105.3	110.0	95.7	P
2			12.7	108.4	110.0	98.5	[illegible]
3			15.7	109.7	110.0	99.7	[illegible]
4			21.0	100.9	110.0	91.7	F
5			19.2	102.5	110.0	93.2	F
5A	recall		18.3	105.6	110.0	96.0	P

Compaction Requirements: ☐ Modified ☑ Standard

Percent Compaction: 95% Moisture Control: 0.4 ± 3%

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: * more tests in the N/A area is required before compl. not for P/F determinations

Contractor Representative Company

Signature Date 10/22/02

Geotechnology, Inc. Date

Engineers's Signature

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Otl

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: _____ Moisture Control: _____

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 448739

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Page 1 of 1

☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Michael McKinney Project No.: [illegible] Task: [illegible]

Equipment & ID No.: CPN MC-3 # [illegible] Project Name: SLAAP

Vehicle: personal Zone: 2 Client: Arrowhead Date: 10 23 02

TIME: Arrive: 2:15 Depart: 3:00 Travel: 0.25 Total: 1.0 hour

Weather: overcast Contractor: Arrowhead Subcontr./Supplier: —

Equipment Working:

Site Activity / Observations / Contacts / Notes: [illegible]

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

DI: 110.0 [illegible]

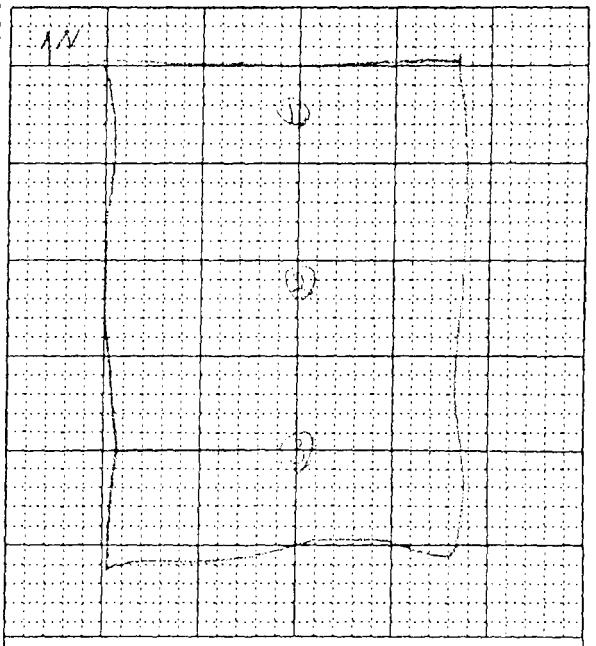
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
~~1~~			~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~F~~
~~2~~			~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~F~~
3			15.7	107.3	110.0	97.6	P
1			22.4	97.5	110.0	88.6	F
2			21.1	100.6	110.0	91.5	F

Compaction Requirements: ☐ Modified ☑ Standard

Percent Compaction: 95% Moisture Control: [illegible]

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments:

Contractor Representative Company

Signature Date

Geotechnology, Inc. Date

Engineers's Signature

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Oth

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☑ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 448656

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Page ___ of ___

☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Michael McKinney Project No.: 0672401.2117 Task: 3300

Equipment & ID No.: CPN MC 3 # 8908 Project Name: SLAAP

Vehicle: personal Zone: 2 Client: Arrowhead Date: 10-24-02

TIME: Arrive: 2:45 Depart: 3:30 Travel: .5 Total: 1½

Weather: PTLY CLOUDY Contractor: ARROWHEAD Subcontr./Supplier:

Equipment Working: IR70 CONTACTOR

Site Activity / Observations / Contacts / Notes: Density test for soil fill

1/4 LOAD - UNLOA PREP

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

M 110.0 %M 17.5

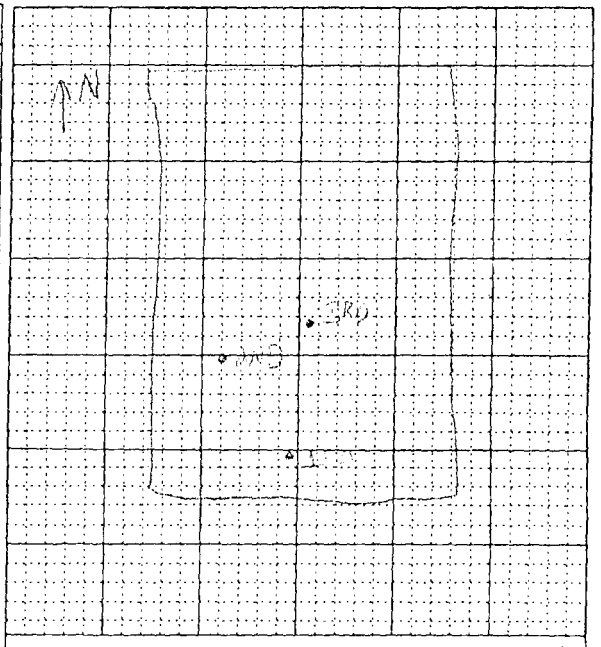
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1			25.64	95.6	120.1	86.9	
2			19.7	101.1	121.0	91.91	
3			20.9	98.6	119.3	89.7	

Compaction Requirements: ☐ Modified ☒ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Aaron Matheny

Contractor Representative Company

Signature Date 10/24/02

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

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1 - JOB SITE 1 - ACCOUNTING

GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. [illegible]

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Oth

Representative: [illegible] Project No.: [illegible] Task: [illegible]

Equipment & ID No.: [illegible] Project Name: [illegible]

Vehicle: [illegible] Zone: [illegible] Client: [illegible] Date: [illegible]

TIME: Arrive: [illegible] Depart: [illegible] Travel: [illegible] Total: [illegible]

Weather: [illegible] Contractor: [illegible] Subcontr./Supplier: [illegible]

Equipment Working: [illegible]

Site Activity / Observations / Contacts / Notes: [illegible]

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1			[illegible]	[illegible]	[illegible]	[illegible]	
2			[illegible]	[illegible]	[illegible]	[illegible]	
3			[illegible]	[illegible]	[illegible]	[illegible]	

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative [illegible] Company [illegible]

Signature [illegible] Date [illegible]

Geotechnology, Inc. Date

Engineer's Signature

Additional Comments:

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 448873

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Page 1 of 1

☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Kevin Krone Project No.: 0672401-2117 Task: 3300

Equipment & ID No.: MC-3 7041 Project Name: SLAAP

Vehicle: 4066 Zone: 2 Client: Arrowhead Date: 11-7

TIME: Arrive: 2:30 Depart: 3:45 Travel: .50 Total: 1.75

Weather: Sunny 55° Contractor: Arrowhead Subcontr./Supplier:

Equipment Working: 750C John Deere Dozer 900 Pro Pac Series Ingersoll Rand Roller

Site Activity / Observations / Contacts / Notes: Arrived onsite for compaction tests on fill. Sketch below for approximate location

Materials / Sources: Soil

Corrective Action Suggested / Taken:

DENSITY TESTS

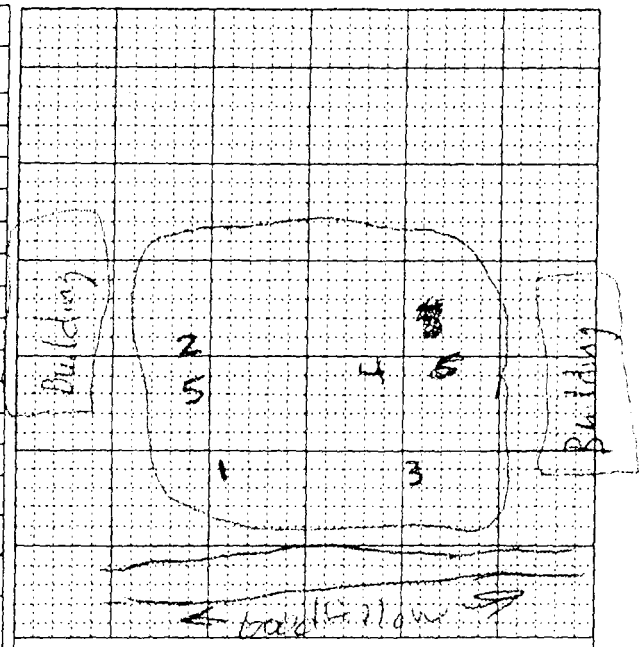
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1	See sketch		20.4	98.1	110	89	F
2			21.5	98.9		90	F
3			21.4	97.9		90	F
4			22	99.9		91	F
5	Re-Roll #1,2		21.6	104.8		95	P
6	Re-Roll #3,4		21.4	104.5		95	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative Company

Signature Date

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

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ACCOUNTING

GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. [illegible]

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Oth

Representative: [illegible] Project No.: [illegible] Task: [illegible]

Equipment & ID No.: [illegible] Project Name: [illegible]

Vehicle: [illegible] Zone: Z Client: [illegible] Date: [illegible]

TIME: Arrive: [illegible] Depart: [illegible] Travel: [illegible] Total: [illegible]

Weather: [illegible] Contractor: [illegible] Subcontr./Supplier: ___

Equipment Working: [illegible]

Site Activity / Observations / Contacts / Notes: [illegible] compaction tests on fill. Sketch below for approximate location

Materials / Sources: Soil

Corrective Action Suggested / Taken: ___

DENSITY TESTS

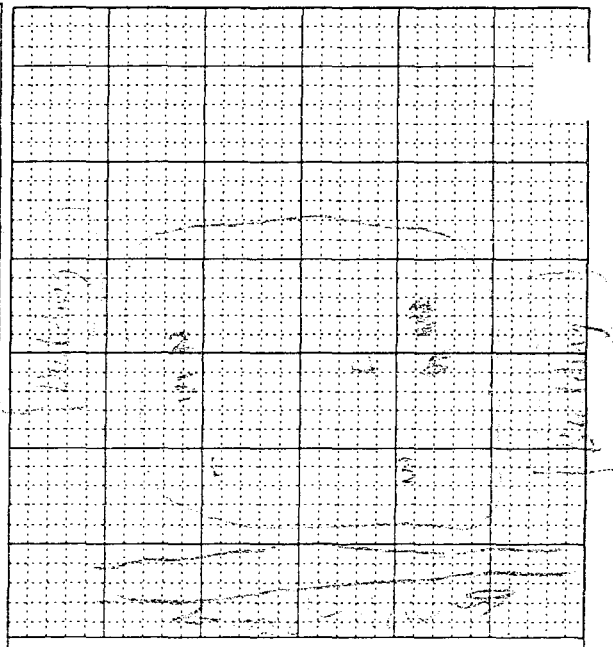
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1	See Sketch		20.4	[illegible]	[illegible]	89	F
2			21.5	[illegible]		90	F
3			21.4	[illegible]		95	F
4			22	[illegible]		91	F
5	[illegible]		21.6	[illegible]		95	P
6	[illegible]		21.4	[illegible]		95	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: ___

Contractor Representative ___ Company ___

Signature ___ Date ___

Geotechnology, Inc. ___ Date ___

Engineers's Signature ___

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 448902

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☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Tim Godlove
Project No.: 06742401.2117
Task: 3300
Equipment & ID No.: CPN 9228
Project Name: SLAAP
Vehicle: 4WD personal
Zone: 2
Client: Arrowhead
Date: 11-8-02

TIME: Arrive: 2:30 Depart: 3:15 Travel: .5 Total: 1.25

Weather: Cloudy Contractor: Arrowhead Subcontr./Supplier:

Equipment Working: dozer, sheepsfoot

Site Activity / Observations / Contacts / Notes: compaction tests with nuclear gauge at fill for west end building 3, all test passed, moisture on stockpile was ~ 14 %

Materials / Sources: brown silty clay

Corrective Action Suggested / Taken:

DENSITY TESTS

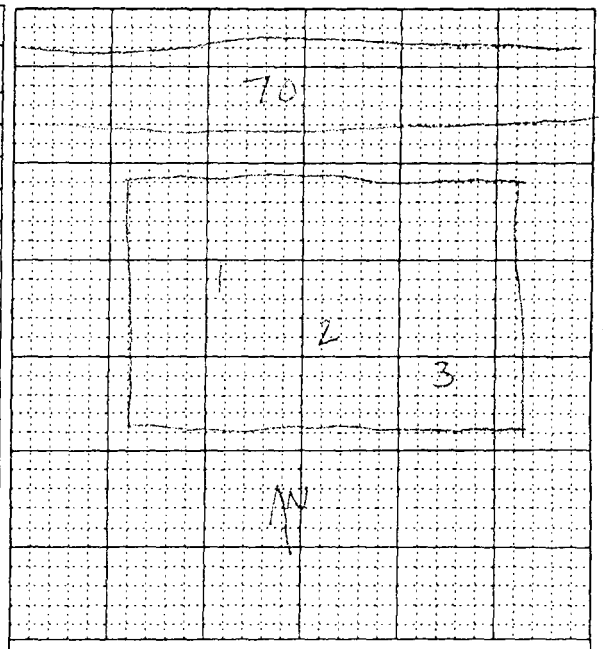
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1	see sketch		15.0	102.2	110	96	P
2	↓		14.7	104.6	110	100	P
3	↓		14.5	103.9	110	95	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: 95 Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative: [illegible] Company

Signature Date 11-8-02

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 448495

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Page 1 of

☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Michael McKinney Project No.: 06 72406 2117 Task: 3300

Equipment & ID No.: [illegible] Project Name: SCAAP

Vehicle: personal Zone: 2 Client: Arrowhead Date: 11-14-02

TIME: Arrive: [illegible] Depart: [illegible] Travel: [illegible] Total: 1.75 hours

Weather: [illegible] Contractor: Arrowhead Subcontr./Supplier:

Equipment Working:

Site Activity / Observations / Contacts / Notes: [illegible]

Materials / Sources:

Corrective Action Suggested / Taken:

BG - Below Grade

DENSITY TESTS

Pl: 110 OM=17.0

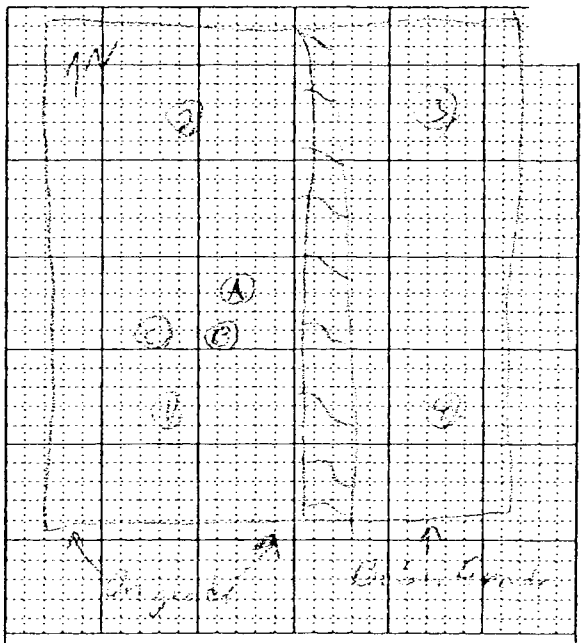
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1		On grade	22.4	98.8	110.0	89.3	F
2		On grade	18.4	107.0	110.0	97.3	P
3		2' BG	20.2	100.5	110.0	91.4	F
4		2' BG	17.4	108.7	110.0	98.8	P
* A			22.6	101.6	110.0	92.4	
* B			22.2	103.1	110.0	93.7	
* C			21.0	104.2	110.0	94.7	

Compaction Requirements: ☐ Modified ☑ Standard

Percent Compaction: 95% Moisture Control: OM ± 3

CONCRETE TESTS

Cyl Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp	Cum Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: * these tests were taken at the request of client to establish a higher understanding of the area

Contractor Representative Company

Signature Date 11/14/02

Geotechnology, Inc. Date

Engineers's Signature

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air %	Mix Temp.	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449075

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Page 1

☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Michael McKinney Project No.: 0672401 2117 Task: 3300

Equipment & ID No.: CPN MC-3 #7041 Project Name: SLAAP

Vehicle: personal Zone: 2 Client: Arrowhead Date: 11-19-02

TIME: Arrive: 7:15 Depart: 8:15 Travel: 0.5 Total: 1.75 hours

Weather: Cloudy Contractor: Arrowhead Subcontr./Supplier:

Equipment Working:

Site Activity / Observations / Contacts / Notes: density tests on soil fill

add time: 1 @ 25 load/unload/prep.

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

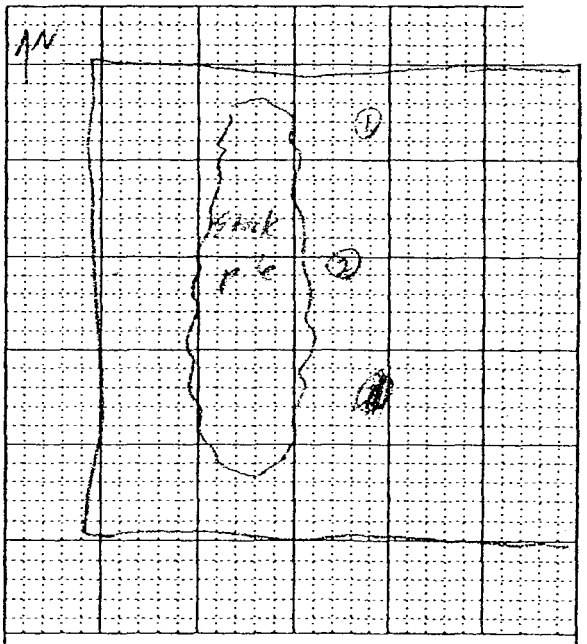
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1			21.7	101.6	110.0	92.4	F
2			23.9	98.1	110.0	89.2	F
~~3~~							

Compaction Requirements: ☐ Modified ☑ Standard

Percent Compaction: 95% Moisture Control: OM ± 3

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative: [signature] Company: Arrowhead Conf.

Signature: [signature] Date:

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

st	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

dditional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449081

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Page 1 of 1

☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Michael McKinney Project No.: 0672401 2117 Task: 3300

Equipment & ID No.: CPN MC-3 # 7010 Project Name: SLAAP

Vehicle: 4050 Zone: 2 Client: Arrowhead Date: 11-20-02

TIME: Arrive: 12:15 Depart: 1:30 Travel: 0.5 Total: 1.75

Weather: Contractor: Arrowhead Subcontr./Supplier:

Equipment Working:

Site Activity / Observations / Contacts / Notes: density tests on soil fill. Test locations determined by and scraped smooth by client. rep.

Materials / Sources:

Corrective Action Suggested / Taken:

OG = on grade / r = reroll

DENSITY TESTS

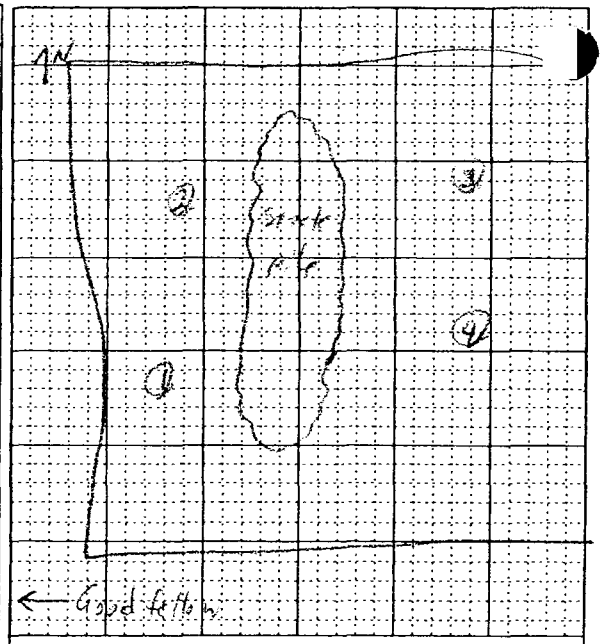
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1		O.G.	19.8	102.7	110.0	93.4	F
2		O.G.	20.6	103.3	110.0	93.9	F
3		O.G.	19.2	108.1	110.0	98.3	P
4		O.G.	20.2	104.6	110.0	95.1	P
1r		O.G.	17.3	107.7	110.0	98.0	P
2ra		O.G.	20.2	102.4	110.0	93.1	F
2rb		O.G.	20.5	103.3	110.0	93.9	F

Compaction Requirements: ☐ Modified ☑ Standard

Percent Compaction: 95% Moisture Control: OM ± 3

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Scott Siegwald Arrowhead

Contractor Representative Company

Scott Siegwald 11-20

Signature Date

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449107

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Page 1 of 1

☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Juan Martinez Project No.: 04-24-013-17 Task: 7370

Equipment & ID No.: Pan Mc-3 (PM) Project Name: [illegible]

Vehicle: [illegible] Zone: 2 Client: Armstrong Date: 11-21-02

TIME: Arrive: 1:15 Depart: Travel: Total:

Weather: 40's cloudy Contractor: Armstrong Subcontr./Supplier: —

Equipment Working: [illegible]

Site Activity / Observations / Contacts / Notes: Performed compaction tests on soil fill below footing [illegible] [illegible] [illegible]

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

Test #	Location	Elev. ft	MC %	Dry γ	Max γ	Comp %	P/F
1	#1	[illegible]	19.2	106.2	110.0	96	P
2	#2	[illegible]	19.6	105.4	"	95	P

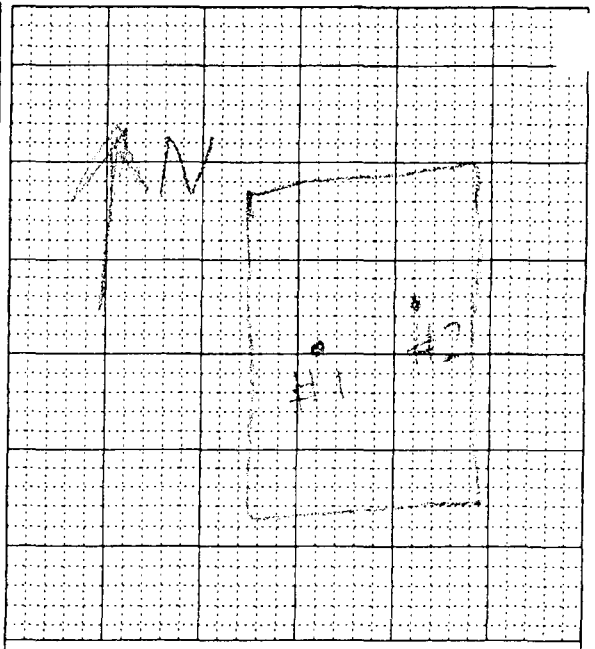
Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: 95% Moisture Control: 17% +/- 2%

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Additional Comments:



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative Company

Signature Date

Geotechnology, Inc. Date

Engineers's Signature

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

st	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449146

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Page 1 of

☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Elizabeth Rabbitt Project No.: 0672401.2117 Task: 3300
Equipment & ID No.: gauge 7844 Project Name: SLAPP
Vehicle: 4071 Zone: 2 Client: Arrowhead Date: 11-22-02

TIME: Arrive: 1:00 Depart: 1:30 Travel: 1/2 Total: 1
Weather: sunny 45 Contractor: Arrowhead Subcontr./Supplier: Spiritas
Equipment Working:

Site Activity / Observations / Contacts / Notes: took compaction tests center of bldg excavation near row 22

Materials / Sources:
Corrective Action Suggested / Taken:

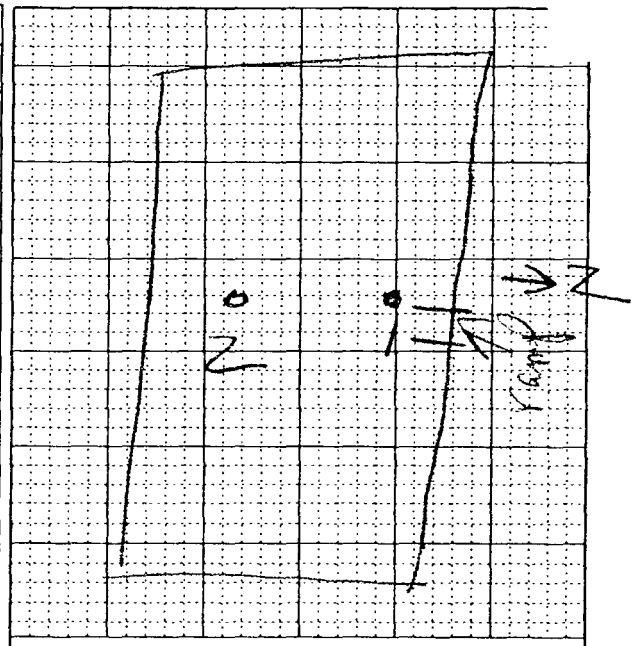
DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1	center of bldg		19.2	105.4	110.0	95.9	P
2	excavation		16.3	105.6		96.0	P
	near row 22						

Compaction Requirements: ☐ Modified ☐ Standard
Percent Compaction: 95% Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements
Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Scott Siegwald Arrowhead
Contractor Representative Company

Scott Siegwald 11-22
Signature Date

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: _____ Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp	Cum. Yds	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

itional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 447620

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Page ___ of ___

☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Oth

Representative: Rick Rebecca Project No.: 67240121 7 Task: 3300

Equipment & ID No.: Project Name: SLAAPS

Vehicle: # 4060 Zone: 2 Client: ACI Arrowhead Center Date: 11.23

TIME: Arrive: 10:00 Depart: 2:30 Travel: .5 Total: 5.0

Weather: Sunny Contractor: ACI Subcontr./Supplier: Onsite

Equipment Working: 963, Sheepsfoot, Track Hoe, D6, 750C Dozer

Site Activity / Observations / Contacts / Notes: Onsite to Observe placement of Clean fill, 963D8 Spread Dumped fill in 6" Lifts (Approx) Sheepsfoots Dressed up and Compacts. Approx 3 hours to place (1) Lift, (1) test per Lift Needed.

← Good Fellow →

Materials / Sources:

Corrective Action Suggested / Taken:

913-461-3828

Blk 9

DENSITY TESTS

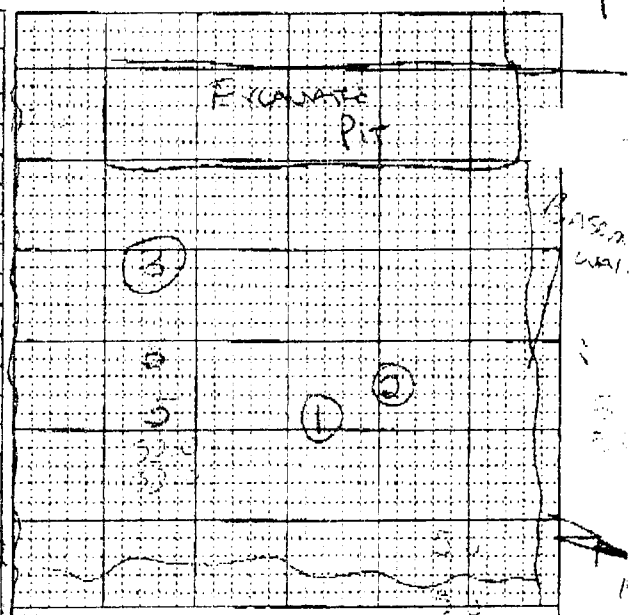
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1	See Lay out	1st DM	21.4	105.7	107.6	98.2	P
2		2nd	20.0	107.6		100.0	P
3		2nd	19.5	105.5		98.6	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos	Placement Structure / Location	Slump	Air %	Mix Temp	Air Temp	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative: [signature] Company: ACI

Signature: Date: 11/23

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 447620

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Page ___ of ___

☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Rick Rebecca Project No.: 67240121 7 Task: 3300

Equipment & ID No.: Project Name: SLAAPS

Vehicle: #4060 Zone: 2 Client: ACI Arrowhead Contractor Date: 11-23

TIME: Arrive: 10:00 Depart: 2:30 Travel: .5 Total: 5.0

Weather: Sunny Contractor: ACI Subcontr./Supplier: Onsite

Equipment Working: 963, Sheepsfoot, Track Hoe, D6, 750C Dozer

Site Activity / Observations / Contacts / Notes: Onsite to Observe placement of Clean fill, 963D8 Spread Dumped fill in 6" Lifts (approx) Sheepsfoots Dressed up and Compacts. Approx 3 hours to place (1) Lift, (1) test per Lift Needed.

← Good Fellow →

Materials / Sources:

Corrective Action Suggested / Taken:

913-461-3828

Bldg 9

DENSITY TESTS

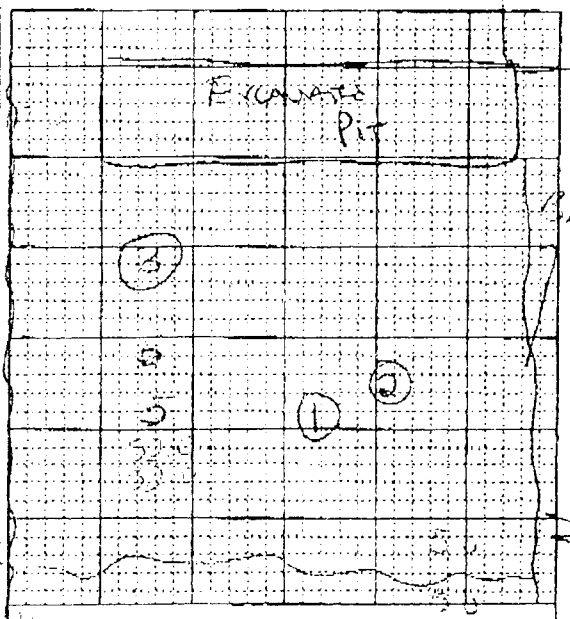
Test #	Location	Elev. ft	MC %	Dry γ	Max γ	Comp %	P/F
1	See Lay out	1st	21.4	105.7	107.4	98.2	P
2		2nd	20.0	107.6		100.0	P
3		2nd	19.5	105.5		98.6	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos	Placement Structure / Location	Slump	Air %	Mix Temp	Air Temp	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative: [signature] Company: ACI

Signature Date 11/23

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449136

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Page 1 of 1

☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Ot

Representative: KEVIN KIONE Project No.: 0672401.2117 Task: 3300

Equipment & ID No.: MC3 6293 Project Name: SLAAP

Vehicle: 4066 Zone: 2 Client: Arrowhead Date: 11-25

TIME: Arrive: 2:45 Depart: 3:15 Travel: ~~[illegible]~~ .50 Total: 1

Weather: Contractor: Arrowhead Subcontr./Supplier:

Equipment Working:

Site Activity / Observations / Contacts / Notes: Density test on soil

Materials / Sources: Soil

Corrective Action Suggested / Taken:

DENSITY TESTS

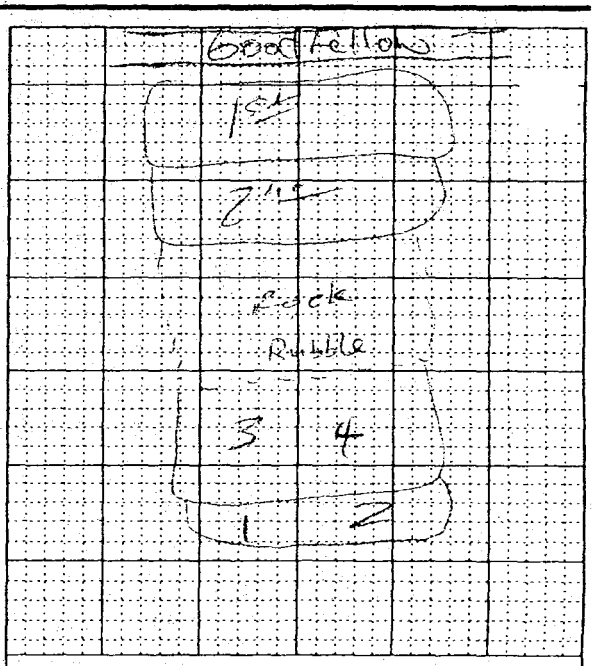
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1			20.7	108.8	110	98	P
2			19	111.6	↓	101	P
3			19.2	104.6	↓	95	P
4			21.1	106	↓	96	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Scott Siegwald Arrowhead

Contractor Representative Company

[signature] 11-3-02

Signature Date

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY FIELD OBSERVATION REPORT NO. 449178

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☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Ot

Representative: KEVIN KROWE Project No.: 0672401.2117 Task: 3300

Equipment & ID No.: MC 3 62293 Project Name: SLAAP

Vehicle: 40166 Zone: 2 Client: Arrowhead Date: 11-25

TIME: Arrive: 7:30/10:45 Depart: 8:00/11:00 Travel: .50 Total: 1.25

Weather: Contractor: Arrowhead Subcontr./Supplier:

Equipment Working:

Site Activity / Observations / Contacts / Notes: Compaction test on soil

Materials / Sources: Soil

Corrective Action Suggested / Taken:

DENSITY TESTS

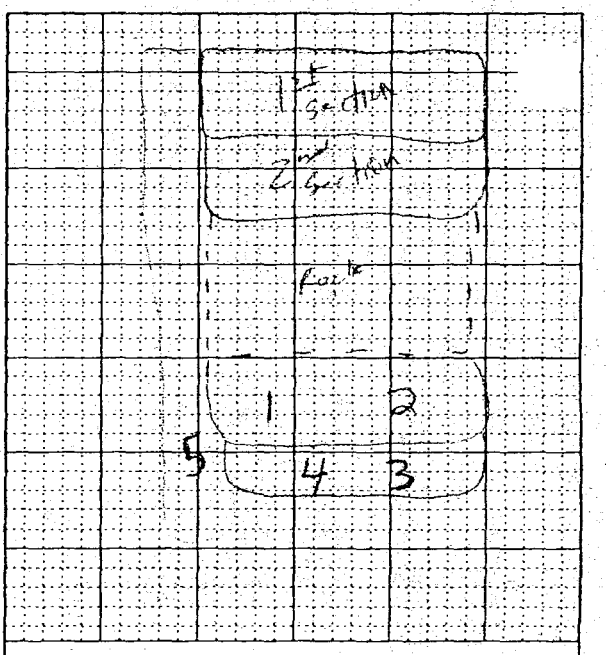
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1			21.5	104.2	110	95	P
2			21.4	103.8		95	P
3			21.6	104.6		95	P
4			20.8	105		95	P
5			21.2	108.2		98	P
6	#1		18.5	105.6		95	P
7	#2		18.9	106.2		[illegible]	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative Company

Signature Date

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

Additional Comments: _____

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GEOTECHNOLOGY FIELD OBSERVATION REPORT NO. 449209

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Page 1 of 1

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Ot

Representative: Kent Krone Project No.: 0672401.2117 Task: 3300

Equipment & ID No.: NC3 6293 Project Name: SLAAP

Vehicle: Hole Zone: 2 Client: Arrowhead Date: 11-21-6

TIME: Arrive 900 Depart 1100 11 30 Travel: 1.5 Total: 4 2 trips

Weather: Contractor: Arrowhead Subcontr./Supplier:

Equipment Working:

Site Activity / Observations / Contacts / Notes: Density test on soil

Materials / Sources: Soil

Corrective Action Suggested / Taken:

DENSITY TESTS

Test #	Location	Elev. ft	MC %	Dry γ	Max γ	Comp %	P/F
1			15.8	108	110	98	P
2			20.3	111.7		101	P
3			19.9	110.6	↓	100	P
4			18.4	109		99	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative Company

Signature Date 11/20/02

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

t	Location	Elev. ft	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative Company

Signature Date

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments: _____

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449212

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Page 1 of 1

☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Otl

Representative: Michael McKinney
Project No.: 0672401.2117 Task: 3300
Equipment & ID No.: CPN MC-3 #7141
Project Name: SLAAP
Vehicle: personal Zone: 2
Client: Arrowhead Date: 11-26-02

TIME: Arrive: 2:45 Depart: 4:00 Travel: 0.75 Total: 2.0 hours
Weather: Mcloudy Contractor: Arrowhead Subcontr./Supplier:
Equipment Working:

Site Activity / Observations / Contacts / Notes: density tests on soil fill. Test locations located and cut smooth by client rep.

Materials / Sources:
Corrective Action Suggested / Taken:

DENSITY TESTS

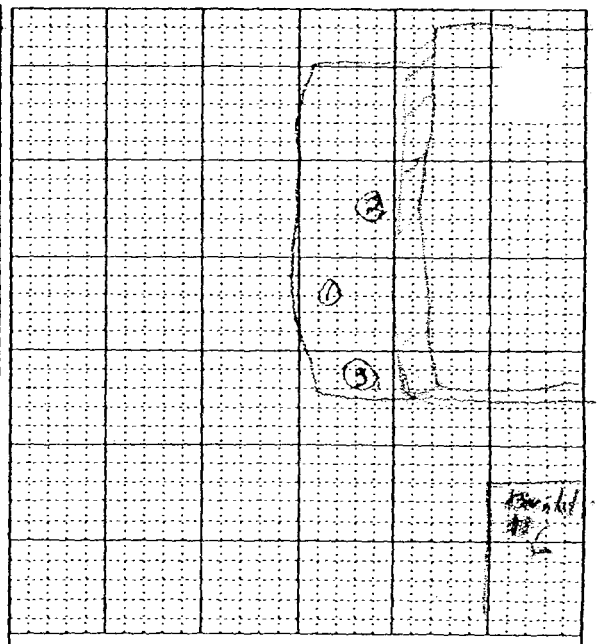
P) max γ: 110 OMS17 1 Passing test per lift

Test #	Location	Elev. ft. l.f.	MC %	Dry γ	Max γ	Comp %	P/F
1		1	20.3	106.7	110.0	97.0	P
2		2	19.8	104.8	110.0	95.3	P
3		3	19.2	107.1	110.0	97.3	P

Compaction Requirements: ☐ Modified ☑ Standard
Percent Compaction: 95% Moisture Control: O.M ± 3%

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements
Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative Company
Signature Date 11/26/02
Geotechnology, Inc. Date
Engineers's Signature

Additional Comments:

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449212

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY FIELD OBSERVATION REPORT NO. 449210

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: KEVIN KRONE Project No.: 0672401.2117 Task: 3300

Equipment & ID No.: NC3 6293 Project Name: SLAAP

Vehicle: 4066 Zone: 2 Client: Arrowhead Date: 11-27

TIME: Arrive: 7:30 Depart: 11:45 Travel: .50 Total: 4.75

Weather: Sunny 35° Contractor: Arrowhead Subcontr./Supplier:

Equipment Working:

Site Activity / Observations / Contacts / Notes: Density test on soil
Five lifts total today

Materials / Sources: soil

Corrective Action Suggested / Taken:

DENSITY TESTS

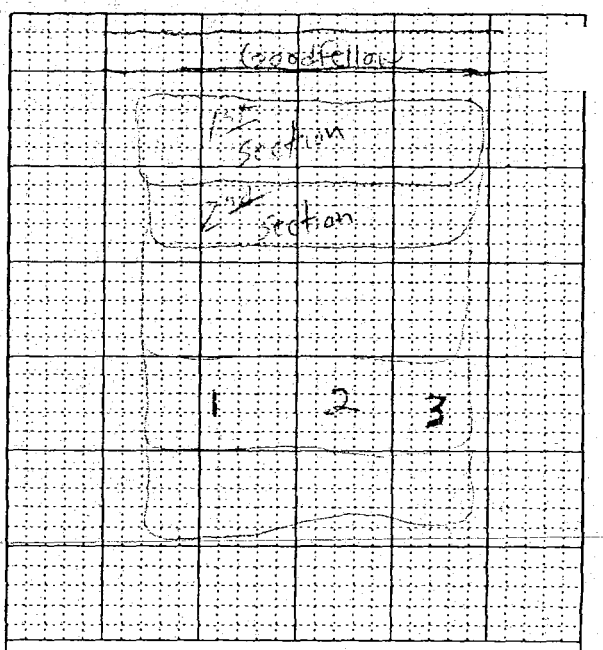
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1			19.8	103	110	95	P
2			20	110.5		100	P
3			20.1	109.5		99	P
4	1		20.2	108.4		98.5	P
5	2		20.9	106.5		97	P
6	3		19.0	102.7		98	P
7	2		19.4	107.8		98	P
8	2		20.1	107.6		98	P
9	3		19.8	108.8		99	P
10	1		20.1	109.7		99	P
11	3		20.4	108.4		98	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative Company

Signature Date 11/27/0

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY **FIELD OBSERVATION REPORT NO.** 449257

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☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: John Meadows Project No.: 06 72401 2117 Task: 3300

Equipment & ID No.: Project Name: SCAAPS

Vehicle: Zone: Client: Arrowhead Date: 12-2-02

TIME: Arrive: 2PM Depart: 3PM Travel: .75 Total: 1.75

Weather: 55° Sun Contractor: Arrowhead Subcontr./Supplier:

Equipment Working: Roller

Site Activity / Observations / Contacts / Notes: Compaction on Soil Fill (See below)

P/U Proctor Sample

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

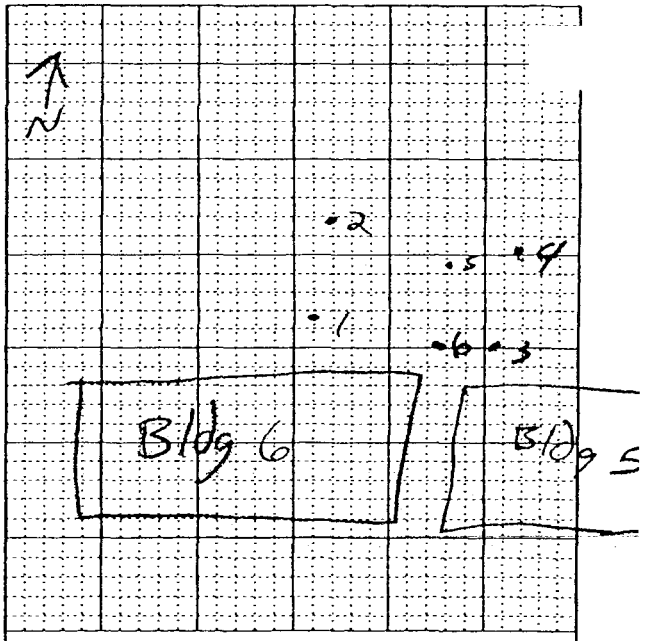
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1		2' BSG	17.9		107.0	95	P
2	See Chart	2' BSG	17.3			97	P
3		6' BSG	18.1			96	P
4		6' BSG	18.0			96	P
5		5' BSG	17.8			97	P
6		5' BSG	18.1			97	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments:

Contractor Representative Company

Signature Date 12/6/02

Geotechnology, Inc. Date

Engineers's Signature

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

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☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: John Meadows Project No.: 06 72401 2117 Task: 3300

Equipment & ID No.: _____ Project Name: SCAAPS

Vehicle: _____ Zone: _____ Client: Arrowhead Date: 12-2-02

TIME: Arrive: 2PM Depart: 3PM Travel: .75 Total: 1.75

Weather: 55° Sun Contractor: Arrowhead Subcontr./Supplier: _____

Equipment Working: Roller

Site Activity / Observations / Contacts / Notes: Compaction on Soil Fill (see below)

P/U Proctor Sample

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

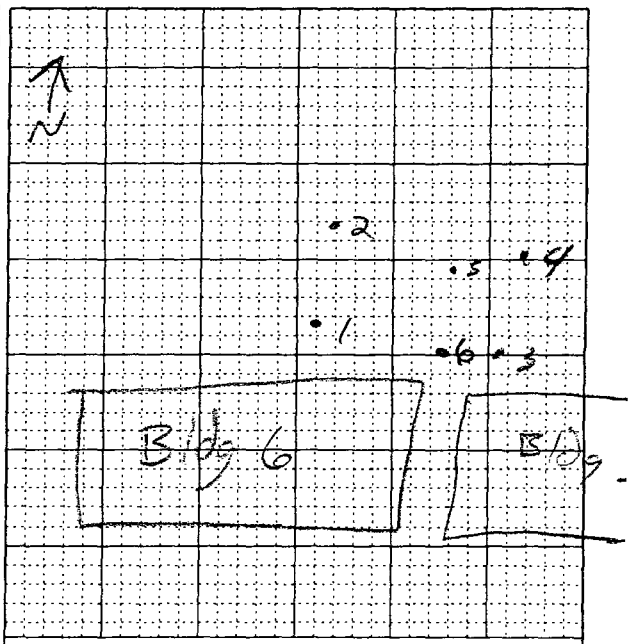
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1		2'BSG	17.9		107.0	95	P
2	See Chart	2'BSG	17.3			97	P
3		6'~~7'~~BSG	17.1			96	P
4		6'~~7'~~BSG	18.0			96	P
5		5'BSG	17.8			97	P
6		5'BSG	18.1			97	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative Company

Signature Date 12/02/02

Geotechnology, Inc. Date

Engineers's Signature

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 447629

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Page ___ of

☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Rick Rebecca
Project No.: 0672401.2117 Task: 3300
Equipment & ID No.: 4752
Project Name: Slaaps
Vehicle: #4060 Zone: 2
Client: AC, Inc. Date: 12-3

TIME: Arrive: 11:00 Depart: 11:30 Travel: .5 Total: 1.0
Weather: Cloudy Contractor: ACI Subcontr./Supplier:
Equipment Working: D6M, Front Sheep 100, 750C Dozer

Site Activity / Observations / Contacts / Notes: Onsite to Conduct Density Test @ Slaaps Fill (2) Tests were Conducted and passed. Call Back will Be Later

Materials / Sources:
Corrective Action Suggested / Taken:

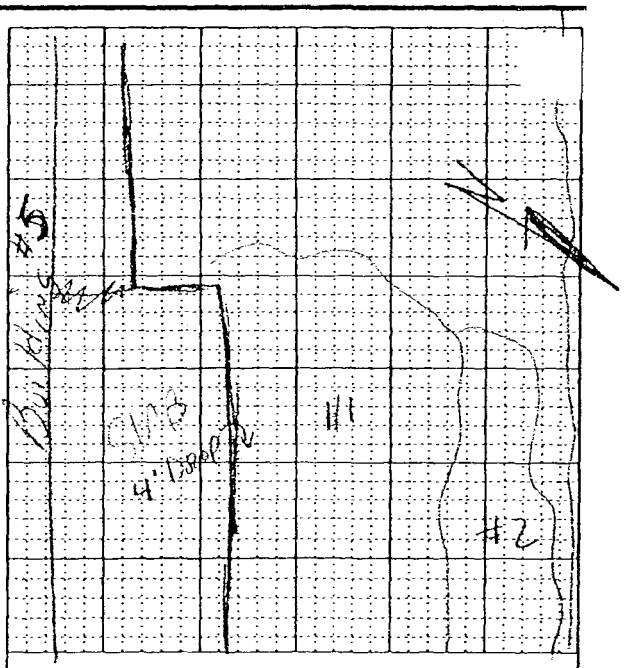
DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1	See Layout	1st Lift	19.6	111.4	110.0	101.2	P
2	"	"	20.1	109.3	"	99.3	P

Compaction Requirements: ☐ Modified ☐ Standard
Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements
Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative Company
Signature Date 12/3
Geotechnology, Inc. Date
Engineers's Signature

Additional Comments:

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature

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GEOTECHNOLOGY **FIELD OBSERVATION REPORT NO.** 447594

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Page 1 o

☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Rick Rebecca Project No.: 0672401.2117 Task: 3300

Equipment & ID No.: Project Name: SLAAPS

Vehicle: #4060 Zone: 2 Client: ACInc. Date: 12-4

TIME: Arrive: 1:00 Depart: 1:30 Travel: .5 Total: 1.0

Weather: Cloudy/snow Contractor: Arrow Subcontr./Supplier:

Equipment Working: None

Site Activity / Observations / Contacts / Notes: Onsite to Test placed Soil For Moisture Readings only. However Ground Temp Below 1' Remove For Test cuns 68 and Tests also showed Compaction passing. Arrow Did remove Toplayer of Soil/ Snow For Tests.

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

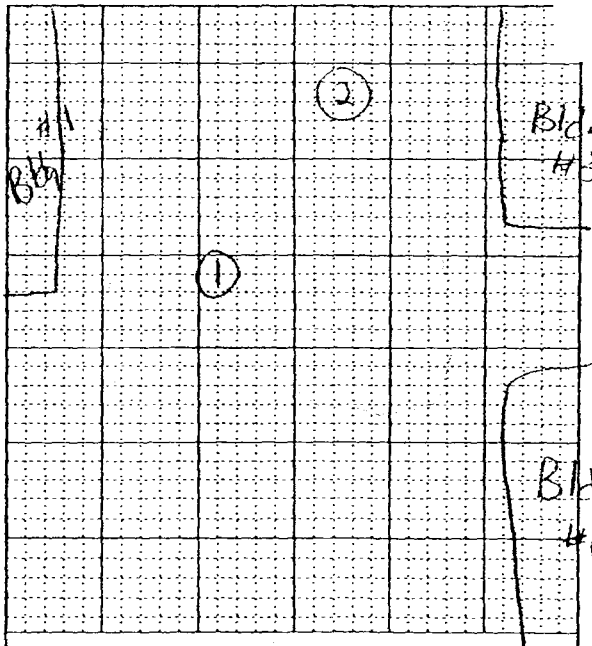
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1	See Layout	-3'	17.5	108.4	107.0	101.3	P
2	"	-3'	16.4	108.6	"	101.4	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Scott Siegwald Contractor Representative

Arrowhead Company

Signature

12-4-0 Date

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 447594

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: [illegible] Project No.: [illegible] Task: [illegible]

Equipment & ID No.: Project Name: [illegible]

Vehicle: [illegible] Zone: 2 Client: [illegible] Date: 12-14

TIME: Arrive: 1:00 Depart: 1:30 Travel: .5 Total: 1.0

Weather: [illegible] Contractor: [illegible] Subcontr./Supplier:

Equipment Working: None

Site Activity / Observations / Contacts / Notes: Visit to Test placed Soil for Moisture Readings only. Unknown Ground Temp Below 1' Remove for Insulation Test and Tests also showed Compaction passing. Remove Dig Remove Footings of Soil Sample for Tests.

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1	See Above	-3'	17.5	108.4	107.0	101.3	P
2		-3'	16.4	109.6	"	102.4	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative Company

Signature Date

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY FIELD OBSERVATION REPORT NO. 449256

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page 1 of 1

☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: John Meadows Project No.: 0672401 2117 Task: 3300

Equipment & ID No.: Project Name: SLAAP

Vehicle: Zone: Client: Arrowhead Date: 12-2-02

TIME: Arrive: 9:45 Depart: 10:15 Travel: .75 Total: 1.25

Weather: 45° Sun Contractor: Arrowhead Subcontr./Supplier:

Equipment Working: Vibe Roller

Site Activity / Observations / Contacts / Notes: Comp. tests on soil Fill North of Bldg 6 (See below)

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

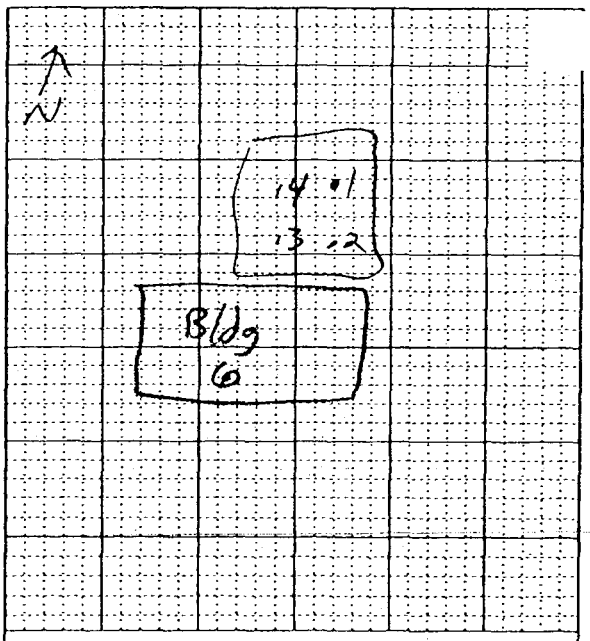
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1		3' BSG	14.8	101.2	107.0	95	P
2	See Chart		16.9	102.1		95	P
3			15.1	102.5		96	P
4			15.6	103.0		96	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments:

Contractor Representative Company

Signature Date 12/6/02

Geotechnology, Inc. Date

Engineers's Signature

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 44955

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: John Meadows Project No.: 0672401 2117 Task: 3300

Equipment & ID No.: Project Name: SLAAP

Vehicle: Zone: Client: Arrowhead Date: 12-2-02

TIME: Arrive: 9:45 Depart: 10:15 Travel: .75 Total: 1.25

Weather: 45° Sun Contractor: Arrowhead Subcontr./Supplier:

Equipment Working: Vibe Roller

Site Activity / Observations / Contacts / Notes: Comp. tests on soil fill North of Bldg 6 (see below)

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

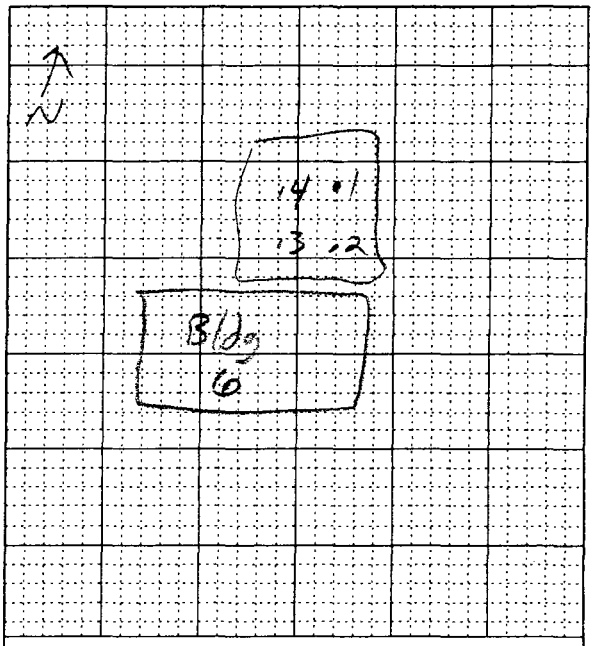
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1		3'BSG	14.8	101.2	107.0	95	P
2	See Chart		16.9	102.1		95	P
3			15.1	102.5		96	P
4			15.6	103.0		96	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments:

Contractor Representative Company

Signature Date 12/02/02

Geotechnology, Inc. Date

Engineers's Signature

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 448662

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page 1 of 1

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Ot

Representative: Michael McKinney Project No.: 0072401 2117 Task: 3300

Equipment & ID No.: CPV MC-3 #6294 Project Name: SEAAP

Vehicle: personal Zone: 2 Client: Arrowhead Date: 12-6-02

TIME: Arrive: 12:45 Depart: 1:30 Travel: 0.5 hours Total: 1.5 hrs

Weather: clear Contractor: Arrowhead Subcontr./Supplier: —

Equipment Working: 750 DL Dozer

Site Activity / Observations / Contacts / Notes: [redacted] measure tests on soil fill. [redacted] Area to be [redacted] proof roll with Cat-L and re-compacted.

add line: 40 ft landfill road.

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

[redacted] DM 5.170

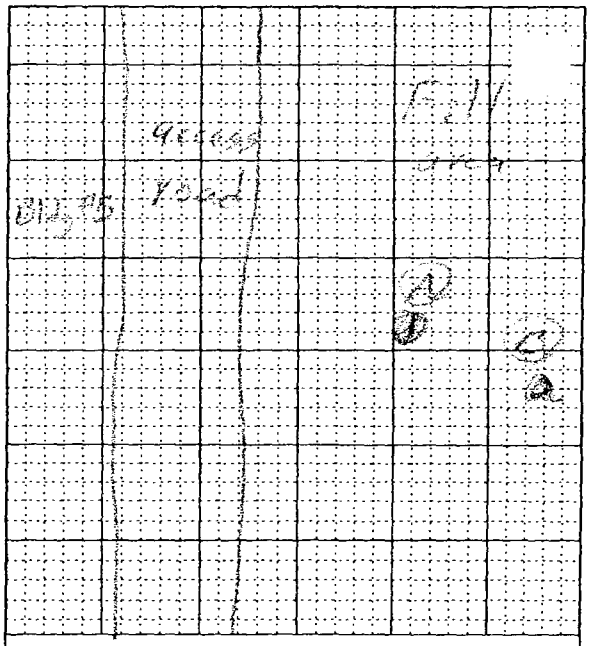
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
A			21.4	102.3	110.0	93.0	
B			23.5				

Compaction Requirements: ☐ Modified ☑ Standard

Percent Compaction: 95% Moisture Control: DM 3.3

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments:

Contractor Representative Company

Signature Date 12/1/02

Geotechnology, Inc. Date

Engineers's Signature

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 44992

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 447633

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page ___ of

☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: Rick Rebecca
Project No.: 0672401.7117 Task: 3300
Equipment & ID No.:
Project Name: SLAAPS
Vehicle: #4060 Zone: 1
Client: ACI Date: 12-7

TIME: Arrive: 7:00/10:30(LAB) Depart: 7:30/3:30 Travel: 1.0 Total: 6.5
Weather: Sunny Contractor: ACT Subcontr./Supplier: Onsite Barrow
Equipment Working: D6H, D8, 963, 815 Sheepsfoot

Site Activity / Observations / Contacts / Notes: Onsite to Observe placement of Barrowed fill for future Bldg Pad. Early Am Tests and Then Return @ 10:00 to Complete Rest of Day. Tests were Conducted and passed.

Materials / Sources: Onsite Barrows
Corrective Action Suggested / Taken:

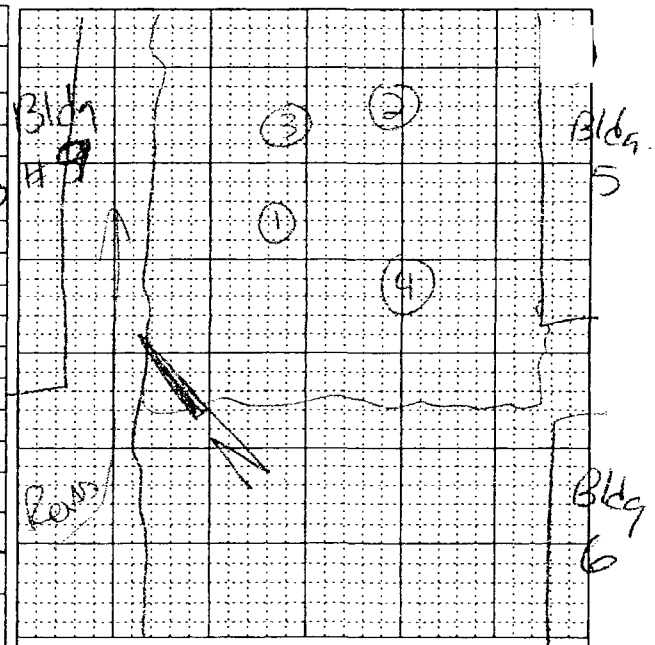
DENSITY TESTS

Test #	Location	Elev. ft. Lift	MC %	Dry γ	Max γ	Comp %	P/F
1	See Layout	1ST	17.6	109.6	107.0	102.4	P
2	↓	"	18.4	110.4	↓	103.1	P
3	↓	2nd	14.6	111.3	↓	104.0	P
4	↓	"	15.1	110.0	↓	102.8	P

Compaction Requirements: ☐ Modified ☐ Standard
Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp	Cum. Yds.	Time



Bearing Capicity Requirements
Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Scott Siegwald — Contractor Representative
Arrowhead — Company
Scott Siegwald — Signature
12-7-2 — Date
Geotechnology, Inc. — Date
Engineers's Signature

Additional Comments:

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. [illegible]

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: [illegible] Project No.: [illegible] Task: [illegible]

Equipment & ID No.: Project Name: [illegible]

Vehicle: [illegible] Zone: 1 Client: [illegible] Date: [illegible]

TIME: Arrive: [illegible] Depart: [illegible] Travel: [illegible] Total: [illegible]

Weather: [illegible] Contractor: [illegible] Subcontr./Supplier: [illegible]

Equipment Working: [illegible]

Site Activity / Observations / Contacts / Notes: [illegible]

Materials / Sources: [illegible]

Corrective Action Suggested / Taken:

DENSITY TESTS

#	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
3		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]
4		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

[illegible]

Contractor Representative Company

Signature Date

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449382

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Ot

Representative: John Meadows Project No.: Task:

Equipment & ID No.: Project Name: SLAAP

Vehicle: Zone: Client: Arrowhead Date: 12-9-02

TIME: Arrive: 2:45 Depart: 3:15 Travel: .5 Total: 1hr

Weather: 40's Sun Contractor: Arrowhead Subcontr./Supplier:

Equipment Working: Sheeps Foot

Site Activity / Observations / Contacts / Notes: on site to test compaction of soil in Fill Area (see below).

Materials / Sources: Br / Silty Clay - stiff

Corrective Action Suggested / Taken:

* - 122.0 is Assumed value

DENSITY TESTS

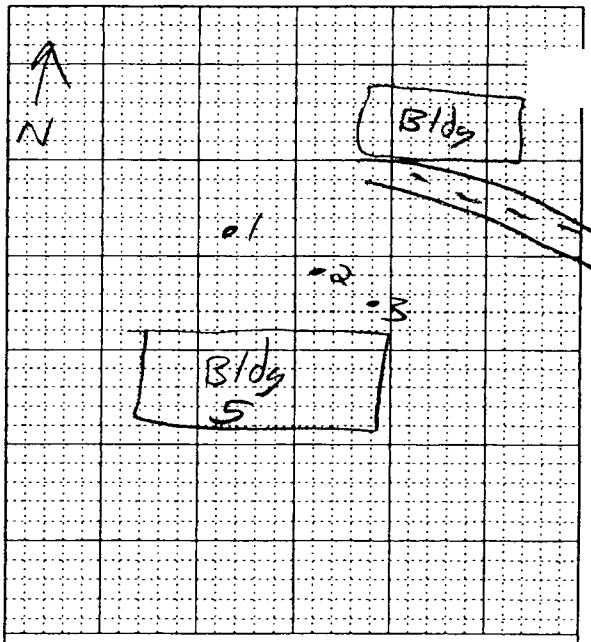
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1		2'BSG	16.3	121.0	122.0	99	P
2	See Chart		17.1	118.3		97	P
3			17.9	120.7		98	P

Compaction Requirements: ☐ Modified ☒ Standard

Percent Compaction: 95% Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings Spread Footings

OBSERVATION AREA SKETCH

Additional Comments:

Contractor Representative Company

Signature Date 12/9/02

Geotechnology, Inc. Date

Engineers's Signature

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449992

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: John Meadows Project No.: Task:

Equipment & ID No.: Project Name: SLAAP

Vehicle: Zone: Client: Arrowhead Date: 12-9-02

TIME: Arrive: 2:45 Depart: 3:15 Travel: .5 Total: 1 hr

Weather: 40's Sun Contractor: Arrowhead Subcontr./Supplier:

Equipment Working: Sheeps Foot

Site Activity / Observations / Contacts / Notes: on site to test compaction of soil in Fill Area (see below).

Materials / Sources: Br / Silty Clay - stiff

Corrective Action Suggested / Taken:

* - 122.0 is Assumed value

DENSITY TESTS

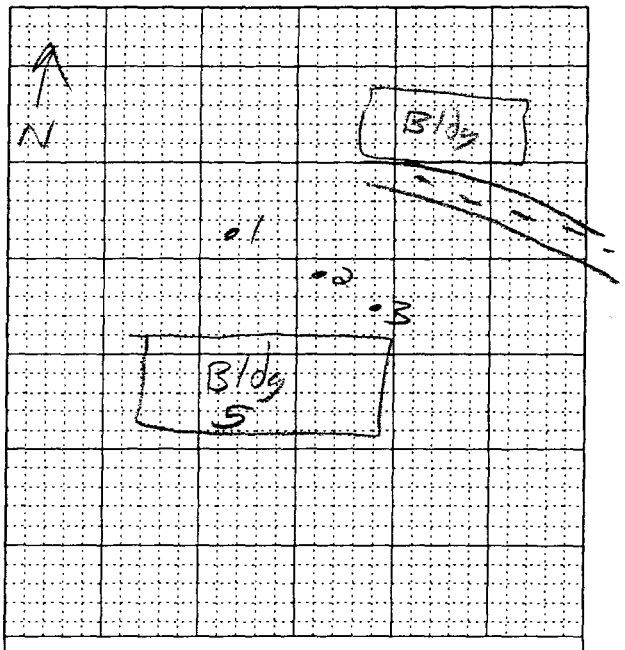
est #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1		2' BSG	16.3	121.9	122.0	99	P
2	See Chart		17.1	118.3		97	P
3			17.9	120.7		98	P

Compaction Requirements: ☐ Modified ☒ Standard

Percent Compaction: 95% Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings Spread Footings

OBSERVATION AREA SKETCH

Additional Comments:

Contractor Representative Company

Signature Date 12/9/02

Geotechnology, Inc. Date

Engineers's Signature

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449318

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

☐ Concrete ☑ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Otl

Representative: [illegible] Project No.: [illegible] Task: [illegible]

Equipment & ID No.: [illegible] Project Name: [illegible]

Vehicle: [illegible] Zone: [illegible] Client: [illegible] Date: 12-11-02

TIME: Arrive: [illegible] Depart: [illegible] Travel: 0.5 Total: 1.5 hrs

Weather: [illegible] Contractor: [illegible] Subcontr./Supplier: [illegible]

Equipment Working: 1 R-100K [illegible]

Site Activity / Observations / Contacts / Notes: [illegible]

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1	[illegible]		17.1	109.7	110.0	99.7	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Additional Comments:

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative Company

Signature Date

Geotechnology, Inc. Date

Engineers's Signature

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. _____

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

st #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449449

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Ot

Representative: John Meadows Project No.: Task:

Equipment & ID No.: Project Name: SCAAP

Vehicle: Zone: Client: Arrowhead Date: 12-16-02

TIME: Arrive: 10:15 Depart: 10:45 Travel: .5 Total: 1.0

Weather: 40° P/C Contractor: Arrowhead Subcontr./Supplier:

Equipment Working: Dozer / Sheeps foot

Site Activity / Observations / Contacts / Notes: on site to test compaction of soil Fill (See below)

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

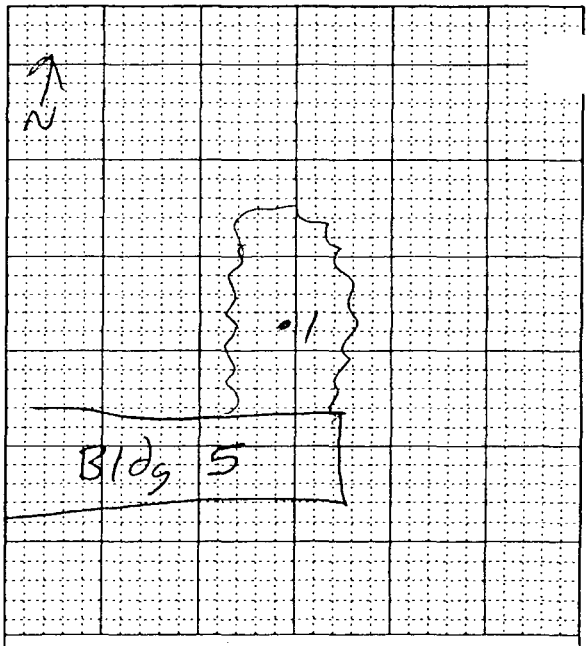
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1	See chart	1' BSG	12.5	110.0	110.0	100	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings Spread Footings

OBSERVATION AREA SKETCH

Contractor Representative Company

Signature Date 12/16/02

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449451

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page 1 of 1

☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: John Meadows Project No.: 06724012117 Task: 3300

Equipment & ID No.: Project Name: SCAMP

Vehicle: Zone: Client: Arrowhead Date: 12-16-02

TIME: Arrive: 2:45 Depart: 3:00 Travel: 5 Total: 75

Weather: Contractor: Subcontr./Supplier:

Equipment Working:

Site Activity / Observations / Contacts / Notes: on site to test compacted fill (see below)

[illegible] 12-16-02

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

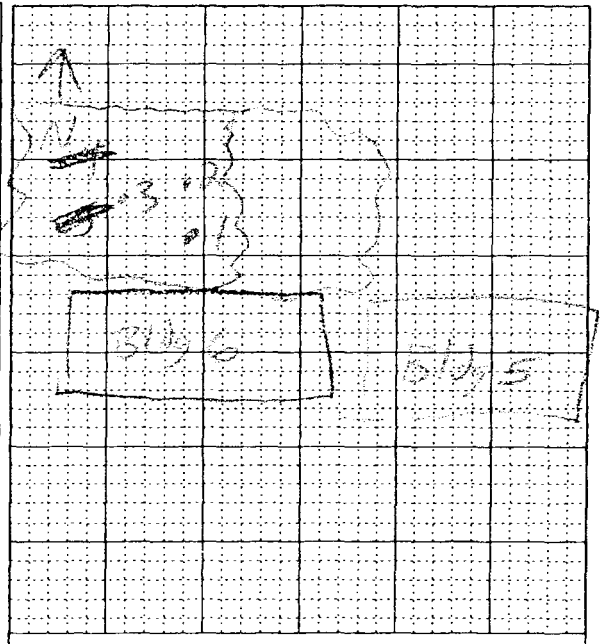
#	Location	Elev. ft.	MC %	Dry γ	Max	Comp %	P/F
1		2136	17.9		110	[illegible]	[illegible]
2	[illegible]	2136	18.4			[illegible]	[illegible]
3		2136	20.1			99.8	[illegible]

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Scott Stagwald — Contractor Representative

Arrowhead — Company

Signature

12-16-02 — Date

Geotechnology, Inc. — Date

Engineers's Signature

Additional Comments:

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 448667

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Ot...

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: 2 Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1	[illegible]		18.9	[illegible]	[illegible]	95	P
2	"		19.6	[illegible]	[illegible]	[illegible]	P
3	"		19.0	[illegible]	[illegible]	[illegible]	P
4	"		19.3	[illegible]	[illegible]	[illegible]	P
5	[illegible]		19.2	[illegible]	[illegible]	[illegible]	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449855

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page 1 of 1

☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: John Meadows Project No.: _____ Task: _____

Equipment & ID No.: NUC 7580 Project Name: SLAAP

Vehicle: _____ Zone: _____ Client: Arrowhead Date: 1-13-02

TIME: Arrive: 2PM Depart: 3PM Travel: .5 Total: 1.5

Weather: 40's P/C Contractor: Arrowhead Subcontr./Supplier: _____

Equipment Working: Vibe Roller (sheeps foot) Dozer

Site Activity / Observations / Contacts / Notes: on site for soil compaction tests (see below)

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

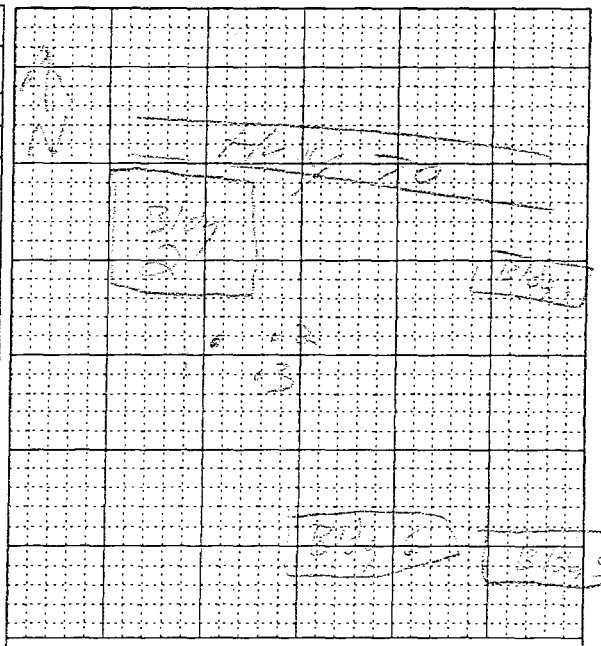
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1		2' BSG	19.5		110.6	94.5	P
2	See chart	1' BSG	18.5		1	95.1	P
3		SG	19.0		1	95.7	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: 95% Moisture Control: 18.5-20%

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date 1/13/02

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. 449963

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☐ Concrete ☒ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ O

Representative: John Meadows Project No.: Task:

Equipment & ID No.: Project Name: SLAAP

Vehicle: Zone: Client: Arrowhead Date: 1-14-03

TIME: Arrive: 2:30 Depart: 3PM Travel: 1.5 Total: 1.0

Weather: 30° Sun Contractor: Arrowhead Subcontr./Supplier:

Equipment Working: Vibe Roller / Dozer

Site Activity / Observations / Contacts / Notes: on site for soil compaction tests

Materials / Sources:

Corrective Action Suggested / Taken:

DENSITY TESTS

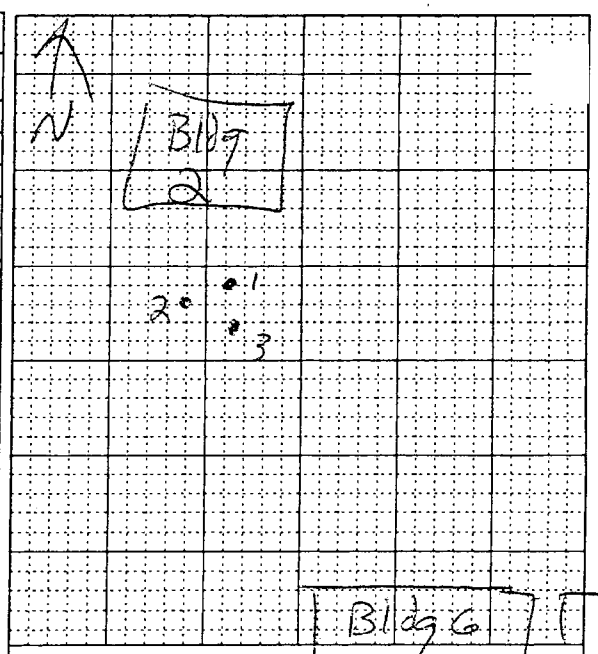
Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1		2'BSG	18.1		110.0	96.1	P
2	See Chart	1'BSG	16.9			96.5	P
3		SG	17.3			97.3	P

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time



Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative Company

Signature Date

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments:

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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FIELD OBSERVATION REPORT NO. _____

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Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Other

Representative: _____ Project No.: _____ Task: _____

Equipment & ID No.: _____ Project Name: _____

Vehicle: _____ Zone: _____ Client: _____ Date: _____

TIME: Arrive: _____ Depart: _____ Travel: _____ Total: _____

Weather: _____ Contractor: _____ Subcontr./Supplier: _____

Equipment Working: _____

Site Activity / Observations / Contacts / Notes: _____

Materials / Sources: _____

Corrective Action Suggested / Taken: _____

DENSITY TESTS

st	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: Moisture Control:

CONCRETE TESTS

Cyl Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Additional Comments: _____

Contractor Representative _____ Company _____

Signature _____ Date _____

Geotechnology, Inc. _____ Date _____

Engineers's Signature _____

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GEOTECHNOLOGY

FIELD OBSERVATION REPORT NO. [illegible]

This is a preliminary report unless signed by Geotechnology's designated project engineer or project manager.

Page ___ of ___

☐ Concrete ☐ Soil ☐ Footings ☐ Asphalt ☐ Steel ☐ Othe

Representative: [illegible] Project No.: [illegible] Task: [illegible]

Equipment & ID No.: [illegible] Project Name: [illegible]

Vehicle: [illegible] Zone: [illegible] Client: [illegible] Date: [illegible]

TIME: Arrive: [illegible] Depart: [illegible] Travel: [illegible] Total: [illegible]

Weather: [illegible] Contractor: [illegible] Subcontr./Supplier: ___

Equipment Working: [illegible]

Site Activity / Observations / Contacts / Notes: [illegible]

Materials / Sources: ___

Corrective Action Suggested / Taken: ___

DENSITY TESTS

Test #	Location	Elev. ft.	MC %	Dry γ	Max γ	Comp %	P/F
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Compaction Requirements: ☐ Modified ☐ Standard

Percent Compaction: [illegible] Moisture Control:

CONCRETE TESTS

Cyl. Nos.	Placement Structure / Location	Slump	Air, %	Mix Temp	Air Temp.	Cum. Yds.	Time

Bearing Capicity Requirements

Strip Footings_____ Spread Footings_____

OBSERVATION AREA SKETCH

Contractor Representative [illegible] Company [illegible]

Signature [illegible] Date [illegible]

Geotechnology, Inc. Date

Engineers's Signature

Additional Comments: ___

Notice: The Geotechnology representative is on site solely to observe operations of the contractor identified, form opinions about the accuracy of those operations and report those opinions to the client. The presence and activities of the geotechnology field representative do not relieve the contractor's obligation to meet contractual requirements. The contractor retains sole responsibility for site safety and the methods and sequences of construction.

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APPENDIX J
CORRESPONDENCE REGARDING SOIL SAMPLE RESULTS BENEATH BURIED SEWER LINES

November 27, 2002

Ms. Sandy Olinger (AMSAM-EN)
Building 111
Redstone Arsenal, Alabama 35898

Preliminary Evaluation of Soil Confirmation Data
Soils Beneath Buried Sewer Lines in the Basement
Building 3, St. Louis Army Ammunition Plant
Contract No. DACW41-00-D-0019

Dear Ms. Olinger:

This letter provides an evaluation of results of soil confirmation samples collected beneath buried sewer lines in the basement of Building 3. Currently, Arrowhead Contracting, Inc. (Arrowhead) is remediating polychlorinated biphenyls (PCBs) contamination in the former basement area of Building 3 in accordance with Addendum No. 1 of Removal Action Work Plan (RAWP) for PCB TSCA Waste (Arrowhead, 2002). In a letter to AMCOM dated May 13, 2002, regarding Army responses to comments to Addendum No. 1 of the RAWP, the Missouri Department of Natural Resources (MDNR) mandated the collection of soil confirmation samples beneath buried sewer lines that are to be removed during the PCB remediation effort. MDNR indicated that the buried sewer lines may have leaked other contaminants into the soil. Additionally, these contaminants may not have been identified during the Building 3 portion of the Site-Specific Environmental Baseline Survey (EBS), because the EBS sample locations were either randomly selected or were placed in oil-stained areas. Thus, there were no specific EBS samples collected to investigate potential releases originating from the buried sewer lines.

AMCOM's response to this comment was outlined in a letter (prepared by Arrowhead) to MDNR dated June 28, 2002. In this letter, AMCOM agreed to collect soil confirmation samples beneath the sewer lines as part of the Building 3, Site-Specific EBS, and that Addendum No. 1 of the RAWP would not be modified to include a discussion of these samples. The approach that was recommended by AMCOM included collection of soil confirmation samples at a frequency of one sample for every 50 feet of buried sewer line, and analysis of the samples for PCBs, metals, semivolatile organic compounds (SVOCs), volatile organic compounds (VOCs), and total petroleum hydrocarbons (TPH, expressed as gasoline and diesel range organics). It was proposed that the sampling event occur during the EBS, prior to removal of select underground sewer lines that was to take place as part of the PCB removal action. However, it was later determined that the more appropriate time to collect these samples would be during the PCB removal action, because the sewer lines would be removed and the soils beneath them would

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become exposed at that time. Even though the sampling event was moved to the PCB removal action, the data remained assigned to the Site-Specific EBS, because the samples were aimed at investigating a broad range of contaminants consistent with the objectives of the EBS. Furthermore, AMCOM indicated in the letter that a stand-alone decision document presenting the results of the samples would be submitted for review and approval by MDNR. As necessary, any additional remediation required based on the results would be conducted concurrent with the PCB removal action prior to backfilling the building footprint. This letter constitutes the above-referenced decision document.

During the removal action, Arrowhead removed five PCB-contaminated, underground sewer lines. In accordance with approach presented to the MDNR, soil confirmation samples were collected beneath each of the lines on November 18 – 19, 2002. The samples and corresponding sewer lines are identified as follows:

- Sample RA-PS01: 40-ft. sewer line that ran south along Row 8, between Rows J and L
- Sample RA-PS02: 40-ft. sewer line that ran south along Row 21, between Rows J and L
- Sample RA-PS03: 50-ft. sewer line that ran south along Row 22, between Rows H and L
- Sample RA-PS04: 50-ft. sewer line that ran south along Row 26, between Rows H and L
- Sample RA-PS05: 40-ft. sewer line that ran north along Row 23, between Rows C and A

The samples were analyzed for metals, SVOCs, VOCs, and TPH in addition to PCBs. The analytical results are summarized as follows:

- PCBs were non-detect in all samples.
- VOCs, SVOCs, and TPH were non-detect in all samples.
- Metals, when detected, were below commercial CALM and C_{LEACH} values.

The data will be submitted to URS Corporation for validation. The results of samples RA-PS01 through RA-PS05 indicate that additional soil remediation beneath the sewer lines will not be required. Accordingly, each area has been cleared for backfilling. If you should have any questions regarding this letter, please call us at (913) 814-9994.

Sincerely,

Scott Siegwald
QA/QC Manager

Enclosures

cc: Brad Eaton (U.S. Army Corps of Engineers, Kansas City District)
Bob Skach (URS Corporation)

Soil Confirmation Sampling Resu... Underground Sewer Lines
Building 3, Basement Area
St. Louis Army Ammunition Plant, St. Louis, Missouri

Analysis, Method, and Analyte	Units	CALM Industrial Limit	CALM CLeach Value	RA-PS01			RA-PS02			RA-PS03			RA-PS04			RA-PS05		
				Result	Q	QL	Result	Q	QL	Result	Q	QL	Result	Q	QL	Result	Q	QL
Metals: SW846-6010/7471																		
Aluminum	mg/kg	NA		4627		(20.2)	6476		(12.9)	6186		(15.3)	2922		(19.6)	6768		(17.2)
Antimony	mg/kg	300			ND	(10.1)		ND	(6.47)		ND	(7.66)		ND	(9.82)		ND	(8.6)
Arsenic	mg/kg	14		1.88		(1)	3.99		(0.801)	2.72		(0.775)	1.44		(0.667)	2.86		(0.686)
Barium	mg/kg	51000	1700	31.21		(0.505)	80.25		(0.324)	28.086		(0.383)	14.66		(0.491)	108.53		(0.43)
Beryllium	mg/kg	0.2	130	0.296	J	(0.505)	0.64		(0.324)	0.329	J	(0.383)	0.283	J	(0.491)	0.379	J	(0.43)
Cadmium	mg/kg	380	11		ND	(1.01)		ND	(0.647)		ND	(0.766)		ND	(0.982)		ND	(0.86)
Calcium	mg/kg	NA		2483		(50.5)	2529		(32.4)	2619		(38.3)	1599		(49.1)	2029		(43)
Chromium	mg/kg	4500	38	11.68		(1.009)	13.46		(0.647)	12.36		(0.766)	7.967		(0.982)	13.15		(0.86)
Cobalt	mg/kg	NA		1.35		(1.009)	3.448		(0.647)	2.53		(0.766)	1.679		(0.982)	6.27		(0.86)
Copper	mg/kg	4700		5.57		(1.009)	13.78		(0.647)	7.664		(0.766)	4.279		(0.982)	6.192		(0.86)
Iron	mg/kg	NA		10796		(10.09)	14549		(6.47)	12637		(7.66)	7496.2		(9.82)	11825		(8.6)
Lead	mg/kg	660		7.72	J	(10.09)	8.88		(6.47)	11.61		(7.66)	6.64	J	(9.82)	8.41	J	(8.6)
Magnesium	mg/kg	NA		1202		(10.09)	2377		(6.47)	1518.9		(7.66)	904.63		(9.82)	1693		(8.6)
Manganese	mg/kg	11000		53.06		(0.505)	81.29		(0.324)	3536		(0.383)	43.47		(0.491)	449.36		(0.43)
Mercury	mg/kg	1			ND	(0.25)		ND	(0.2)		ND	(0.194)		ND	(0.167)		ND	(0.171)
Nickel	mg/kg	17000	170	5.31		(2.52)	18.019		(1.62)	8.13		(1.91)	4.55		(2.45)	12.217		(2.15)
Potassium	mg/kg	NA		317.3		(252)	302.12		(162)	244.94		(191)	156.7	J	(245)	194.12	J	(215)
Selenium	mg/kg	970			ND	(1)		ND	(0.801)		ND	(0.775)		ND	(0.667)		ND	(0.686)
Silver	mg/kg	26			ND	(1.51)		ND	(0.97)		ND	(1.15)		ND	(1.47)		ND	(1.29)
Sodium	mg/kg	NA		232.1		(15.1)	76.78		(9.7)	80		(11.5)	122.61		(14.7)	71.65		(12.9)
Thallium	mg/kg	61			ND	(15.1)		ND	(9.7)		ND	(11.5)	ND		(14.7)		ND	(12.9)
Vanadium	mg/kg	5300		23.8		(1.009)	32.19		(0.647)	29.62		(0.766)	17.8		(0.982)	27.32		(0.86)
Zinc	mg/kg	130000	3000	9.85		(3.03)	27.6		(1.94)	15.01		(2.3)	6.82		(2.94)	25.095		(2.58)
TPH: SW846-8015																		
Diesel Range Organics - DRO	mg/kg	500			ND	(12.96)		ND	(12.86)		ND	(12.58)		ND	(12.71)		ND	(12.75)
Gasoline Range Organics - GRO	mg/kg	500			ND	(1.03)		ND	(1.05)		ND	(0.96)		ND	(0.96)		ND	(1.06)

Soil Confirmation Sampling Results - Underground Sewer Lines
Building 3, Basement Area
St. Louis Army Ammunition Plant, St. Louis, Missouri

Analysis, Method, and Analyte	Units	CALM Industrial Limit	CALM CLeach Value	RA-PS01			RA-PS02			RA-PS03			RA-PS04			RA-PS05		
				Result	Q	QL	Result	Q	QL	Result	Q	QL	Result	Q	QL	Result	Q	QL
PCBs: SW846-8082																		
PCB-1016	mg/kg				ND	(0.5)		ND	(0.482)		ND	(0.494)		ND	(0.496)		ND	(0.492)
PCB-1221	mg/kg				ND	(0.5)		ND	(0.482)		ND	(0.494)		ND	(0.496)		ND	(0.492)
PCB-1232	mg/kg				ND	(0.5)		ND	(0.482)		ND	(0.494)		ND	(0.496)		ND	(0.492)
PCB-1242	mg/kg				ND	(0.5)		ND	(0.482)		ND	(0.494)		ND	(0.496)		ND	(0.492)
PCB-1248	mg/kg				ND	(0.5)		ND	(0.482)		ND	(0.494)		ND	(0.496)		ND	(0.492)
PCB-1254	mg/kg				ND	(0.5)		ND	(0.482)		ND	(0.494)		ND	(0.496)		ND	(0.492)
PCB-1260	mg/kg				ND	(0.5)		ND	(0.482)		ND	(0.494)		ND	(0.496)		ND	(0.492)
VOCs: SW846-8260																		
1,1,1-Trichloroethane	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
1,1,2,2-Tetrachloroethane	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
1,1,2-Trichloroethane	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
1,1-Dichloroethane	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
1,1-Dichloroethylene	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
1,2,4-Trichlorobenzene	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
1,2-Dichlorobenzene	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
1,2-Dichloroethane	ug/kg	6	0.02		ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
1,2-Dichloropropane	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
1,3-Dichlorobenzene	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
1,4-Dichlorobenzene	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
2-Chloroethyl Vinyl Ether	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Acrolein	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Acrylonitrile	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Benzene	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Bromoform	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Bromomethane	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Carbon Tetrachloride	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Chlorobenzene	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Chlorodibromomethane	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Chloroethane	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)

Soil Confirmation Sampling Results - Underground Sewer Lines
Building 3, Basement Area
St. Louis Army Ammunition Plant, St. Louis, Missouri

Analysis, Method, and Analyte	Units	CALM Industrial Limit	CALM CLeach Value	RA-PS01			RA-PS02			RA-PS03			RA-PS04			RA-PS05		
				Result	Q	QL	Result	Q	QL	Result	Q	QL	Result	Q	QL	Result	Q	QL
Chloroform	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Chloromethane	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Dichlorobromomethane	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Ethylbenzene	ug/kg	400	32		ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Hexachlorobutadiene	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Methyl Ethyl Ketone	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Methylene Chloride	ug/kg	150	0.02		ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Naphthalene	ug/kg	240	24		ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Tetrachloroethene	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Toluene	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Trichloroethene	ug/kg	89	0.1		ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Vinyl Chloride	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
Xylene (Total)	ug/kg	418	16		ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
cis-1,3-Dichloropropene	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
trans-1,2-Dichloroethene	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
trans-1,3-Dichloropropene	ug/kg				ND	(10.6)		ND	(10.5)		ND	(9.6)		ND	(9.6)		ND	(10.6)
SVOCs: SW846-8270																		
1,2-Diphenylhydrazine	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
2,4,6-Tribromophenol	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
2,4,6-Trichlorophenol	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
2,4-Dichlorophenol	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
2,4-Dimethylphenol	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
2,4-Dinitrophenol	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
2,4-Dinitrotoluene	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
2,6-Dinitrotoluene	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
2-Chloronaphthalene	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
2-Chlorophenol	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
2-Fluorobiphenyl	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
2-Fluorophenol	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
2-Methylnaphthalene	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)

Soil Confirmation Sampling Results - Underground Sewer Lines
Building 3, Basement Area
St. Louis Army Ammunition Plant, St. Louis, Missouri

Analysis, Method, and Analyte	Units	CALM Industrial Limit	CALM CLeach Value	RA-PS01			RA-PS02			RA-PS03			RA-PS04			RA-PS05		
				Result	Q	QL	Result	Q	QL	Result	Q	QL	Result	Q	QL	Result	Q	QL
2-Nitrophenol	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
3,3'-Dichlorobenzidine	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
4,6-Dinitro- 2-Methylphenol	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
4-Bromophenyl Phenylether	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
4-Chloro-3-Methylphenol	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
4-Chlorophenylphenyl- Ether	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
4-Nitrophenol	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Acenaphthene	ug/kg	5400	1000		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Acenaphthylene	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Anthracene	ug/kg	27000	33000		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Benzidine	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Benzo (a) Anthracene	ug/kg	4	0.2		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Benzo (a) Pyrene	ug/kg	0.6	24		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Benzo (b) Fluoranthene	ug/kg	4	0.6		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Benzo (g,h,i,) Perylene	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Benzo (k) Fluoranthene	ug/kg	32	0.6		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Bis (2-Chloroethoxy)- Methane	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Bis (2-Chloroethyl) Ether	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Bis (2-Chloroisopropyl)- Ether	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Bis (2-ethylhexyl)- Phthalate	ug/kg	1800	11000		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Butyl Benzyl Phthalate	ug/kg	930	20000		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Chrysene	ug/kg	140	0.2		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Di-n-Butylphthalate	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Di-n-Octylphthalate	ug/kg	0.3			ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Dibenzo (a,h) Anthracene	ug/kg	0.6	2		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Diethylphthalate	ug/kg	2000	830		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Dimethylphthalate	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Fluoranthene	ug/kg	5200	3800		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Fluorene	ug/kg	3600	2100		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Hexachlorobenzene	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Hexachlorocyclopentadiene	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)

Soil Confirmation Sampling Resu... Underground Sewer Lines
Building 3, Basement Area
St. Louis Army Ammunition Plant, St. Louis, Missouri

Analysis, Method, and Analyte	Units	CALM Industrial Limit	CALM CLeach Value	RA-PS01			RA-PS02			RA-PS03			RA-PS04			RA-PS05		
				Result	Q	QL	Result	Q	QL	Result	Q	QL	Result	Q	QL	Result	Q	QL
Hexachloroethane	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Indeno (1,2,3-cd) Pyrene	ug/kg	11	1.8		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Isophorone	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
N-Nitroso-di-Phenylamine	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
N-Nitroso-di-methylamine	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
N-Nitrosodi-n-Propylamine	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Naphthalene	ug/kg	240	24		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Nitrobenzene	ug/kg	35	0.2		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Pentachlorophenol	ug/kg	25			ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Phenanthrene	ug/kg				ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Phenol	ug/kg	17000	21		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)
Pyrene	ug/kg	6900	12000		ND	(413)		ND	(410)		ND	(430)		ND	(405)		ND	(410)