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MEASURES STUDY

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**Harding Lawson Associates**

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**Corrective Measures Study  
AlliedSignal, Inc.  
Buffalo Research Laboratory  
(Permit No. NYD000632315)**

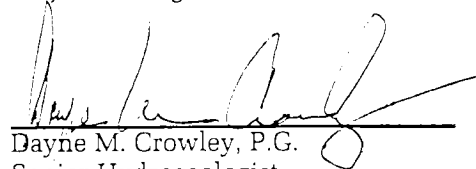
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Prepared for

**AlliedSignal, Inc.**  
Buffalo, New York

HLA Project No. 33753.6

  
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January 8, 1997

Honeywell  
Correc. Measures  
Study 01/97



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## EXECUTIVE SUMMARY

A RCRA Permit (Permit No. NYD000632315) was issued for the AlliedSignal Buffalo Research Laboratory on October 19, 1992 in accordance with Section 6 of the New York Codes, Rules and Regulations (6 NYCRR) Article 27, Title 9. In accordance with the conditions of that Permit, the facility's Hazardous Waste Container Storage Area has been identified as a Solid Waste Management Unit (SWMU) and other areas of the facility have been identified as Areas of Concern. Based on the requirements of the Permit, a RFA was conducted in 1993 to determine if a release had occurred from in any of the Areas of Concern or the SWMU. The findings of the RFA indicated low levels of certain hazardous constituents in the tested media, above background levels.

Following the completion of the RFA, a RFI was conducted that characterized the individual areas of the facility. Samples were collected and analyzed for constituents of interest to determine which constituents, if any, were present at levels that exceeded regulatory levels. The RFI was completed in 1996 and indicated that arsenic was the only constituent of concern. Based on the results of the RFI, the NYSDEC required AlliedSignal to complete this Corrective Measures Study (CMS).

This CMS was completed to identify, evaluate, and recommend corrective measures alternatives for the facility. The CMS is based on the results of the RFI and the results of the analyses of six additional soil samples, which were collected to evaluate the lateral extent of arsenic concentrations in one area of the facility. In general, the RFI concluded that arsenic concentrations in surface soil ranged from 0.6 to 343 mg/kg. The RFI also concluded that arsenic was not detectable in groundwater samples collected from monitoring wells at the site and that the concentrations of arsenic in subsurface soil indicated that site-specific background levels may be on the order of 18 mg/kg. The RFI also indicated that although surface soils contained levels of arsenic exceeding state cleanup criteria (24 mg/kg), the site was not expected to represent a risk, based on the site uses and lack of exposure pathways. In order to further evaluate this possibility, a site specific risk assessment was conducted for arsenic in surface soil at the facility.

The results of the risk assessment indicate that the arsenic concentrations in surface soil at the AlliedSignal facility do not pose an unacceptable risk nor noncancer hazard to site occupants current (occupational) or even the very unlikely (future) residential scenario. This conclusion is based on EPA arsenic cancer risk policy and current knowledge of arsenic's mechanism of action and arsenic's bioavailability in soils upon ingestion.

Even without consideration of the upcoming changes in the cancer risk assessment policy or the reduced bioavailability of arsenic in soil, the generic nonrestricted, risk-based soil concentrations do not apply to this site. The site-specific assumptions include:

- Industrial rather than residential receptors
- 180 (accounting for frozen ground or snow cover) rather than 250 days of exposure.

With consideration of the current EPA risk management policy for arsenic ( $<10^{-3}$  risk), the arsenic soil concentrations at the AlliedSignal site are well within the acceptable risk management range. Due to the uncertainty in the risk assessment process, EPA risk assessment guidelines and the default conservative exposure assumption overestimate risk. The current risk assessment indicates that noncancer hazards and cancer risks may be a concern using standard conservative default industrial exposure assumptions, when soil arsenic levels exceed 613 mg/kg. That level is approximately twice that found as the maximum concentration of arsenic in surface soil on the AlliedSignal site.

This CMS has evaluated corrective measures alternatives that include the following:

- No Action
- Excavation and Disposal
- Containment by placement of top soil
- Containment by placement of asphalt pavement
- Isolation trough installation of a fence.

Each of the potential corrective measures alternatives was evaluated with respect to its technical merit, ability to meet the cleanup objectives, effect on human health, ability to be implemented at the facility, and the potential cost of implementation.

Based on the results of the evaluation of each of the above alternatives and the results of the risk assessment, which indicates that the levels of arsenic in surface soil do not pose an unacceptable risk or hazard, HLA has developed a recommendation for the site. This recommendation is that no action is required for the facility, providing that the current use of the property (industrial usage) does not change and that the areas of surface soil with elevated arsenic be maintained as they are currently. If work is to be undertaken in these areas, HLA believes that appropriate safe guards should be put in place to limit potential exposure, consistent with the assumptions of the risk assessment.

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## 1.0 INTRODUCTION

This Corrective Measures Study Report has been prepared by Harding Lawson Associates (HLA) under contract to AlliedSignal, Inc. (AlliedSignal) to satisfy the requirements of the Resource Conservation and Recovery Act (RCRA) Part B Permit (No. NYD000632315) for the AlliedSignal Buffalo Research Laboratory (facility) in Buffalo, New York (Figure 1). The RCRA Facility Investigation (RFI) was initiated by Remcor, Inc. (Remcor) and completed by HLA on August 6, 1996. The following sections of this chapter present a chronological summary of the project.

### 1.1 PROJECT HISTORY

On October 19, 1992, the New York State Department of Environmental Conservation (NYSDEC) issued a RCRA Part B Permit (Permit) for the facility in accordance with Section 6 of the New York Codes, Rules and Regulations (6 NYCRR) Article 27, Title 9. Under the conditions of the Permit, the facility can operate a covered and diked pad for the storage of up to 8,800 gallons of containerized hazardous waste. The facility's Hazardous Waste Container Storage Area has been defined as a solid waste management unit (SWMU) consistent with the permit regulations.

Module II of the permit addresses the corrective action requirements for the SWMU and other areas of concern (AOCs) identified by the NYSDEC. In accordance with the terms of the permit, corrective action is required, when necessary, to protect human health and environment from releases or potential releases of hazardous wastes and constituents from such units.

In accordance with the Permit requirements (Module III A.2), a RCRA Facility Assessment<sup>1</sup> (RFA) was completed by Remcor in 1993 to determine if a release of hazardous constituents had occurred from any of four facility areas identified by the NYSDEC and U.S. Environmental Protection Agency (EPA). These areas include the following:

- The RCRA SWMU - The Hazardous Waste Container Storage Area for which the RCRA Part B Permit was issued
- Three AOCs:
  - AOC-1 - Storm Sewer System
  - AOC-2 - Activated Carbon System
  - AOC-3 - Drum Storage Area

The SWMU is located east of the Pilot Plant and north of Building 514. AOC-1 (storm sewer system) consists of storm water manholes located in the southeast and southwest portions of the facility as well as the sump in Building 513. AOC-2, the activated carbon system, is located at the southeast corner of the Pilot Plant. The Drum Storage Area (AOC-3) is located along the site's western boundary west of the Pilot Plant. The locations of the SWMU and AOCs are shown on Figure 2.

The findings of the RFA indicated the presence of certain hazardous constituents at low concentrations but above background in tested media samples collected from the facility. EPA and NYSDEC concluded<sup>2</sup> that an RFI was required pursuant to the Part B Permit (Module III A.2). Samples collected

<sup>1</sup> Remcor, Inc., August 11, 1993, "Report, Field Sampling and Analysis Activities, RCRA Facility Assessment, AlliedSignal Inc., Buffalo Research Laboratory, Buffalo, New York," prepared for AlliedSignal, Inc., Buffalo, New York.

<sup>2</sup> New York State Department of Environmental Conservation, Bureau of Western Hazardous Waste Programs, and U.S. Environmental Protection Agency Region II, December 7, 1993, "Notification to Conduct a RCRA Facility Investigation (RFI)," correspondence to AlliedSignal Inc.

in the RFI were tested for constituents of interest, which were determined based on the results of the RFA and the historic activities at the facility.

The Part B Permit identified seven Project Tasks to be implemented pursuant to completion of an RFI. These tasks included:

- Task I Description of Current Conditions
- Task II Pre-Investigation Evaluation of Corrective Measures Technologies
- Task III RFI Management Plans
- Task IV Facility Investigation (RFI Work Plan)
- Task V Investigation Analysis
- Task VI Laboratory and Bench-Scale Studies
- Task VII Reporting

The Current Conditions Report (CCR)<sup>3</sup>, completed as Project Task I, was submitted to NYSDEC and EPA Region II on March 7, 1994. The Pre-Investigation Evaluation of Corrective Measure Technologies<sup>4</sup>, Project Task II, was submitted concurrent with the RFI Work Plan<sup>5</sup>. The RFI Work Plan satisfies the requirements of Tasks III, IV, and V.

The RFI Report<sup>6</sup>, Project Task VII, was submitted to the NYSDEC and EPA on May 18, 1995. The NYSDEC and EPA reviewed the report and issued comments in a letter dated August 25, 1995<sup>7</sup>. HLA responded to the NYSDEC comments in a letter dated December 19, 1995<sup>8</sup>. NYSDEC reviewed HLA's response to comments and approved supplemental sampling activities in a letter dated January 22, 1996<sup>9</sup>. HLA prepared a Supplemental Sampling and Analysis Plan<sup>10</sup> to conduct additional sampling in accordance with the NYSDEC comments. The supplemental sampling was completed and a letter report<sup>11</sup> presenting the finding of the supplemental sampling and finalizing the RFI report was submitted to the NYSDEC on August 6, 1996. NYSDEC reviewed the results of the supplemental sampling and concluded, in a letter dated September 12, 1996<sup>12</sup> that a Corrective Measures Study (CMS) should be completed in accordance with the requirements of Module III Condition E.9. (a) of the RCRA Permit.

<sup>3</sup> Remcor, Inc., March 7, 1994. "Current conditions Report, AlliedSignal Inc., Buffalo Research Laboratory," AlliedSignal Inc., Buffalo, New York.

<sup>4</sup> Remcor, Inc., April 6, 1994. "Pre-Investigation Evaluation of Corrective Measures Technologies, AlliedSignal Inc., Buffalo research Laboratory," AlliedSignal Inc., Buffalo, New York.

<sup>5</sup> Remcor, Inc., April 6, 1994. "RCRA Facility Investigation Work Plan, AlliedSignal Inc., Buffalo Research Laboratory," AlliedSignal Inc., Buffalo, New York.

<sup>6</sup> Remcor, Inc., "RCRA Facility Investigation Report, AlliedSignal Inc., Buffalo Research Laboratory," AlliedSignal Inc., Buffalo, New York.

<sup>7</sup> New York State Department of Environmental Conservation, August 25, 1995, "NYSDEC Comments, RCRA Facility Investigation Report, AlliedSignal, Inc., Buffalo Research Laboratory," correspondence to AlliedSignal, Inc., Buffalo, New York.

<sup>8</sup> Harding Lawson Associates, December 19, 1995. "Response to NYSDEC Comments, RCRA Facility Investigation Report, AlliedSignal, Inc. Buffalo research Laboratory," correspondence to NYSDEC.

<sup>9</sup> New York State Department of Environmental Conservation, January 22, 1996. "RCRA Facility Investigation Report - Comment Response," correspondence to AlliedSignal Inc.

<sup>10</sup> Harding Lawson Associates, March 8, 1996. "Supplemental Sampling and Analysis Plan, RCRA Facility Investigation, AlliedSignal, Inc., Buffalo Research Laboratory," prepared for AlliedSignal Inc., Buffalo, New York.

<sup>11</sup> Harding Lawson Associates, August 6, 1996. "Completion of Supplemental Sampling and Analysis, RCRA Facility Investigation - AlliedSignal, Inc. Buffalo Research Laboratory," correspondence to NYSDEC, prepared for AlliedSignal, Inc., Buffalo, New York.

<sup>12</sup> New York State Department of Environmental Conservation, September 12, 1996. "Supplemental Sampling and Analysis - RCRA Facility Investigation," correspondence to AlliedSignal, Inc. Buffalo, New York.

## 1.2 CMS FORMAT

Appendix III-C, Section II identifies four Project Tasks to be implemented pursuant to the completion of a CMS. These tasks include:

- Task I Identification and Development of the Corrective Measure Alternative or Alternatives
- Task II Evaluation of the Corrective Measure Alternative or Alternatives
- Task III Justification and Recommendation of the Corrective Measure or Measures
- Task IV Reports

This document has been prepared to fulfill the requirements of Project Tasks I through III. A description of the current conditions is presented in Chapter 2.0. A risk assessment addressing concentrations of arsenic in surface soil at the facility is presented in Chapter 3.0. The corrective action objectives are identified in Chapter 4.0. The screening of corrective measures technologies (CMT) and the identification of corrective measures alternatives (CMA) is presented in Chapter 5.0. Chapters 6.0 and 7.0 present an evaluation, justification, and recommendation of the CMAs, respectively.

## 2.0 CURRENT CONDITIONS

The following sections of this chapter present a summary of the results of the RFI conducted at the AlliedSignal Buffalo Research Laboratory.

### 2.1 OBJECTIVES AND SCOPE OF THE RFI

In order to determine if hazardous constituents have been released from any of the three AOCs or the SWMU identified by the NYSDEC, the following five RFI objectives were identified:

- Characterization of the facility environmental setting
- Characterization and delineation of potential source areas
- Identification and characterization of Constituents of Interest (COIs)
- Identification, characterization, and delineation of impacted areas/media
- Identification of potential receptors

To accomplish these objectives, a scope of work was designed which included the completion of the following tasks:

- Data search and compilation
- Soils investigation
- Hydrogeologic investigation
- Storm sewer discharge investigation
- Potential receptor identification

The following sections of this chapter summarize the results of the RFI regarding the investigation of the site soils, hydrogeology, and storm sewer discharge and how they relate to the CMS.

### 2.2 SOILS INVESTIGATION

In order to characterize soils within and adjacent to the SWMU and AOCs, surface and subsurface soil samples were collected from 13 soil and well borings (Figure 2) and analyzed for select chemical and geotechnical parameters. Borings MW-1, MW-2, MW-3, and SB-3 were advanced in the vicinity of the SWMU. Soils in the vicinity of AOC-1 (Storm Sewer System) were characterized through the advancement of soil borings MW-4 and MW-5. Soil conditions in the vicinity of AOC-2 (Activated Carbon System) were evaluated through the advancement of boring MW-9. Five soil borings (SB-1, SB-2, MW-6, MW-7, and MW-8) were advanced in the vicinity of AOC-3 (Drum Storage Area) to evaluate soil conditions. A final boring (MW-10) was advanced outside the operations areas in a grassy open area located at the northern limits of the facility.

#### 2.2.1 Geologic Conditions

The lithologic data generated during the RFI indicate three apparently continuous, unconsolidated units immediately underlying the facility. These units include:

- A heterogeneous fill
- A zone of lacustrine deposits consisting of interbedded layers of silt, clay, and very fine sand
- A third unit comprised of a homogenous glaciofluvial clay

The fill material extends from the ground surface to depths ranging from 2 to 7 feet below ground surface (ft-bgs) across the facility, and is predominately damp to moist. Perched, saturated zones

approximately 1 foot thick were observed within the fill in the borings for MW-1, MW-3, MW-7, MW-8, and SB-1. The underlying interbedded lacustrine unit generally extends to a depth of approximately 10 ft-bgs and has been logged as damp to moist. The first continuous saturated zone encountered was observed in the basal glaciofluvial clay unit approximately one foot below that unit's upper surface. This unit was logged to a depth of approximately 34 ft-bgs at the location in which boring MW-10 was completed. Based on the relatively flat topography at the site and the interface between the lacustrine and glaciofluvial units, Remcor concluded that the bedrock surface is also anticipated to be relatively flat across the facility.

### 2.2.2 Soils Investigation Analytical Program

Surface soil samples for chemical analysis were collected from the ground surface to a depth of 2 ft-bgs, and subsurface samples were collected at a depth of 8 to 10 ft-bgs. All samples were analyzed for the following chemical parameters using the listed EPA methodologies:

- Target Compound List (TCL) volatile organic compounds (VOCs) - SW-846<sup>13</sup> Method 8240
- RCRA Metals<sup>14</sup> - EPA<sup>15</sup> 7060, EPA 6010, and EPA 7740
- Mercury - EPA 7471
- Cyanide (total) - EPA 9011/9012

Select additional samples were also analyzed for cation exchange capacity (CEC) by EPA Method 9080 and total organic carbon by the American Society for Testing and Materials (ASTM) Method D-3176.

### 2.2.3 Surface Soil Sample Analytical Results

Several organic and inorganic compounds were detected in surface soil samples collected from the soil borings (Tables 2-1 and 2-2). When a COI was detected, the reported concentration was compared to state action levels<sup>16</sup> to identify Constituents of Concern (COC) in surface soils. NYSDEC action levels for soils are summarized in Table 2-3. Based on this comparison, surface soil samples from the ten following locations exceeded the state action level for arsenic of 24 milligrams per kilogram (mg/kg):

Boring	Location	Detected Arsenic Concentration (mg/kg)
SB-1	AOC-3 Drum Storage Area	70.3
SB-2	AOC-3 Drum Storage Area	67.2
SB-3	SWMU Hazardous Waste Container Storage Area	343
MW-1	SWMU Hazardous Waste Container Storage Area	180
MW-2	SWMU Hazardous Waste Container Storage Area	117
MW-3	SWMU Hazardous Waste Container Storage Area	46.8
MW-7	AOC-3 Drum Storage Area	113
MW-8	AOC-3 Drum Storage Area	26.4
MW-9	AOC-2 Activated Carbon System	97.2
MW-10	Outside Operations Areas	224

<sup>13</sup> U.S. EPA, 1986, "Test Methods for Evaluating Solid Waste, Chemical/Physical Methods," SW-846, 3rd Edition as updated and revised.

<sup>14</sup> The RCRA Metals include: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver.

<sup>15</sup> U.S. EPA, 1983, "Methods for Chemical Analysis of water and Wastes," EPA 600/4-70-020.

<sup>16</sup> Action Levels defined in: New York State Department of Environmental Conservation, October 31, 1994, "Contained -In Criteria for Environmental Media," Technical Administrative Guidance Memorandum (TAGM) 3028.

Based on these results, arsenic has been identified as a COC with respect to surface soils. No other organic or inorganic compounds exceeded state action levels in surface soil samples.

#### **2.2.4 Subsurface Soil Analytical Results**

Several organic and inorganic compounds were detected in subsurface soil samples, collected from a depth of 8 to 10 ft-bgs from each soil boring (Tables 2-4 and 2-5). When detected, the reported concentration was compared to state action levels (Table 2-3) to identify COC in subsurface soils. Based on this comparison, none of the constituents detected in subsurface soil samples had concentrations in excess of the state guidelines for VOCs, RCRA metals, or cyanide. As a result, there are no COCs with respect to subsurface soils.

### **2.3 HYDROGEOLOGIC INVESTIGATION**

A hydrogeologic investigation was conducted to evaluate the quality of the shallow groundwater underlying the facility, even though local groundwater is not used. Investigation activities included the installation of ten shallow groundwater monitoring wells (Figure 2), aquifer characterization through *in situ* permeability testing, evaluation of the groundwater flow direction and gradient, and an assessment of the groundwater quality through the collection and analysis of groundwater samples on two separate occasions.

#### **2.3.1 Hydrogeologic Conditions**

The first continuous saturated zone was encountered within the upper one foot of the basal clay unit (identified in section 2.2.1) at an approximate depth of 10 ft-bgs. In general, groundwater flow across the site is to the south, with a hydraulic gradient of 0.0067 to 0.0095 feet per foot as calculated between monitoring wells MW-10 and MW-5 in October 1994 and January 1995, respectively. A summary of the groundwater level data is presented in Table 2-6 and potentiometric surface maps for these dates are included as Figures 3 and 4, respectively. Analysis of the *in situ* permeability tests indicate values of transmissivity ranged from  $1.5 \times 10^{-5}$  to  $2.8 \times 10^{-9}$  square feet per second ( $\text{ft}^2/\text{sec}$ ) and assuming a saturated thickness of 24.5 feet, hydraulic conductivity values ranged from  $1.9 \times 10^{-5}$  to  $3.5 \times 10^{-9}$  centimeters per second ( $\text{cm}/\text{sec}$ ). Storativity was also calculated and values range from  $1 \times 10^{-2}$  to  $1 \times 10^{-9}$  (Table 2-7).

#### **2.3.2 Groundwater Analytical Program**

Groundwater samples were collected from each monitoring well in October 1994 and January 1995 and submitted for laboratory analysis for the following compounds using the listed EPA methods:

- TCL VOCs - SW-846 Method 8240
- Total RCRA Metals - EPA 7060, 6010, 7740 and 7471
- Cyanide (total) - EPA 9011/9012

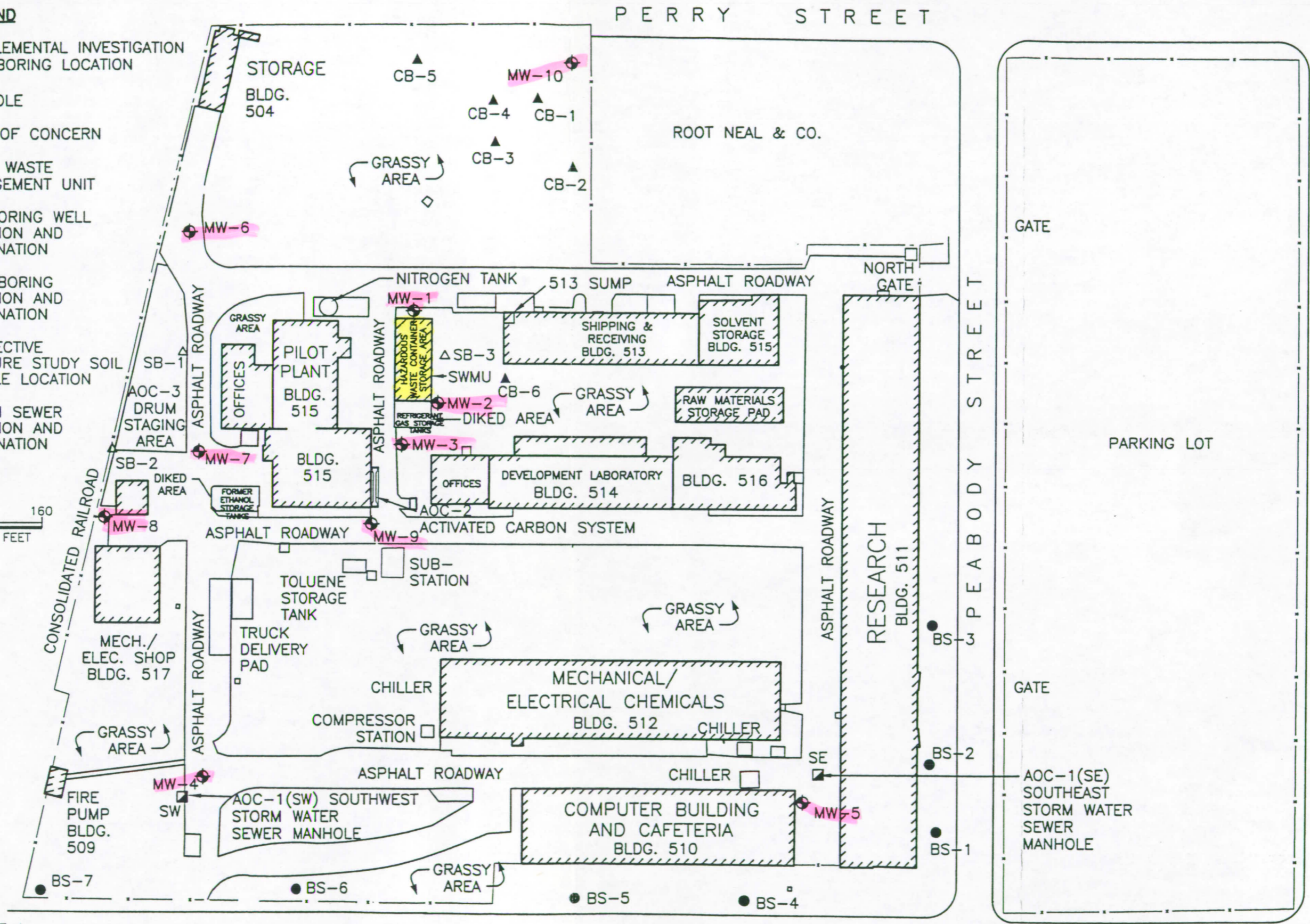
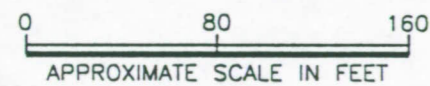
Additional analyses included the determination of field pH, specific conductance, turbidity, and temperature, and laboratory determination of pH and specific conductance.

#### **2.3.3 Groundwater Analytical Results**

Tables 2-8 and 2-9 summarize the results of the groundwater sample analyses conducted at the facility. When detected, the constituent concentrations detected in samples from both rounds of groundwater

**LEGEND**

- BS-1 ● SUPPLEMENTAL INVESTIGATION SOIL BORING LOCATION
- MANHOLE
- AOC-1 AREA OF CONCERN
- SWMU SOLID WASTE MANAGEMENT UNIT
- MW-1 ◐ MONITORING WELL LOCATION AND DESIGNATION
- SB-1 ▲ TEST BORING LOCATION AND DESIGNATION
- CB-1 ▲ CORRECTIVE MEASURE STUDY SOIL SAMPLE LOCATION
- SW ■ STORM SEWER LOCATION AND DESIGNATION



Base Map Source:  
 TOPOGRAPHIC MAP OF A  
 PORTION ALLIEDSIGNAL INC.  
 By: McINTOSH &  
 McINTOSH, P.C.  
 Dated: 2/26/96

OSW ■ OFF-SITE SOUTHWEST STORM WATER MANHOLE (Beneath Elk Street Bridge)

OSE ■ OFF-SITE SOUTHEAST STORM WATER MANHOLE

BUFFALO COLOR CORPORATION

Harding Lawson Associates  
 Engineering and  
 Environmental Services  
 700 North Bell Avenue  
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 412-279-6661  
 DRAWN WGA  
 JOB NUMBER 33753.2

INVESTIGATION LOCATIONS  
 BUFFALO RESEARCH LABORATORY  
 AlliedSignal Inc.  
 Buffalo, New York

DWG. No. 33753B12  
 DATE 12/20/96

# MEETING AGENDA

## AlliedSignal, Buffalo Research Laboratory and NYS Department of Environmental Conservation

October 2, 1997  
8:30 am

### 1. Corrective Measures Study Report/Risk Assessment

- EPA's Review/Comments
- NYS Department of Health's input

### 2. Department's Proposed Final Corrective Measures/Statement of Basis

- Deed Restrictions/Notification
- Soil Management Plan
- Limited Groundwater Monitoring Program

*- A no further  
evaluation /  
or remediation*

### 3. Next Steps

- Letter of Agreement
- Permit Modification
- Public Notice
- Public Participation and Comment

→ SOB

→ agree w/ conclusion  
that no further action  
is required  
of CMS  
as long as Allied  
Signal remains  
individual

MW-3 & MW-5  
ANNUAL MONITORING

- ① can decommission site with
- ② Dep. reserves right  
to require further  
evaluation if  
data warrants



sampling were compared to applicable state and federal regulations<sup>17</sup> (Table 2-10) to identify facility-related COCs. Cadmium, 1,1-dichloroethane (1,1-DCA), 1,2-dichloropropane, and 1,1,1-trichloroethane (1,1,1-TCA) were each identified as facility related COCs based on concentrations reported in excess of NYSDEC groundwater action levels in samples collected from Wells MW-3 (SWMU) and/or MW-7 (AOC-3 Drum Storage Area). Barium was also reported in concentrations in excess of the Maximum Contaminant Level (MCL) in samples collected from MW-2 (SWMU), MW-4 (AOC-1 Storm Sewer System), and MW-7 (AOC-3 Drum Storage Area).

Remedial action is not warranted with respect to groundwater for the following reasons:

- The COCs were not identified at concentrations in excess of the regulatory limits in any other facility monitoring wells.
- Groundwater quality at the farthest downgradient monitoring wells (MW-4 and MW-5) does not exhibit concentrations of any of these constituents at or near the regulatory limits, except for barium in the sample collected from MW-4.
- The migration rates across the facility are slow<sup>18</sup>,  $3.1 \times 10^{-11}$  feet per second, or approximately  $1 \times 10^{-3}$  foot per year.
- There is no surface water discharge point proximate to the facility.
- Groundwater is not used as a drinking water source at the facility or in the greater Buffalo area.

For these reasons, groundwater impact at the site is not considered an issue at the facility and does not require additional evaluation or remedial measures.

## 2.4 STORM SEWER DISCHARGE INVESTIGATION

The storm sewer investigation was completed by collecting samples from five storm sewer locations to determine if storm sewer water and/or sediments were impacted above appropriate discharge standards by facility-related constituents, since the sewer lines could provide a potential off-site migration pathway. To determine the quality of the storm sewer water within the facility, samples were collected from three storm sewer locations within the facility. To assess the quality of storm sewer water off-site, samples were collected from two storm sewer manholes immediately "up stream" of the facility (Figure 2). The quality of the sediments within the storm sewers could only be characterized from one sewer located within the facility because the remaining sewers contained no sediments.

### 2.4.1 Storm Sewer Analytical Program

Storm sewer water and sediment (when present) samples were collected from each storm sewer identified in Figure 2 in October 1994 and January 1995 and submitted for laboratory analysis of the following compounds:

- TCL VOCs - SW-846 Method 8240
- Total RCRA Metals - EPA 7060, 6010, 7740 and 7471
- Cyanide (total) - EPA 9011/9012

<sup>17</sup> Groundwater concentrations were compared to NYSDEC TAGM no. 3028 and the National Primary and Secondary Drinking water Regulations, despite the fact neither facility groundwater, nor groundwater in the greater Buffalo area, is used as a source of potable water.

<sup>18</sup> This velocity was calculated using the formula  $V=Ki/n$ , where V is groundwater velocity, K is hydraulic conductivity, i is the gradient (0.0095), and n is the porosity (40 percent).

Storm sewer water samples were also analyzed for field pH, specific conductance, turbidity, and temperature, as well as the laboratory determination of pH and specific conductance.

#### **2.4.2 Storm Sewer Discharge Investigation Analytical Results**

The following sections present the results of the analytical testing conducted on the storm sewer water and sediment samples collected during the storm sewer discharge investigation.

##### **2.4.2.1 Storm Sewer Sediments**

Several metals and VOCs were detected in the sediment sample collected from the southwest storm sewer manhole in October 1994. The analytical results, presented in Table 2-11, were compared to the applicable state soil and sediment action levels and cleanup guidelines identified in Table 2-3 to determine if additional action was required. Based on that comparison, the sediment does not exceed the guidelines for any of the constituents detected; therefore, there were no identified potential storm sewer sediment COCs.

##### **2.4.2.2 Storm Sewer Water Discharge**

Storm sewer water samples were collected and analyzed from several storm sewers within and upgradient of the facility in October 1994 and January 1995. Several metals and VOCs were detected in the samples collected from the storm sewers (Tables 2-12 and 2-13). The concentrations reported were compared to the discharge requirements of the facility's existing Buffalo Sewer Authority (BSA) Permit (Table 2-14) to determine if the conditions of the permit had been met. Based on that comparison, it was determined that two of the detected VOCs (methylene chloride and acetone) were not addressed by the current BSA Permit and were therefore considered COCs. To address these COCs and account for the presence of methylene chloride and acetone, a new BSA Permit<sup>19</sup> was issued. Therefore, there are no longer any COCs associated with the facility's storm sewer system.

#### **2.5 ADDITIONAL ON-SITE SURFACE SOIL SAMPLING**

At the conclusion of the RFI, arsenic in surface soil remained as the only COC requiring additional evaluation. Because this CMS would have to evaluate potential remedial measures, and the lateral limits of elevated arsenic concentrations in surface soil near well MW-10 had not been fully characterized in the RFI, additional surface soil samples were collected for the analysis of arsenic. At that time, an additional surface soil samples was also collected from the area of the SWMU.

A total of six surface soil samples were collected on October 10, 1996 from the locations illustrated on Figure 5 to delineate the limit of surface soils with elevated arsenic levels in the vicinity of Monitoring Well MW-10 and the SWMU. These two areas were chosen for additional characterization because surface soil samples collected in these areas during the RFI exhibited the highest reported arsenic concentrations on site. Samples collected during the RFI from these areas reported the following arsenic concentrations:

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<sup>19</sup> Buffalo Sewer Authority, March 1, 1996. "Revision of B.P.D.E.S. Permit." correspondence to AlliedSignal, Inc., Buffalo, New York.

Boring	Location	Detected Arsenic Concentration (mg/kg)
SB-3	SWMU Hazardous Waste Container Storage Area	343
MW-1	SWMU Hazardous Waste Container Storage Area	180
MW-2	SWMU Hazardous Waste Container Storage Area	117
MW-3	SWMU Hazardous Waste Container Storage Area	46.8
MW-10	SWMU Outside Operations Area	224

After review of the analytical data, five additional surface soil samples were collected in the vicinity of MW-10 (CB-1 through CB-5) as illustrated in Figure 5. These samples were collected from depths ranging from 0.5 to 0.75 foot below ground surface from the fill material characterized during the RFI. In each case the fill was overlain by topsoil and grass was growing at the surface.

Surface soils in the vicinity of the SWMU were well characterized during the RFI (samples were collected from soil boring SB-3 as well as monitoring well borings MW-1, MW-2 and MW-3). As a result, only one additional surface soil sample was collected in this area (CB-6) as illustrated in Figure 3. This sample was also collected from the fill material at a depth of approximately 0.75-ft-bgs.

Each sample was submitted to Quanterra Environmental Services (Quanterra) of Pittsburgh, Pennsylvania and analyzed for arsenic using EPA Method 7060. Quanterra provided analytical support to this project during the RFI for the analysis of arsenic in surface soil samples. The data for this supplemental samples has not been validated; however, a Contract Laboratory Program data package was prepared by Quanterra and the data can be validated at a later date if necessary. See Appendix A for copies of the analytical data

Arsenic concentrations in surface soils in the vicinity of MW-10 ranged from 18.7 mg/kg (CB-5) to 86.7 mg/kg (CB-3). The surface soil sample collected from boring CB-6 in the vicinity of the SWMU had an arsenic concentration of 210 mg/kg. A summary of the surface soil sampling results is as follows:

Boring Identification	Distance from MW-10 (feet)	Arsenic Concentration (mg/kg)
CB-1	45	48.7
CB-2	95	21.9
CB-3	102	86.7
CB-4	70	54.9
CB-5	112	18.7
CB-6	Not applicable	210

#### Equipment Blank

An equipment blank sample was collected by pouring deionized water over a freshly decontaminated hand auger to evaluate the effectiveness of the decontamination procedure. This sample (BRL-EB-1096) was also analyzed for arsenic by Quanterra. Arsenic was not detected in the sample in a concentration greater than the 1.8 micrograms per liter detection limit.

### 3.0 RISK ASSESSMENT

The RFI concluded that the only COC at the facility which required further action was arsenic in surface soil. The concentrations of this COC in surface soil exceed the New York State action level. However, because the site is an industrial facility and because the RFI indicated that it is likely that the risk presented by this COC is small, a risk assessment has been included in this CMS. The objective of this risk assessment is to evaluate concentrations of arsenic and to assist in the determination of the most appropriate corrective action.

#### 3.1 POTENTIAL MIGRATION PATHWAYS

Potential migration pathways have been identified for the facility on the basis of the characteristics of arsenic in surface soil. The migration pathways include:

- Atmosphere, via wind erosion
- Surface water, via stormwater runoff
- Groundwater, via transport of soluble constituents
- Surface soil, via direct contact

##### 3.1.1 Atmosphere

Arsenic has been detected at elevated levels in surface soil samples collected at the site. The highest concentrations of arsenic were reported in samples from the SWMU at boring SB-3 and from the boring for Well MW-10. These samples were collected between 0 and 2 ft-bgs, therefore they are considered surface soil samples. The potential exists for migration of constituents via wind erosion. However, because the areas of the facility in which arsenic was detected are covered with pavement and/or grass, the potential for migration via wind is limited.

##### 3.1.2 Surface Water

Due to the presence of arsenic in surface soil samples, the potential also exists for migration via surface water runoff. Because the site is covered with pavement and grassed areas, the potential for migration via surface water runoff is limited. Facility surface water drains to the southeast and southwest inlets in the facility's storm sewer system in accordance with the BPDES Permit, and then to the BSA for primary and secondary treatment. Treatment is performed at the publicly owned treatment works (POTW) at the foot of Ferry Street on an island in the Niagara River (4.8 miles from the facility). Treated water is subsequently discharged to the Niagara River. During 100-year storms, the combined sewer and sanitary systems bypass the treatment plant and discharge directly to the Niagara River through the BSA.

##### 3.1.3 Groundwater

Because arsenic is present in surface soil, the soil to groundwater pathway could represent a potential migration pathway. However, subsurface soil samples that were collected from the same borings in which surface soil samples indicated elevated arsenic concentrations, indicated background levels of arsenic. Furthermore, analyses of groundwater samples collected from monitoring wells constructed in borings where elevated arsenic levels were detected in surface soil samples, did not detect elevated concentrations of arsenic. These factors indicate that it is not likely that surface soil acts as a significant source of arsenic to groundwater. Furthermore, because groundwater is not used at or near the site, a completed pathway to a receptor is not established.

### 3.1.4 Direct Contact/Ingestion

The direct contact/ingestion pathway exists at the site because surface soil is impacted. This pathway is limited due to the fact that the facility is an active industrial site, with a fence to preclude inadvertent site access. The pathway is further limited by surface coverage of pavement, gravel, and grass in certain areas. This pathway is evaluated in detail in the site-specific risk assessment.

### 3.2 BACKGROUND SOIL ARSENIC CONCENTRATIONS

The NYSDEC's TAGM screening level for arsenic in soil is 7.5 mg/kg or site background. While TAGM for organics are risk-based for conservative residential exposures, those for inorganics are not. Recommended soil cleanup objectives for metals are either site background or the average background concentrations for the eastern United States as reported in a 1984 survey of reference material by E. Carol McGovern, NYSDEC.

Applying the standard residential exposure assumptions used by NYSDEC and USEPA, a risk-based soil concentration can be developed. These conservative default residential exposure assumptions are as follows:

Variable	Symbol	Default Value
Risk management level	RML	$1 \times 10^{-6}$
Exposure duration, total	ED <sub>tot</sub>	30 years
Exposure duration, child	ED <sub>c</sub>	6 years
Exposure duration, adult	ED <sub>a</sub>	24 years
Exposure frequency	EF	350 days/year
Body weight, adult	BW <sub>a</sub>	70 kg
Body weight, child	BW <sub>c</sub>	15 kg
Soil ingestion rate, adult	IRS <sub>a</sub>	100 mg/day
Soil ingestion rate, child	IRS <sub>c</sub>	200 mg/day
Fraction of contaminated soil ingested	FC	1 (100%)
Fraction of contaminant absorbed into the body	FA	1 (100%)
Average time	AT	25,550 days (i.e., 70 years)
Arsenic (As) cancer slope factor	CSF	1.5 kg-day/mg

Because contact rates with residential soil are different for children and adults, carcinogenic risks during the first 30 years of life are calculated using age-adjusted soil ingestion factors (IFS<sub>adj</sub>).

The default age-adjusted soil ingestion factor is defined by the following equation:

Equation 1:

$$IFS_{adj} \frac{mg-y}{kg-d} = \frac{ED_c \times IRS_c}{BW_c} + \frac{(ED_{tot} - ED_c) \times IRS_a}{BW_a}$$

$$IFS_{adj} = 114.29 \frac{mg-y}{kg-d}$$

Using the age-adjusted soil ingestion factors, the risk-based concentration (RBC) for arsenic in soil as a carcinogen is calculated using the following equation:

Equation 2:

$$RBC \frac{mg}{kg} = \frac{RML \times AT}{EF \times \frac{IFS_{adj}}{10^6 \frac{mg}{kg}} \times CSF}$$

$$RBC = 0.43 \frac{mg}{kg}$$

In other words, based on conservative default risk assessment assumptions, a concentration of 0.43 mg/kg in soil, in a residential setting produces one excess cancer in a population of 1,000,000 similarly exposed individuals.

The NYSDEC established background for arsenic in the eastern United States is 3 - 12 mg/kg and the average is 7.5 mg/kg. In his December 3, 1996 letter to Mr. Dayne Crowley, Mr. DiGiulio acknowledged that the geologic background for arsenic at AlliedSignal "is above the EPA Region III Risk Based Concentration for residential and industrial soil ingestion" and indicated that a site background level of 18 mg/kg would be an acceptable target cleanup level for unrestricted use.

Because the RBC (i.e.,  $1 \times 10^{-6}$  risk level) for arsenic exceeds the site background level, the risk associated with that concentration should be determined. To determine the risk posed by arsenic concentrations, the background concentration of arsenic in soil (C) is substituted for the RBC in Equation 2 and the equation is rearranged to solve for risk (R), which has been substituted for the RML. This increased cancer risk associated with 18 mg/kg of arsenic in residential surface soil is calculated as follows:

Equation 3:

$$R = \frac{C \times IFS_{adj} \times CSF \times EF}{AT \times 10^6 \frac{mg}{kg}}$$

$$R = 4.2 \times 10^{-5}$$

Using the above standard default residential exposure assumptions, the resulting risk to background soil arsenic is summarized as follows:

Arsenic Concentration (mg/kg)	Description	Risk
3	Eastern United States - low background	$7.1 \times 10^{-6}$
12	Eastern United States - high background	$2.8 \times 10^{-5}$
7.5	Eastern United States - average background	$1.8 \times 10^{-5}$
18	Site unrestricted use (i.e., site geologic background)	$4.2 \times 10^{-5}$

Each of these concentrations of arsenic in residential soil produce risks that are greater than the risk level of  $1 \times 10^{-6}$ . Therefore, the background concentrations of arsenic in eastern US soils pose an unacceptable cancer risk based on established residential soil ingestion assumptions. However, the USEPA acceptable risk range is at least  $10^{-4}$  to  $10^{-6}$  for all carcinogens and these risks are within that risk management range. Furthermore, due to the prevailing geologic conditions, NYSDEC has accepted the risk of  $4.2 \times 10^{-5}$  for residential (unrestricted) exposure to regional background of arsenic in soil (based on 18 mg/kg arsenic in soil).

This conservative method of assessing cancer risks for arsenic in soil is generally believed to be flawed for industrial sites. This is due primarily to three assumptions used in the carcinogenic risk assessment procedure. These assumptions are as follows:

- Assuming a nonthreshold mechanism of carcinogenic action for arsenic
- Estimating 100 percent availability of arsenic for absorption into the body
- Residential exposure scenario, which uses conservative standard defaults.

In addition to assessing the site specific conditions with a risk assessment, the impact of these assumptions is the overprediction of any risk associated with exposure to arsenic in soil. Each of these assumptions and the associated impact on the risk analysis will be discussed in detail below.

### 3.3 MECHANISM OF CARCINOGENIC ACTION

Arsenic is considered a human carcinogen based on human epidemiology studies; there is evidence for a link between nonoccupational exposures to arsenic and some cancer, most notably cancer of the skin. Nonoccupational arsenic exposures (drinking water and medicinal preparations) show a correlation between increased incidences of skin cancer and skin lesions thought to be preconditions for cancer or precancerous. These skin lesions serve as the basis for assessing noncancer hazards associated with arsenic exposure.

The current cancer slope factor for arsenic was derived according to old USEPA cancer risk policy<sup>20</sup>. While currently being revised, the existing USEPA cancer risk policy assumes that all carcinogens act through the same nonthreshold mechanism. This mechanism implies that any exposure is associated with some degree of risk. For chemicals with no threshold, risk decreases as dose decreases, but never reaches zero.

In order to assess risk associated with nonthreshold chemicals, the human or experimental data requires downward extrapolation of the dose-response curve to exposure levels below those actually received. The downward extrapolation of the curve is accomplished through the use of mathematical models. The shape of the dose-response curve depends upon the model used. It is USEPA's cancer risk policy to apply the linearized multistage (LMS) model in developing the cancer slope factors for chemicals classified as carcinogens. This model is the most conservative model available (next to the

<sup>20</sup> U.S. Environmental Protection Agency, 1986 Guidelines for Carcinogen Risk Assessment, September 24, 1996

one-hit model) and assumes linearity through zero. This model does not fit most environmental substances. Therefore, linearity provides conservative or overestimated extrapolated risk estimates. It has been USEPA cancer risk policy in developing risk estimates that are designed to be highly conservative where the true risk is almost certainly lower than the estimate.

Recently, the proposed guidelines for carcinogen risk assessment have been released for public comment. Among the major changes from the 1986 guidelines<sup>21</sup> is the recognition of differing mechanism of action among substances classified as carcinogens. The guidelines permit the development of a biologically based response model for the substance to replace the default conservative LMS model. Once in place the new cancer guidelines will result in a less conservative cancer slope factor for most regulated substances.

USEPA has also assessed the threshold response of arsenic. For many substances, the dose-response curves demonstrate an exposure below which no response can be detected. Unlike the downward extrapolation of the dose-response curve for carcinogens, the no observed adverse effect level (NOAEL) can be determined with some accuracy. Safety or uncertainty factors are applied to the NOAEL, including those to account for extrapolating among the population or data gaps. The result of this is the toxicity criteria for the most sensitive noncarcinogenic endpoint or the reference dose (RfD).

Using the oral RfD for arsenic and the same conservative default exposure assumptions, the health-based concentration (HBC) for arsenic in soil can be developed. The major difference from the RfD described above is that the exposure to noncarcinogens is not a probabilistic determination of cancer risk and the exposure is not averaged over lifetime. The noncancer management level is the target hazard quotient (THQ) of 1. As a conservative measure, the residential exposure scenario for noncarcinogenic effects is based on childhood exposures only. Based on a review of the integrated risk information system (IRIS) data base, the RfD for arsenic is  $3 \times 10^{-4}$  mg/kg/d. The HBC is calculated using the following equation:

Equation 4:

$$\text{HBC} = \frac{\text{THQ} \times \text{RfD}_o \times \text{BW}_c \times \text{AT}_N}{\text{EF} \times \text{ED}_c \times \frac{\text{IRSc}}{10^6 \frac{\text{mg}}{\text{kg}}}}$$

$$\text{HBC} = 23 \frac{\text{mg}}{\text{kg}}$$

<sup>21</sup> U.S. Environmental Protection Agency, Proposed Guidelines for Carcinogen Risk Assessment, April 23, 1986.



Variable	Symbol	Default Value
Target hazard quotient	THQ	1
Reference dose, oral	RfD <sub>o</sub>	3 x 10 <sup>-4</sup> mg/kg/day for arsenic
Body weight, child	BW <sub>c</sub>	15 kg
Averaging time (non-carcinogen)	AT <sub>N</sub>	2,190 days (6 years)
Exposure frequency	EF	350 days/year
Exposure duration	ED <sub>c</sub>	6 years
Soil ingestion rate, child	IRS <sub>c</sub>	200 mg/day

Using the **child residential exposure scenario** and the NYSDEC established soil concentration range and average for **the eastern United States**, as well as the NYSDEC established background for the site, the resultant hazard quotients would be less than unity (i.e., acceptable hazards).

While it is **not known** what the specific results of the new cancer risk assessment guidance will have on arsenic, it **will** most likely result in a more realistic assessment of the risk posed by arsenic ingestion and a higher acceptable risk-based soil concentration for arsenic. Many states currently assess arsenic based on its **noncarcinogenic potential** rather than the carcinogenic potential. The basis for this is the precancerous skin lesions associated with arsenic exposure. It is thought that if one protects against the precancer condition, the cancer condition will be protected against as well. In other words, if exposure is not great enough to produce the precancer conditions, then cancer will not be produced.

USEPA and USEPA Region III have recognized the problem with assessing risks of exposures to arsenic in soil. In the USEPA Region III Risk Based Concentration table<sup>22</sup>, two soil concentrations are provided reflecting the noncancer and cancer toxicity criteria.

Contaminant	RBC residential (mg/kg)
Arsenic (as noncarcinogen) <sup>a</sup>	23
Arsenic (as carcinogen) <sup>b</sup>	0.43

<sup>a</sup> At the risk management screening level of 1

<sup>b</sup> At the risk management screening level of 10<sup>-6</sup>

In the documentation that accompanies EPA Region III's RBC tables, EPA Region III addresses the rationale for arsenic appearing in the RBC table separately as a carcinogen and a noncarcinogen. EPA Region III provided both sets of values to "ensure that the risk assessor realizes that noncarcinogenic concerns are significant for arsenic." In addition, EPA Region III points out that "EPA has a little-known risk management policy for arsenic (dating from 1988<sup>23</sup>) that suggests that arsenic related cancer risks of up to 1 x 10<sup>-3</sup> can be accepted because the cancers are squamous cell carcinomas with a low mortality rate." Therefore, according to EPA arsenic risk management policy, acceptable residential soil concentrations would range up to 43 mg/kg. However, at that point the noncarcinogenic action must be

<sup>22</sup> Roy L. Smith, April 19, 1996. "Risk-Based Concentration Table, January-June 1996." U.S. Environmental Protection Agency, Region II, Philadelphia, PA.

<sup>23</sup> U.S. Environmental Protection Agency, Recommended Agency Policy on the Carcinogenic Risk associated with the Ingestion of Inorganic Arsenic, Memorandum to Assistant Administrators, June 21, 1988.

considered and would take precedence resulting in acceptable arsenic soil concentrations of 23 mg/kg for residential exposures.

In the interim, prior to the finalization of the new cancer policy, it is imperative that flaws in the current methodology be considered in environmental risk assessments. The impact of this conservatism in risk estimates can be demonstrated by comparing the method of assessing noncancer hazards associated with arsenic exposure.

### 3.4 EXPOSURE ASSUMPTIONS

The exposure conditions at the site differ from the conservative standard default assumptions. The receptors at the site that may come in contact with the material of concern were identified as occupational workers. The climatic conditions of the area reduce exposure potential from that assumed for standard default exposures.

A summary of the results of the health-related issues associated with arsenic discussed to this point, are shown below. Specifically, risk- or hazard-based arsenic soil concentrations associated with site background, standard default residential and industrial exposure assumptions, snow cover, EPA's generic and arsenic risk management range and noncancer hazard are shown. The site-specific exposure conditions will be discussed below.

Exposure	Risk-based (mg/kg)	Hazard-based (mg/kg)
Standard Default - Residential	0.43 <sup>a</sup>	23
Snow Cover - Residential	0.6 <sup>a</sup>	32 <sup>b</sup>
EPA Risk Management Range - Residential (10 <sup>-6</sup> to 10 <sup>-4</sup> )	0.43 to 43	N/A
EPA Arsenic Risk - Residential (10 <sup>-3</sup> )	430 <sup>a</sup>	N/A <sup>b</sup>
Site Background-Residential Risk (4.2 x 10 <sup>-5</sup> )	18	N/A
Standard Default - Occupational	3.8 <sup>a</sup>	613 <sup>b</sup>
Snow Cover - Occupational	5.4 <sup>a</sup>	854 <sup>b</sup>
EPA Risk Management Range - Occupational (10 <sup>-6</sup> to 10 <sup>-4</sup> )	3.8 to 380	N/A
EPA Arsenic Risk Management- Occupational (10 <sup>-3</sup> )	3800	N/A
Site-Background Occupational Risk (4.2 x 10 <sup>-5</sup> )	160	N/A

<sup>a</sup> Risk level at 10<sup>-6</sup>

<sup>b</sup> Hazard Quotient at 1

#### 3.4.1 Receptor

The AlliedSignal site is currently industrial and this use is not expected to change in the future. Therefore, the more appropriate exposure scenario would be that associated with industrial activities. The USEPA default exposure assumptions for an industrial setting are as follows:

Equation 5 (for carcinogens):

$$RBC \frac{\text{mg}}{\text{kg}} = \frac{RML \times BW_a \times AT_c}{EF_o \times ED_o \times \frac{IRS_a}{10^6 \frac{\text{mg}}{\text{kg}}} \times FC \times CSF_{as}}$$

$$RBC = 3.8 \frac{\text{mg}}{\text{kg}}$$

Equation 6 (for noncarcinogens):

$$RBC \frac{\text{mg}}{\text{kg}} = \frac{THQ \times RfD_o \times BW_a \times AT_n}{EF_o \times ED_o \times \frac{IRS_a}{10^6 \frac{\text{mg}}{\text{kg}}} \times FC}$$

$$RBC = 613 \frac{\text{mg}}{\text{kg}}$$

Variable	Symbol	Default Value
Risk management level	RML	$1 \times 10^{-6}$
Target Hazard Quotient	THQ	1
Exposure duration, occupational	ED <sub>o</sub>	25 years
Exposure frequency, occupational	EF <sub>o</sub>	250 days/year
Body weight, adult	BW <sub>a</sub>	70 kg
Soil ingestion rate, adult	IRS <sub>a</sub>	100 mg/day
Arsenic cancer slope factor	CSF <sub>as</sub>	1.5 kg-day/mg
Reference dose, oral	RfD <sub>o</sub>	$3 \times 10^{-4}$ mg/kg/day
Fraction of contaminated soil ingested	FC	0.5 (50%)
Fraction of contaminant absorbed into the body	FA	1 (100%)
Averaging time (carcinogen)	AT <sub>c</sub>	25,550 days (70 years)
Average time (noncarcinogen)	AT <sub>n</sub>	9,125 days (25 years)

These exposure assumptions are used in Equations 5 and 6 (for an adult) to obtain the following industrial RBC.

Contaminant	RBC Industrial (mg/kg)
Arsenic (as noncarcinogen)	613
Arsenic (as carcinogen) <sup>a</sup>	3.8

<sup>a</sup> At the risk management screening level of  $10^{-6}$

Based on EPA's risk management policy for arsenic as a carcinogen, acceptable industrial soil concentrations would range up to 3,800 mg/kg ( $1 \times 10^{-3}$  risk). However, at that point the noncarcinogenic action must be considered and would take precedence resulting in acceptable arsenic soil concentrations of 613 mg/kg for industrial exposures. Therefore, the risk-based concentration for arsenic in soil in an industrial setting should be 613 mg/kg.

### 3.4.2 Climate

Climatic conditions (snow cover) at the site influences exposure to the surface soil at the site. Conservative default exposure assumptions do not take into account the days in the year that snow would cover the soil and prevent exposures. It is reasonable to assume that the ground would be either covered by snow or frozen for 3 months out of the year, resulting in a reduction of the exposure frequency assumption from 250 days per year to 180. The risk- and hazard based soil concentrations were adjusted upward by a factor of 1.4 using this assumption resulting in concentrations of 0.6 and 5.4, respectively (at  $10^{-6}$  risk).

### 3.4.3 Bioavailability

For arsenic, excess cancer risk and noncancer hazard is estimated by application of cancer slope factors and reference doses (RfD) from an epidemiological study<sup>24,25,26</sup> of a Taiwanese population with elevated levels of arsenic in their drinking water. In contrast to soluble arsenic in drinking water, arsenic forms in soil will be incompletely solubilized or absorbed during transit through the gastrointestinal tract, therefore, downward adjustment to arsenic exposures representing the reduced bioavailability should be made to reflect the difference between arsenic in drinking water and in soil. Bioavailability from solids, as determined from soil, is between two and eight percent (Johnson et al., 1989<sup>27</sup>). Conservatively using 10% or a 0.1 fraction available for absorption, the acceptable soil concentrations for arsenic are greater than those established previously. These values are shown in the table below.

<sup>24</sup> Tseng, W.P., 1977, "Effects and Dose-Response Relationships of Skin Cancer and Blackfoot disease with Arsenic Environmental Health Perspective," 19:109-119.

<sup>25</sup> Tseng, W.P., 1989, "Blackfoot Disease in Taiwan. A 30-year Follow-up Study." Angiology 40:547-558.

<sup>26</sup> Tseng, W.P., Chu, H.M., How, S.W., et al, 1968 "Prevalence of Skin Cancer in an Endemic Area of Chronic Arsenicism in Taiwan." J. Natl. Cancer Inst. 40: 453-463.

<sup>27</sup> Johnson, J.D., Freeman, G.B., and Killinger, J.M., "Pilot Bioavailability Study of Lead and Arsenic in Soil Following Oral Administration in Rabbits," Columbus, OH. Battelle, I.D. No. 965-2600 (1989).

Parameter	Residential		Occupational	
	Risk	Hazard	Risk	Hazard
RML or THQ	10 <sup>-6</sup>	1	10 <sup>-6</sup>	1
ED (years)	30	1	25	1
EF (days)	350	365	250	250
BW (kg)	70; 15	15	70	70
IRS (mg)	200; 100	200	100	100
FC	1	1	0.5	0.5
FA	0.1	0.1	0.1	0.1

Both low bioavailability from soil and snow cover are characteristic of this site. Therefore, the more appropriate soil concentrations were obtained by adjusting the exposure for the limited bioavailability of the arsenic in soil and the lack of exposure during snow cover. The risk- and hazard-based soil concentrations of arsenic would increase by at an order of magnitude.

Exposure	Risk-based (mg/kg)	Hazard-based (mg./kg)
Bioavailability/Standard Default - Residential	4.3 <sup>a</sup>	240 <sup>b</sup>
Bioavailability/Snow Cover - Residential	6.0 <sup>a</sup>	320 <sup>b</sup>
Bioavailability/Standard Default - Occupational	37.8 <sup>a</sup>	6039 <sup>b</sup>
Bioavailability/Snow Cover - Occupational	52.9 <sup>a</sup>	8540 <sup>b</sup>

<sup>a</sup> Risk level at 10<sup>-6</sup>

<sup>b</sup> Hazard Quotient at 1

#### 3.4.4 Concentrations of Arsenic at Site

In USEPA Risk Assessment Guidance, Part A<sup>28</sup> the concentration term is calculated for use in the exposure assessment step of the risk assessment. For risk assessments, the concentration term in the intake equations is an estimate of the arithmetic average concentration for a contaminant based on a set of site sampling results. Because of the uncertainty associated with estimating the true average concentrations at a site, the 95% upper confidence limit (UCL) of the arithmetic means is used as the concentration of a contaminant in a risk assessment. The 95% UCL is very conservative and provides reasonable confidence that the true site average will not be underestimated.

The estimate of an average concentration is used because carcinogenic and chronic noncarcinogenic toxicity criteria are based on lifetime average exposures and the average concentrations is most representative of the concentration that would be contacted at a site over time.

As with most site soil data, the distribution of soil arsenic concentrations at the AlliedSignal Buffalo site is lognormal. Using standard USEPA guidance to determine the exposure point concentration of arsenic in soil, the 95% UCL of the arithmetic mean of the sample concentrations was calculated. If the 95% UCL is greater than the maximum value then the maximum concentration is used in the risk assessment. The statistical evaluation of arsenic in soils across the AlliedSignal Buffalo site include the

<sup>28</sup> U.S. Environmental Protection Agency. Supplemental Guidance to RAGS: Calculations the Concentration Term, May 1992.

results of the analyses of each surface soil (i.e., collected between 0 and 2 ft-bgs) sample collected during the RFI as well as the results of the six additional surface soil samples discussed in Section 2.5 of this CMS. A statistical summary of these data is presented as follows:

Sample Location	Mean Concentration (mg/kg)	Standard Deviation (mg/kg)	Number of Samples	95% UCL/Max Concentration (mg/kg)
Under asphalt	48.4	51.2	6	2539/97.2
Gravel or Grassy Area	106.5	97.0	14	249.2/343
All	89.1	88.8	20	499.4/343
<b>Bold values used in risk assessment</b>				

By evaluating exposures based on these statistical parameters, it is assumed that if an exposed individual moves randomly across an exposure area, then the spatially averaged soil concentrations can be used to estimate the true average concentration contacted over time. The average concentration contacted over time would therefore equal the spatially averaged concentration over the exposure area.

While an individual may not actually exhibit a truly random pattern of movement across an exposure area, the assumption of equal time spent in different parts of the area is a simple but reasonable approach. However, in a more desperate data set, the 95% UCL becomes higher, even exceeding the maximum concentration. In these cases, the maximum concentration is used, which essentially assumes that the individual receives all of the exposure from that one area. For the AlliedSignal Buffalo site this is an extremely conservative assumption based on the knowledge of the site and the soil analytical results because the highest arsenic concentrations at the site occur in very localized area(s) and are typically covered by gravel or grass, which would limit the actual direct contact exposure.

Exposure to soil is a function of the surface soils' susceptibility to wind erosion. Vegetative and other ground coverings inhibit and may even prevent the soil exposure pathway. For example, some of the site soil is underneath asphalt. Therefore, there is no completed exposure pathway from the soil to human receptors. This is an engineering control of exposure. It would be reasonable to only assess the areas not covered by asphalt as available for exposure to site occupants. However, both the overall and the exposed areas will be assessed in the following analysis.

A comparison of the RBC and HBC for the residential and industrial scenario are shown in the table below.

Exposure	Risk-Based (mg/kg)	Hazard-Based (mg/kg)
Standard Default - Residential	0.43 <sup>a</sup>	23 <sup>b</sup>
Snow Cover - Residential	0.6 <sup>a</sup>	32 <sup>b</sup>
Bioavailability/Snow Cover - Residential	6.0 <sup>a</sup>	320 <sup>b</sup>
EPA Risk Management Range - Residential (10 <sup>-6</sup> to 10 <sup>-4</sup> )	0.43 to 43	N/A
EPA Arsenic Risk Management-Residential (10 <sup>-3</sup> )	430 <sup>a</sup>	N/A <sup>b</sup>
Site Background-Residential Risk (4.2 x 10 <sup>-5</sup> )	18	N/A
Standard Default - Occupational	3.8 <sup>a</sup>	613 <sup>b</sup>
Snow Cover - Occupational	5.4 <sup>a</sup>	854 <sup>b</sup>
Bioavailability/Snow Cover - Occupational	54 <sup>a</sup>	8540 <sup>b</sup>
EPA Risk Management - Occupational (10 <sup>-6</sup> to 10 <sup>-4</sup> )	3.8 to 380	N/A
EPA Arsenic Risk Management - Occupational (10 <sup>-3</sup> )	3800	N/A
Site-Background Occupational Risk (4.2 x 10 <sup>-5</sup> )	160	N/A

Summary of Arsenic Concentrations	
Under pavement - Max Conc.	97.2
Grassy/gravel - 95% UCL	249.2
All - Max. Conc.	343.0

<sup>a</sup> Risk level at 10<sup>-6</sup>

<sup>b</sup> Hazard Quotient at 1

Setting the acceptable risk to that associated with residential exposures to regional background concentrations of arsenic in soil (4.2 x 10<sup>-5</sup>), the comparable occupational soil concentration for arsenic would be 160 mg/kg. Based on the current USEPA position on arsenic (10<sup>-3</sup> risk management level), the acceptable RBC for residential and occupational exposure scenarios could be as high as 430 and 3800 mg/kg, respectively. Thus for occupational settings the acceptable RBC and HBC would be 3900 and 613 mg/kg, respectively. The noncarcinogenic HBC, being the more stringent, would take precedence. The 95% UCL and maximum concentrations in the gravel or grass areas and overall site do not exceed either of these health based concentrations.

Another climatic condition that influences exposure to the surface soil at the site is snow cover. Conservative default exposure assumptions do not take into account the days in the year that snow would cover the soil and prevent exposures. It is reasonable to assume that the ground would be either covered by snow or frozen for 3 months out of the year, resulting in a reduction of the exposure frequency assumption from 250 days per year to 180. This would result in an increase in the RBC for soil by a factor of 1.4. This factor would be applied to both carcinogenic and noncarcinogenic risk-based concentrations. Similarly, it is unlikely that all of the occupational soil exposure would come from the area of maximum concentration or the 95% UCL value for the noncovered areas. The comparison of the range of "acceptable values" is shown below.

Assessing the risk associated with exposure to the 95% UCL of the arithmetic mean and the maximum detected arsenic soil concentrations, the results are within the acceptable risk range. Using the standard default exposure assumptions for industrial land use, the resultant risks are 6.5 x 10<sup>-5</sup> and 9.0 x 10<sup>-5</sup> for exposure to the 95% UCL or the maximum arsenic concentration soil, respectively. These are in the same risk range as that deemed acceptable by NYSDEC (i.e., 10<sup>-5</sup>). Accounting for lower exposures during the winter months, the resultant risk to the 95% UCL and maximum arsenic

concentrations would be  $4.6 \times 10^{-5}$  and  $6.5 \times 10^{-5}$ , respectively. None of the detected concentrations of arsenic in soil at the site pose an unacceptable noncarcinogenic hazard.

### 3.5 SUMMARY OF RISK ASSESSMENT

As presented and discussed above, the arsenic concentrations in soils at the AlliedSignal Buffalo site do not pose an unacceptable risk nor noncancer hazard to site occupants current (occupational) or the unlikely future scenario (residential). This conclusion is based on EPA arsenic cancer risk policy and current knowledge of arsenic's mechanism of action as well as arsenic's bioavailability in soils upon ingestion.

Even without consideration of the upcoming changes in the cancer risk assessment policy or the reduced bioavailability of arsenic in soil, the generic nonrestricted, risk-based soil concentrations do not apply to this site. The site-specific assumptions include:

- Industrial rather than residential receptors; and
- 180 days of exposure (accounting for frozen ground or snow cover) rather than 250.

With consideration of the current EPA risk management policy for arsenic ( $<10^{-3}$  risk), the arsenic soil concentrations at the AlliedSignal Buffalo site are well within the acceptable range. Due to the uncertainty in the risk assessment process, EPA risk assessment guidelines and the default conservative exposure assumption overestimates risk. The current risk assessment indicates that noncancer hazards and cancer risks may be a concern using standard conservative default industrial exposure assumptions, when soil arsenic levels exceed 613 mg/kg. This level is approximately twice that found as the maximum concentration of arsenic in soil on the AlliedSignal Buffalo site.

### 3.6 REMEDIAL ALTERNATIVES

While the goal of remedial action is to prevent or reduce the risks to human health posed by contact with contaminants associated with the surface soil, the short- and long-term risk of the remedial alternatives must also be evaluated when selecting the best remedy for a site. In addition other important aspects must be considered as well including technical feasibility, costs and implementability.<sup>29</sup>

Based on the risk assessment provided in this CMS, the concentrations of arsenic in soils across the AlliedSignal Buffalo site, do not pose an unacceptable cancer risk or noncancer hazard to site occupants (occupational) or unlikely more conservative future land use (residential). Therefore, the risk-based, proposed remedial alternative is no action. Two other remedial alternatives to reduce or eliminate exposure to arsenic in soil will be discussed: (1) excavation with removal, and (2) covering.

Using the same conservative default assumptions as provided above for deriving occupational soil concentration and risk from exposure to site background, the estimated risk to current occupants of the site is  $6.2 \times 10^{-5}$  for grassy and gravel areas and  $9.0 \times 10^{-5}$  for the entire site (based on maximum concentration of 343 mg/kg). The latter is the most conservative estimate since it reflects reasonable maximum exposure (RME) to the maximum concentration found on the site. This can be interpreted that the entire amount of soil that the individual ingests on-site is from the area of the highest arsenic concentrations, even though this is highly unlikely. However, even if it were the case, it would be within EPA's risk management range of  $10^{-4}$  to  $10^{-6}$  and is similar, from the statistical probability

<sup>29</sup> U.S. Environmental Protection Agency, 1991, Human Health Evaluation Manual, Part C: Risk Evaluation of Remedial Alternatives, December 13, 1991.



perspective, to the risk level deemed appropriate for residential exposures (and presumably occupational exposures) of  $4.2 \times 10^{-5}$ .

### 3.6.1 Excavation

The removal of the soils containing arsenic at concentrations greater than the NYSDEC acceptable target cleanup level for unrestricted use (i.e., site background concentration of 18 mg/kg) would require removal of a considerable portion of the surface soil of the sampled area. In addition, the residual risk after remediation (long-term risk of remediation) to the NYSDEC acceptable cleanup level for unrestricted use (18 mg/kg) remains at  $4.2 \times 10^{-5}$ .

Alternatively, based on the acceptable risk level for nonrestricted use, the industrial exposure scenario resulting in the comparable generic or snow-covered risk-based soil concentration of arsenic would be 160 and 224 mg/kg, respectively. Only two areas on the site exceed this value. The act of removal results in a potential for greater exposures, albeit over shorter periods of times that would then be added to the existing "background" exposures. This can be demonstrated using standard exposure assumptions for a construction worker removing the surface soil containing arsenic at the maximum concentration of 343 mg/kg. The assumptions are shown below assuming no personal protection of the hazardous waste worker.

Short-term exposure health risks generally include any current baseline risks plus any new risks that would occur while implementing the remedy. While in practice, the Worker Protection Standards require that implementation of the selected remedy proceed with risk-related considerations including personal protection equipment, a baseline risk assessment can be conducted assuming no personal protective equipment. However, on-site remediation workers are most likely equipped with appropriate PPE and are required to use appropriate engineering controls, their risk generally should be minimal. Factors that affect the potential for exposure include the likelihood of PPE failure. In general, the more restrictive PPE is more likely to fail due to considerations such as worker mobility and visibility constraints and potential for worker heat stress.

Variable	Symbol	Default Value
Arsenic concentration in soil	C	343 mg/kg
Exposure duration	ED	1 year
Exposure frequency	EF	60 days/year
Body weight	BW	70 kg
Soil ingestion	IRS	480 mg/day
Fraction of contaminated soil ingested	FC	1 (100%)
Fraction of contaminant absorbed into the body	FA	1 (100%)
Average time	AT	25,550 days (70 years)
Cancer slope factor	CSF	1.5 kg/day/mg
Reference Dose (Oral)	RFD <sub>o</sub>	$3 \times 10^{-4}$ mg/kg/day
Average Time (noncarcinogenic-construction)	AT <sub>N</sub>	365 days

Equation 7 (for carcinogens):

$$R = \frac{C \times IRS \times CSF \times EF \times ED \times FC}{BW \times AT \times 10^6 \frac{\text{mg}}{\text{kg}}}$$
$$R = 8.3 \times 10^{-6}$$

When the **above** assumptions are used in Equation 3, the carcinogenic risk from this short term (less than life time) exposure is determined to be  $8.3 \times 10^{-6}$ . This would be added to the risk from industrial exposures to background concentrations ( $4.2 \times 10^{-5}$ ) resulting in a cumulative lifetime risk of  $5.2 \times 10^{-5}$  for that individual - an individual lifetime risk similar to that of an individual exposure to the current site conditions ( $6.2 \times 10^{-5}$  to  $9.0 \times 10^{-5}$ ). In addition, the excavation and removal of the soil would increase the amount of dust and thus exposure to soil containing arsenic for on-site workers.

Equation 8 (for noncarcinogens):

$$HQ = \frac{C \times IRS \times EF \times ED \times FC}{BW \times AT_N \times RfD_o \times 10^6 \frac{\text{mg}}{\text{kg}}}$$
$$HQ = 1.3$$

More importantly, the higher soil ingestion during excavation (assuming no personal protective equipment) produces an unacceptable hazard using Equation 4. Based on the above exposure assumptions, the hazard quotient is greater than 1 (1.3). The relatively high level limited exposure posed by excavation is hazard where no such unacceptable hazard exists for the current site conditions. Therefore, **not only** does the excavation scenario produce carcinogenic risks that must be added to that for background arsenic lifetime exposures, the soil removal poses a hazard for the excavation worker that would **not** exist for receptors at the site unless the soil was disturbed.

### 3.6.2 Engineered Control

As an alternative, routine exposure to the soils deemed to be in excess of NYSDEC's risk management level for the site could be provided with an engineered barrier, e.g., asphalt paving or placement of additional top soil. This would preclude exposures to those soils with arsenic concentrations in excess of what NYSDEC has deemed acceptable for unrestricted use (i.e.,  $4.2 \times 10^{-5}$  risk).

## 4.0 CORRECTIVE ACTION OBJECTIVES

The following sections define the objectives of the corrective action to be performed at the facility. The objectives identified are based on the results of the RFI Report, the risk assessment, and NYSDEC guidelines governing cleanup criteria associated with the elevated levels of arsenic in soil.

### 4.1 IDENTIFICATION OF COCs

As a result of the RFI, COCs were identified for surface soils and storm sewer water within the facility. The COCs associated with the storm sewer water (methylene chloride and acetone) were addressed by the issuance of a new BSA Permit; as a result no further action is required. Arsenic was identified as a COC with respect to surface soils in the ten locations identified in Chapter 2.0. It was determined by the NYSDEC that a CMS be performed to identify CMAs that can address the surface soils with elevated arsenic concentrations..

### 4.2 OBJECTIVES OF THE CMS

Based on the results of the RFI, the NYSDEC has determined a CMS is necessary in reference to arsenic concentrations in surface soils in the vicinity of the SWMU. The objectives of the CMS are as follows:

- Identify Corrective Measure Technologies (CMTs) that address concentrations of arsenic in surface soils that are greater than 18 mg/kg based on NYSDEC's perception of site background.
- Evaluate the potential CMTs and identify the Corrective Measure Alternatives (CMAs) which address arsenic in surface soils in the vicinity of the SWMU.
- Evaluate the CMAs identified with respect to the proposed alternatives:
  - technical merit
  - ability to meet environmental cleanup objectives identified by the risk assessment and NYSDEC guidelines
  - effect on human health of the facility worker and/or corrective action worker
  - ability to be employed at the facility
- Propose a CMA that can be employed at the facility and be protective of the environment and human health

These objectives are met through the completion of the following sections of the CMS.

## 5.0 SCREENING OF CMTs AND IDENTIFICATION OF CMAs

An initial screening of the CMTs was performed by Remcor in the April 6, 1994 submittal entitled "Pre-Investigation Evaluation of Corrective Measure Technologies." The initial screening was done to identify the alternative technologies considered technically feasible and appropriate to address facility-specific constituent characteristics and conditions. The list of CMTs was developed based on the four general response actions including:

- No Action based on the concentrations detected which are typically below existing TAGM 4046 cleanup levels
- Removal and recovery measures to excavate media containing concentrations of facility-related constituents, classified as hazardous, that exceed TAGM 4046 cleanup levels
- Treatment and discharge measures to convert media of concern to a form that will have little or no adverse public health or environmental effects
- Containment measures to manage affected media on a long-term basis to limit their interaction with the environment and public.

These general response actions and how they relate to potential CMTs are discussed in greater detail in the following sections of this chapter.

### 5.1 SCREENING OF CMTs

There are a number of potential CMTs associated with the general response actions for this facility. The most appropriate CMTs were identified based on the following screening criteria:

- Facility Characteristics:
  - General working conditions within and adjacent to the facility
  - Facility configuration and accessibility
  - Climate
  - Soil characteristics
  - Constituent concentrations in soil
  - Potential migration pathways and receptors
- Media Characteristics:
  - Chemical composition and quantities
  - Biodegradability
  - Solubility
  - Volatility
- Technology Limitations:
  - Applicability to the facility and area characteristics
  - Technical feasibility
  - Level of performance and risk reduction
  - Cost effectiveness

Potential CMTs for surface soils with arsenic levels of concern were evaluated using the screening criteria listed above.

### 5.1.1 No Action

The No-Action CMT for surface soils remediation at the facility is based on the results of the risk assessment presented in Chapter 3.0 of this report. In the risk assessment, it was determined that arsenic concentrations reported in surface soils at the facility do not pose an unacceptable risk nor noncancer hazard to site occupants, either occupational or residential. As detailed in Chapter 3.0, the maximum arsenic concentration reported on site was 343 mg/kg (boring SB-3). Based on the results of the risk assessment, noncarcinogenic hazards are the determinant factors over carcinogenic risks. The noncarcinogenic hazard threshold value for arsenic cleanup at the site is 613 mg/kg.

The No-Action alternative would not alter the configuration, accessibility or general working conditions at the facility as the soil would be left in place. The facility currently operates in an industrial setting and access is limited to those employed by the facility. The general public has no access to the site; access is limited by fencing which surrounds the site and 24 - hour security personnel. The site has historically been used as an industrial facility, as has most of the properties which are nearby. AlliedSignal has no plans to convert this facility from an industrial setting at any time in the foreseeable future.

The extent of the arsenic impact at the facility (based on the 24 mg/kg NYSDEC action level) is limited to the surface soils in portions of the facility surrounding the SWMU, AOC-3 (the Drum Storage Area), and Monitoring Well MW-10. Arsenic was not detected in subsurface soil samples collected from 8 to 10 ft-bgs in concentrations greater than the NYSDEC action level. Likewise, the results of groundwater sampling conducted on two occasions did not indicate elevated concentrations of arsenic. Based on these findings, the soils with elevated arsenic concentrations can be left in place and not impact either the deeper subsurface soils or groundwater at the facility.

Based on the risk assessment, the noncarcinogenic hazard and the carcinogenic risk associated with the arsenic concentrations reported in surface soil samples collected at the facility do not present an unacceptable risk. As a result, the no action alternative is warranted regardless of whether the site is operated in an industrial setting as it is now or if it is converted to a residential setting. There is no cost associated with the No Action alternative.

### 5.1.2 Removal and Recovery Measures

The removal and recovery CMT results in the removal of soil with elevated arsenic concentrations for subsequent treatment and/or containment (i.e., off-site landfill) and backfilling of excavated areas with clean fill. This technology involves conventional excavation procedures to remove soils from the facility. The excavated soils are transported and disposed of in an off-site landfill in accordance with all regulatory requirements.

In a letter to Mr. Dayne Crowley of HLA from Mr. Tim DiGiulio of the NYSDEC dated December 3, 1996, the NYSDEC indicated an arsenic concentration of 18 mg/kg would be an acceptable target cleanup level for surface soils at the facility. This concentration is based on the NYSDEC's perception of background conditions at the facility and would be necessary for the NYSDEC to approve unrestricted use of the site.

The risk assessment evaluates the risk associated with the 18 mg/kg criteria and finds an exceedence of the  $1 \times 10^{-6}$  risk level for carcinogens. When an arsenic concentration of 18 mg/kg is inserted in the standard residential risk-based calculation employed by the NYSDEC, a risk of  $4.2 \times 10^{-5}$  was determined.

Assuming a cleanup level of 18 mg/kg were employed, removal and recovery measures would significantly alter working conditions at the facility while excavation activities were being performed. As a result, access throughout most of the plant would be limited, in some cases making it difficult for the facility to conduct business (access to the Pilot Plant and its associated features would be limited). In addition, sections of asphalt roadway would need to be destroyed and later replaced to remove unexposed soils with arsenic concentrations greater than 18 mg/kg.

The technology exists and can be employed to excavate and dispose of all surface soils within the facility with concentrations greater than 18 mg/kg. However, the benefits of removing the assumed risk from the site are not justified by the cost associated with this technology. Based on the existing data, approximately 3,000 cubic yards of soil would need to be removed and disposed of as well as approximately 2,400 square feet of asphalt. The cost associated with the excavation and disposal of this volume of soil is approximately \$1,100,000. The concentrations of arsenic observed at this industrial site where access is limited, do not warrant an expenditure of this degree when other more cost-effective approaches exist.

In addition to the cost, there would be potential for significant hazard for any unprotected worker performing the excavation work. Furthermore, the removal activities would create dust that would increase exposures to arsenic above that currently existing at the site. The risk assessment states that unprotected workers performing excavation activities could be exposed to a degree which produces a hazard quotient greater than 1. The hazard quotient is not exceeded if the soil is left in place.

### 5.1.3 Containment Measures

Containment measures are employed to limit human health and environmental exposure (i.e., preclude human contact with the material of concern to limit potential health risks). Such modifications include covering of the media with top soil or pavement. On-site isolation can be completed using any of the options listed below:

- Cover the areas of concern with additional top soil and vegetative cover
- Cover the areas of concern with a low-permeability cap (i.e., asphalt pavement)
- Isolate the area with elevated arsenic levels with a chain-link fencing

Of these options, isolation through the use of additional top soil or asphalt would have the least adverse impact on site operations while effectively eliminating the risk of human exposure. Isolation by chain link fencing does not eliminate the risk associated with exposure to workers and would limit access to portions of the plant and potentially alter access to some plant buildings. The greatest arsenic impact is observed in landscaped areas of the plant; the placement of additional top soil and revegetation eliminates the risk while retaining the plant's configuration and surface water drainage patterns.

Each of the containment measures discussed above are technically feasible and could be employed at the facility to accomplish the objective of limiting human contact with surface soils of concern. Covering the areas of concern with either topsoil or asphalt would be more effective in reducing human contact as the soils with an elevated arsenic concentration would no longer be exposed. Isolating the areas of concern with fencing reduces human contact, however it does not eliminate it. The areas of impact are largely landscaped; these areas will need to be maintained and to do so a site worker will be exposed to the subject surface soil.

The most cost-effective way to eliminate the risk associated with the surface soils containing arsenic is the placement of six inches of topsoil and vegetative cover. This alternative eliminates human contact with the soils containing arsenic while maintaining the current facility configuration and surface water drainage patterns. This technology can be employed for approximately \$31,500. The next most cost effective option is the placement of an asphalt cap over the appropriate areas. This alternative changes the configuration of the plant and substantially alters the surface water runoff pattern at the facility. This technology can be employed for approximately \$35,000. This cost does not reflect the additional costs associated with the maintenance of the asphalt. It is estimated the areas will need resurfaced every 3 to 5 years at a cost of approximately \$22,000 per event. The least effective option is the installation of chain link fence around the areas of elevated arsenic in soil. This alternative significantly alters the plant's configuration while reducing, not eliminating, the risks associated with the subject surface soils. The cost to implement this technology is approximately \$30,000.

## 5.2 IDENTIFICATION OF CORRECTIVE MEASURE ALTERNATIVES

The following sections will identify the CMAs which can be implemented at the facility to remediate the areas of concern at the facility. The estimated costs associated with implementing each CMA are presented in Appendix C.

### 5.2.1 No Action

Based on the risk assessment presented in Chapter 3.0, the concentrations of arsenic in surface soils across the facility do not pose an unacceptable cancer risk or noncancer hazard to site occupants (occupational) or the unlikely future land use (residential), when site-specific conditions are considered. This conclusion is based on the EPA cancer risk policy and current knowledge of arsenic's mechanism of action as well as arsenic's bioavailability in soils upon ingestion.

Even without consideration of the upcoming changes in the cancer risk assessment policy or the reduced bioavailability of arsenic in soil, the generic nonrestricted, risk-based soil concentrations do not apply to this site. The specific assumptions include:

- Industrial rather than residential receptors; and
- 180 (accounting for frozen and/or snow covered) rather than 250 days of exposure

With consideration of the current EPA risk management policy for arsenic ( $<10^{-3}$  risk), the concentrations of arsenic in surface soils at the facility are well within the acceptable range. Due to the uncertainty in the risk assessment process, EPA risk assessment guidelines and the default conservative exposure assumptions overestimate risk. The current risk assessment indicates that noncancer hazards and cancer risks may be a concern using standard conservative default industrial exposure assumptions when arsenic concentrations in surface soils exceed 613 mg/kg. The highest arsenic concentration detected at the facility was 343 mg/kg.

For this reason, the proposed CMA is No Action.

### 5.2.2 Excavation and Disposal

The NYSDEC has indicated that an arsenic concentration of 18 mg/kg would be an acceptable cleanup objective for unrestricted use of the property. To accomplish this, approximately 12 to 24 inches of soil would be removed and direct loaded into trucks for subsequent off-site disposal using conventional excavation techniques. The areas of the facility which would require excavation are illustrated in

Figure 5. These areas encompass an approximate area of 40,500 square feet and represent approximately 3,000 cubic yards of soil.

It is estimated this work can be completed for approximately \$1,100,000.

The excavated soil will be directly loaded onto trucks and shipped to the disposal facility. Prior to initiating the project, the materials will be characterized for disposal and an appropriate landfill will be selected. It is estimated that transportation and disposal of the soils will cost approximately \$945,000.

Once excavation activities are completed, the areas will be landscaped to pre excavation conditions with the appropriate amount of top soil and vegetation. Asphalt will also need to be replaced in the vicinity of MW-9 and MW-7. It is estimated an area of approximately 2,400 square feet will need to be resurfaced following excavation activities. The cost associated with the completion of these tasks is estimated to be approximately \$95,000.

Excavation and disposal of surface soils at the facility with arsenic concentrations greater than the NYSDEC imposed cleanup objective of 18 mg/kg will cost approximately \$1,100,000. In doing so, the risk is removed from the site, however, the additional hazard associated with the workers performing the excavation activities exceeds the hazard quotient of 1.

### 5.2.3 Containment Alternatives

Two containment alternatives exist which eliminate the risk perceived by the NYSDEC associated with the surface soils with elevated levels of arsenic; these alternatives include covering the appropriate areas of the facility with either an additional six inches of top soil or asphalt pavement. The areas of concern are identified in Figure 5 and consist of approximately 28,700 square feet in the vicinity of Monitoring Well MW-10 and approximately 9,000 square feet east of the SWMU. These alternatives are described individually in the following sections.

#### 5.2.3.1 Top Soil Cover

Each of the areas identified in Figure 5 are in areas of the plant which are currently landscaped. To eliminate human exposure to the soils areas with elevated arsenic, each of the areas illustrated will be landscaped by placing six inches of topsoil over the existing soil and planting grass. It is estimated approximately 705 cubic feet of top soil will be placed at an estimated cost of \$21,150. The areas will then be seeded for an additional cost of approximately \$5,000. The total cost associated with this alternative is approximately \$31,500.

There are no additional maintenance costs associated with this alternative as the areas are currently landscaped and AlliedSignal budgets for its maintenance. Additionally, as the areas are currently landscaped, there will be no alteration in surface water runoff patterns across the areas in question.

#### 5.2.3.2 Asphalt Pavement Cover

Each of the areas identified in Figure 5 will be covered with an asphalt pavement consisting of a two inch thick layer of surface course (I-2 Mix). The areas to be paved would not be subjected to vehicular traffic; as a result a two inch layer would be sufficient to eliminate human contact with the soils of concern. The asphalt would also significantly limit infiltration from the surface.



Maintenance of the paved area would be required if this alternative were selected. The paved areas would need to be inspected once a year and it is estimated the areas would need to be resurfaced with a one inch thick layer of surface course (I-2) every five years.

The two areas have a combined area of approximately 38,100 square feet. It is estimated it will cost approximately \$35,000 to cover these areas with asphalt.

There is also additional cost associated with the maintenance of the paved areas. The integrity of the paved surface should be inspected yearly and resurfaced every 5 years. The costs associated with the resurfacing is approximately \$21,100.

The asphalt pavement does eliminate the exposure to the soils but in doing so it alters the configuration of the plant as well as the current surface water runoff patterns. The two areas with elevated arsenic levels are currently landscaped. If they become paved, runoff from precipitation could cause problems in the vicinity of the SWMU and Shipping and Receiving Building.

#### **5.2.3.3 Isolation through Fence Installation**

This CMA is not as effective as either the soil or asphalt cover as the surface soils are still exposed and the potential for human contact exists. The areas to be isolated with chain link fence include the areas identified in Figure 5 and encompass a total area of approximately 38,100 square feet. To isolate these areas with fencing would cost approximately \$30,000. Once the fence is installed, the landscaped areas within the fence must still be maintained. This creates an exposure to the worker performing the landscaping. For this reason, this CMA is not as effective as either of the cover methods.

## 6.0 RECOMMENDED ACTION

The risk assessment included in this CMS has concluded that the existing concentrations of arsenic in surface soil do not pose an unacceptable risk at an industrial site. Using standard conservative, default risk assessment exposure assumptions and the USEPA's risk policy for arsenic, noncarcinogenic hazards may be a concern when surface soil arsenic levels exceed 610 mg/kg. This threshold concentration nearly doubly exceeds any detected concentration of arsenic in soil at the site. The maximum detected arsenic concentration in soil was reported in the RFI as 343 mg/kg. When the risk assessment considered the risk associated with removal of the soil, it was concluded that a hazard level greater than unity was posed to the unprotected excavation workers, which represents an unacceptable and unnecessary risk.

Because the facility is an industrial site, and there appears to be no reason to discontinue such a usage of the property, HLA recommends that the no action alternative be implemented. Because arsenic concentrations will be present in soil that exceed background levels in the region, it will be necessary to ensure that the usage of the property will continue as industrial. Furthermore, AlliedSignal should maintain the areas with elevated arsenic concentrations as per their current status. If work is to be undertaken in these areas that requires excavation, proper safeguards should be put in place to limit the potential exposure of the workers, or the assumptions presented in this risk assessment should be reviewed to determine whether workers are likely to be subject to exposure to unacceptable risk.

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CORRECTIVE MEASURES STUDY  
ALLIEDSIGNAL, INC.  
BUFFALO RESEARCH LABORATORY**

Prepared for AlliedSignal Inc.

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**FIGURES**



**REFERENCES:**  
 USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES,  
 BUFFALO NE AND BUFFALO SE, NEW YORK  
 BOTH DATED 1965. SCALES 1: 24000



Harding Lawson Associates  
 Engineering and  
 Environmental Services  
 700 North Bell Avenue  
 Pittsburgh, Pennsylvania 15106  
 412-279-6661

## SITE LOCATION MAP

BUFFALO RESEARCH LABORATORY  
 ALLIED SIGNAL, INC.  
 BUFFALO, NEW YORK

FIGURE

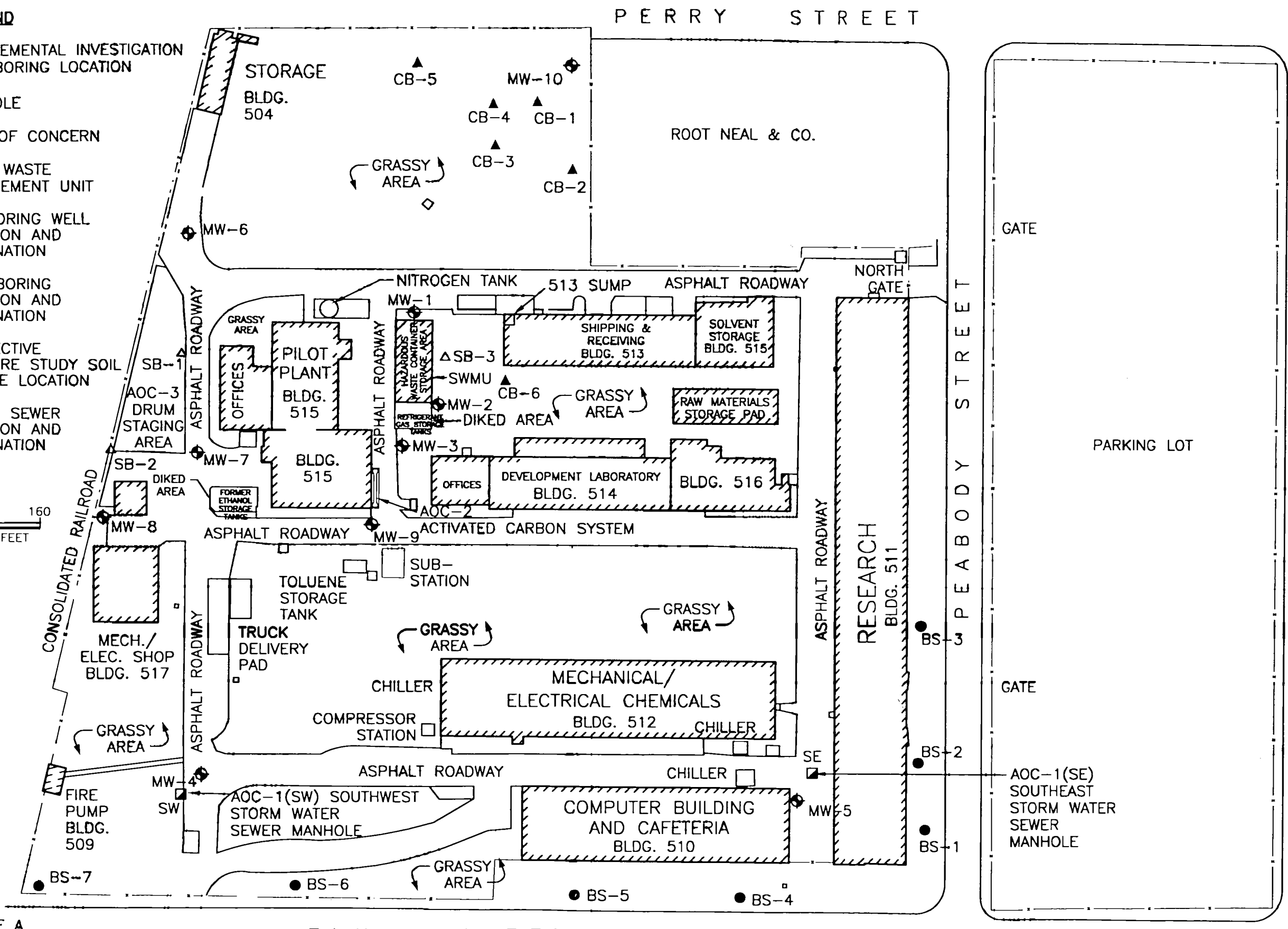
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**LEGEND**

- BS-1 SUPPLEMENTAL INVESTIGATION SOIL BORING LOCATION
- MANHOLE
- AOC-1 AREA OF CONCERN
- SWMU SOLID WASTE MANAGEMENT UNIT
- ◆ MW-1 MONITORING WELL LOCATION AND DESIGNATION
- △ SB-1 TEST BORING LOCATION AND DESIGNATION
- ▲ CB-1 CORRECTIVE MEASURE STUDY SOIL SAMPLE LOCATION
- SW STORM SEWER LOCATION AND DESIGNATION

0 80 160  
APPROXIMATE SCALE IN FEET



Base Map Source:  
TOPOGRAPHIC MAP OF A  
PORTION ALLIEDSIGNAL INC.  
By: McINTOSH &  
McINTOSH, P.C.  
Dated: 2/26/96

OSW  
OFF-SITE SOUTHWEST  
STORM WATER MANHOLE  
(Beneath Elk Street Bridge)

BUFFALO COLOR CORPORATION

OSE  
OFF-SITE SOUTHWEST  
STORM WATER MANHOLE

Harding Lawson Associates  
Engineering and  
Environmental Services  
700 North Bell Avenue  
Pittsburgh, Pennsylvania 15106  
412-279-6661  
DRAWN: WGA  
JOB NUMBER: 33753.2

INVESTIGATION LOCATIONS  
BUFFALO RESEARCH LABORATORY  
AlliedSignal Inc.  
Buffalo, New York

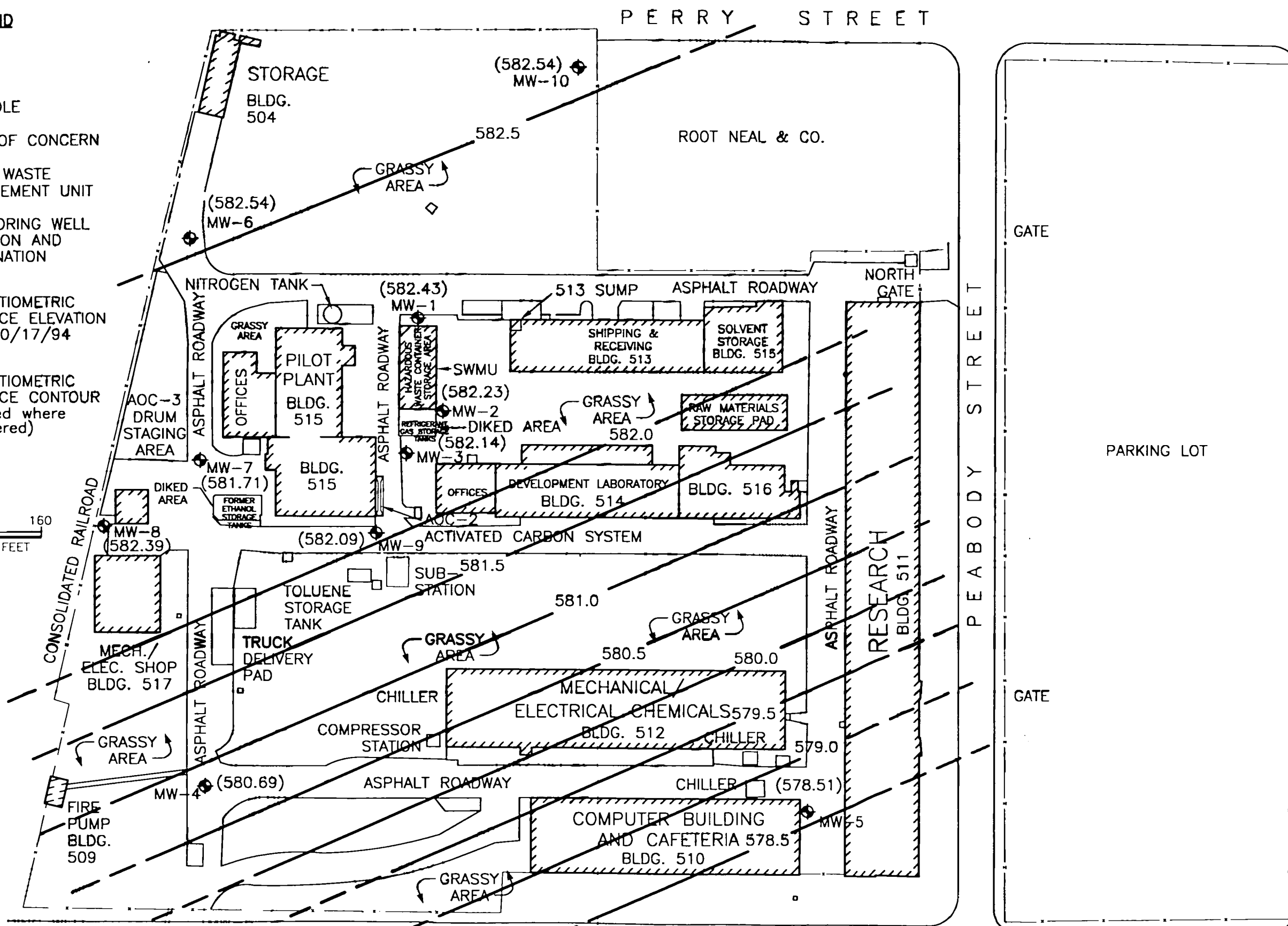
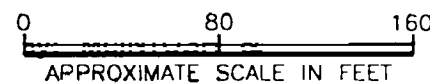
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DWG. No. 33753B12  
DATE 12/20/96  
REVISED DATE

**LEGEND**

- MANHOLE
- AOC-1 AREA OF CONCERN
- SWMU SOLID WASTE MANAGEMENT UNIT
- ◆ MW-1 MONITORING WELL LOCATION AND DESIGNATION

(582.54) POTENTIOMETRIC SURFACE ELEVATION FOR 10/17/94

582.0 POTENTIOMETRIC SURFACE CONTOUR (dashed where inferred)



Base Map Source:

TOPOGRAPHIC MAP OF A PORTION ALLIEDSIGNAL INC.

By: McINTOSH & McINTOSH, P.C.

Dated: 2/26/96

BUFFALO COLOR CORPORATION

Harding Lawson Associates  
Engineering and Environmental Services  
700 North Bell Avenue  
Pittsburgh, Pennsylvania 15106  
412-279-6661

DRAWN: WGA  
JOB NUMBER: 33753.2

POTENTIOMETRIC SURFACE MAP  
OCTOBER 17, 1994  
BUFFALO RESEARCH LABORATORY  
AlliedSignal Inc.  
Buffalo, New York

FIGURE

3

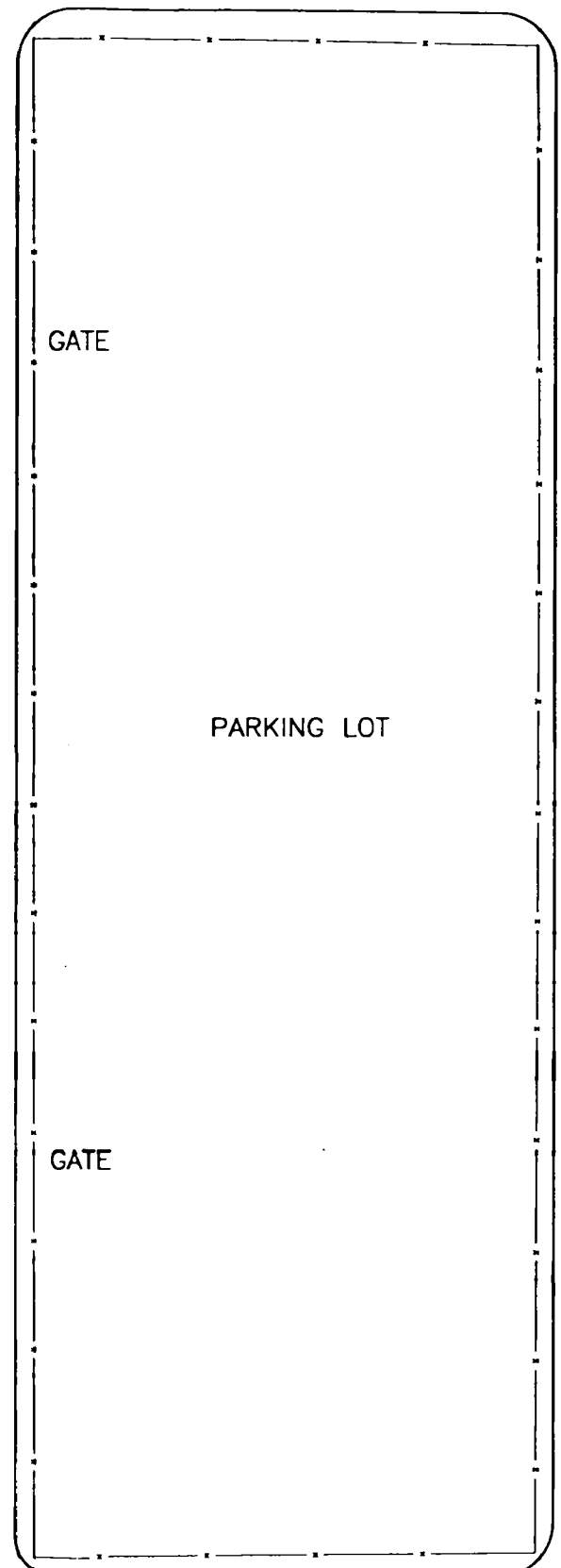
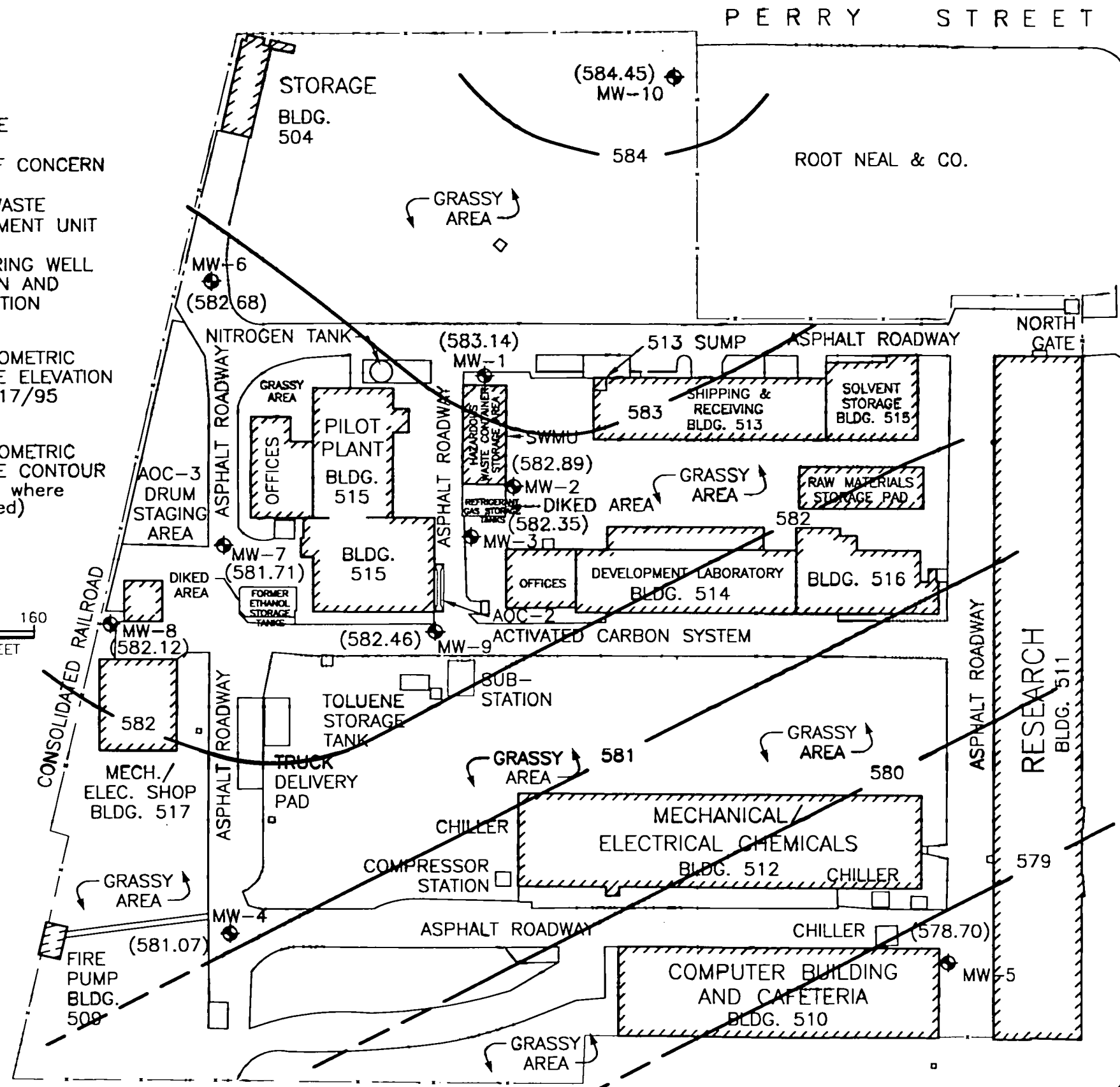
APPROVED:	DWG. No. 33753B13	DATE 12/20/96	REVISED DATE
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**LEGEND**

- MANHOLE
- AOC-1 AREA OF CONCERN
- SWMU SOLID WASTE MANAGEMENT UNIT
- ◆ MW-1 MONITORING WELL LOCATION AND DESIGNATION
- (584.45) POTENTIOMETRIC SURFACE ELEVATION FOR 1/17/95
- - - 582 - - - POTENTIOMETRIC SURFACE CONTOUR (dashed where inferred)

0 80 160  
APPROXIMATE SCALE IN FEET



P E R R Y   S T R E E T

E L K   S T R E E T

P E A B O D Y   S T R E E T

W A L T E R   S T R E E T

Base Map Source:

TOPOGRAPHIC MAP OF A  
PORTION ALLIEDSIGNAL INC.  
By: McINTOSH &  
McINTOSH, P.C.  
Dated: 2/26/96

BUFFALO COLOR CORPORATION



Harding Lawson Associates  
Engineering and  
Environmental Services  
700 North Bell Avenue  
Pittsburgh, Pennsylvania 15106  
412-279-6661  
DRAWN: WGA  
JOB NUMBER: 33753.2

POTENTIOMETRIC SURFACE MAP  
JANUARY 17, 1995  
BUFFALO RESEARCH LABORATORY  
AlliedSignal Inc.  
Buffalo, New York

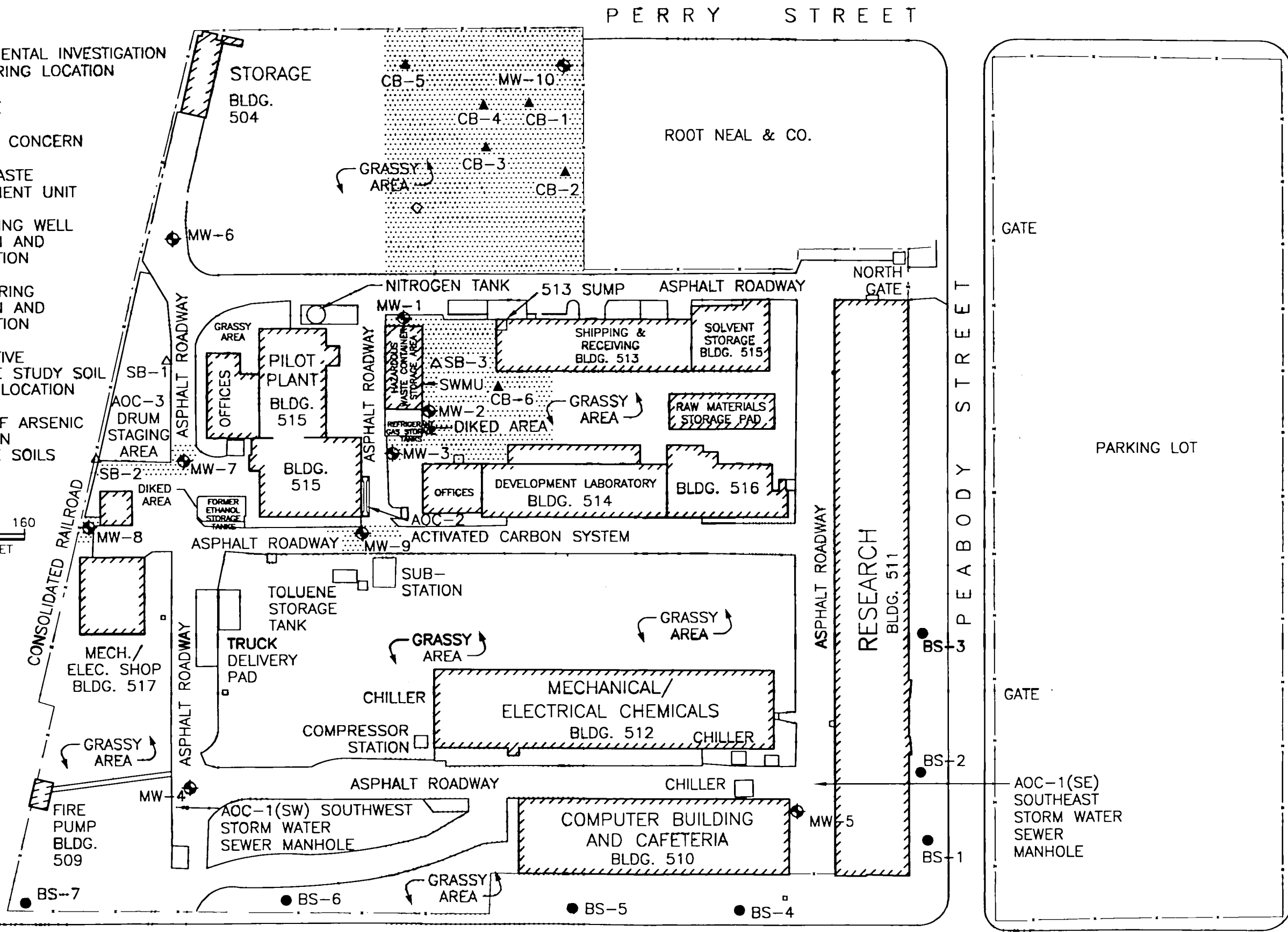
FIGURE  
4

APPROVED: [Signature]  
DWG. No. 33753B14  
DATE 12/20/96  
REVISED DATE

**LEGEND**

- BS-1 SUPPLEMENTAL INVESTIGATION SOIL BORING LOCATION
- MANHOLE
- AOC-1 AREA OF CONCERN
- SWMU SOLID WASTE MANAGEMENT UNIT
- ⊕ MW-1 MONITORING WELL LOCATION AND DESIGNATION
- △ SB-1 TEST BORING LOCATION AND DESIGNATION
- ▲ CB-1 CORRECTIVE MEASURE STUDY SOIL SAMPLE LOCATION
- [Dotted Pattern] LIMITS OF ARSENIC IMPACT IN SURFACE SOILS

0 80 160  
APPROXIMATE SCALE IN FEET



PERRY STREET

ELK STREET

PEABODY STREET

WALTER STREET

Base Map Source:  
TOPOGRAPHIC MAP OF A  
PORTION ALLIEDSIGNAL INC.  
By: McINTOSH &  
McINTOSH, P.C.  
Dated: 2/26/96

BUFFALO COLOR CORPORATION

	Harding Lawson Associates	AREA OF POTENTIAL CORRECTIVE MEASURE	FIGURE
	Engineering and Environmental Services		5
	700 North Bell Avenue Pittsburgh, Pennsylvania 15106 412-279-8661	BUFFALO RESEARCH LABORATORY AlliedSignal Inc. Buffalo, New York	
	DRAWN WGA	JOB NUMBER 33753.2	DATE 12/20/96

DWG. No. 33753B15  
APPROVED: [Signature]  
REVISOR: [Signature]  
REVISED DATE



**TABLES**

Table 2-1  
**Inorganic Results for Surface Soil Samples**  
**RCRA Facility Investigation**  
**AlliedSignal, Inc. Buffalo Research Laboratory**  
**Buffalo, New York**

Solid Waste Management Unit						
Sample ID, Interval and Collection Date						
Parameters	MDL <sup>(a)</sup>	Units	BRL-SS-MW1-0002 MW-1 0-2 <sup>(b)</sup> 09/26/94	BRL-SS-MW1-0002D MW-1 0-2 (duplicate) 09/26/94	BRL-SS-MW2-0002 MW-2 0-2 09/29/94	BRL-SS-MW3-0002 MW-3 0-2 09/29/94
<b><u>INORGANICS</u></b>						
Arsenic	0.5	mg/kg <sup>(c)</sup>	180 J <sup>(d)</sup>	236 J	117 J	46.8 J
Barium	0.1	mg/kg	42.9 J	79 J	44.2 J	34.8 J
Cadmium	0.2	mg/kg	4.5	6.1	2.8	1.1
Chromium (total)	5	mg/kg	29	30.6	37	14
Lead	10	mg/kg	111 J	174 J	80 J	30 J
Mercury	0.04	mg/kg	0.42 J	0.84 J	0.37 J	0.04 J
Selenium	0.2	mg/kg	1.0 U <sup>(e)</sup>	1 U	1 U	1 U
Silver	0.5	mg/kg	1.0 J	0.87 J	0.5 U	0.7 J
Cyanide (total)	0.010	mg/kg	0.05 U	1.5 J	0.05 U	0.05 U
<b><u>MISCELLANEOUS</u></b>						
Moisture content	0.1	percent	7.8	- <sup>(f)</sup>	12	12
Total Organic Carbon	500	mg/kg	--	--	--	--

NOTES:

- (a) "MDL" indicates Method Detection Limit.
- (b) Sample interval is expressed in feet below ground surface.
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "J" indicates the value is estimated.
- (e) "U" indicates the compound was not detected.
- (f) "--" indicates not analyzed.

Prepared by: LH  
checked by: ELR

Table 2-1  
**Inorganic Results for Surface Soil Samples**  
**RCRA Facility Investigation**  
**AlliedSignal, Inc. Buffalo Research Laboratory**  
**Buffalo, New York**

Parameters	MDL <sup>(a)</sup>	Units	Solid Waste Management Unit	AOC-1 -Storm Sewer System	AOC-2 - Activated Carbon System	
			Sample ID, Interval and Collection Date			
			BRL-SS-SB3-0002 SB3 0-2 09/29/94	BRL-SS-MW4-0002 MW-4 0-2 10/03/94	BRL-SS-MW5-0002 MW-5 0-2 10/04/94	BRL-SS-MW9-0002 MW-9 0-2 10/04/94
<b><u>INORGANICS</u></b>						
Arsenic	0.5	mg/kg <sup>(c)</sup>	343 J	0.6 J	7.6 J	97.2 J
Barium	0.1	mg/kg	75.5 J	15.5 J	77.5 J	110 J
Cadmium	0.2	mg/kg	0.3	0.2 U	0.6	2.7
Chromium (total)	5	mg/kg	25	5 U	16	20
Lead	10	mg/kg	16 J	10 U	103 J	70 J
Mercury	0.04	mg/kg	3.1 J	0.04 U	8.9 J	0.22 J
Selenium	0.2	mg/kg	1.5	1 U	1 U	1 U
Silver	0.5	mg/kg	2.1 J	0.5 U	0.5 U	0.5 U
Cyanide (total)	0.010	mg/kg	0.05 U	0.05 U	0.05 U	0.05 U
<b><u>MISCELLANEOUS</u></b>						
Moisture content	0.1	percent	15	20	20	17
Total Organic Carbon	500	mg/kg	--	18000	15000	--

NOTES:

- (a) "MDL" indicates Method Detection Limit.
- (b) Sample Interval is expressed in feet below ground surface.
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "J" indicates the value is estimated.
- (e) "U" indicates the compound was not detected.
- (f) "--" indicates not analyzed.

Prepared by: LH  
 Checked by: AR

Table 2-1  
 Inorganic Results for Surface Soil Samples  
 RCRA Facility Investigation  
 AlliedSignal, Inc. Buffalo Research Laboratory  
 Buffalo, New York

AOC-3 - Drum Storage Area						
Sample ID, Interval and Collection Date						
Parameters	MDL <sup>(a)</sup>	Units	BRL-SS-SB1-0002 SB1 0-2 09/29/94	BRL-SS-SB2-0002 SB-2 0-2 10/05/94	BRL-SS-MW6-0002 MW-6 0-2 09/27/94	BRL-SS-MW7-0002 MW-7 0-2 09/27/94
<b><u>INORGANICS</u></b>						
Arsenic	0.5	mg/kg	70.3 J	67.2 J	1.8 J	113 J
Barium	0.1	mg/kg	92.5 J	75.7 J	457 J	140 J
Cadmium	0.2	mg/kg	3.1	2.0	1.9	4.2
Chromium (total)	5	mg/kg	27	18	7.0	21
Lead	10	mg/kg	112 J	207 J	50 J	227 J
Mercury	0.04	mg/kg	0.04 U	0.23 J	0.04 U	0.81 J
Selenium	0.2	mg/kg	1 U	1.6	3.3 U	2.6
Silver	0.5	mg/kg	1.5 J	0.80 J	2.5 J	1.7 J
Cyanide (total)	0.010	mg/kg	0.05 U	0.05 U	0.05 U	0.05 U
<b><u>MISCELLANEOUS</u></b>						
Moisture content	0.1	percent	15	27	13	19
Total Organic Carbon	500	mg/kg	--	--	--	--

NOTES:

- (a) "MDL" indicates Method Detection Limit.
- (b) Sample interval is expressed in feet below ground surface.
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "J" indicates the value is estimated.
- (e) "U" indicates the compound was not detected.
- (f) "--" indicates not analyzed.

Prepared by: LH  
 Checked by: ELR

**Table 2-1**  
**Inorganic Results for Surface Soil Samples**  
**RCRA Facility Investigation**  
**AlliedSignal, Inc. Buffalo Research Laboratory**  
**Buffalo, New York**

Parameters	MDL <sup>(a)</sup>	Units	AOC-03 Drum Storage Area	Outside of Operations Area
			Sample ID, Interval and Collection Date	
			BRL-SS-MW8-0002 MW-8 0-2 10/03/94	BRL-SS-MW10-0002 MW-10 0-2 09/28/94
<b><u>INORGANICS</u></b>				
Arsenic	0.5	mg/kg	26.4 J	224 J
Barium	0.1	mg/kg	175 J	129 J
Cadmium	0.2	mg/kg	1.5	4.7
Chromium (total)	5	mg/kg	18	13
Lead	10	mg/kg	218 J	95 J
Mercury	0.04	mg/kg	0.83 J	0.34 J
Selenium	0.2	mg/kg	1.9	3.0
Silver	0.5	mg/kg	0.5 J	2.6 J
Cyanide (total)	0.010	mg/kg	0.05 U	0.05 U
<b><u>MISCELLANEOUS</u></b>				
Moisture content	0.1	percent	21	25
Total Organic Carbon	500	mg/kg	--	--

NOTES:

- (a) "MDL" indicates Method Detection Limit.
- (b) Sample interval is expressed in feet below ground surface.
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "J" indicates the value is estimated.
- (e) "U" indicates the compound was not detected.
- (f) "--" indicates not analyzed.

Prepared by: LH  
Checked by: AR



Table 2-2  
TCL Volatile Organic Compound Results for Surface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

		Solid Waste Management Unit				
		Sample ID, Interval and Collection Date				
Parameters	MDL <sup>(a)</sup>	Units	BRL-SS-MW1-0002 MW-1 0-2 <sup>(b)</sup> 09/26/94	BRL-SS-MW2-0002 MW-2 0-2 09/29/94	BRL-SS-MW2-0002 MW-2 0-2 09/29/94 Dilution <sup>(c)</sup>	BRL-SS-MW3-0002 MW-3 0-2 09/29/94
<u>Target Compound List</u>						
<u>Volatile Organic</u>						
<u>Compounds</u>						
Acetone	0.003	mg/kg <sup>(d)</sup>	0.53	0.74	2.7	0.15
Benzene	0.001	mg/kg	0.001 U <sup>(e)</sup>	0.014	0.12	0.001 U
Bromodichloromethane	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
Bromomethane	0.002	mg/kg	0.002 U	0.02 U	0.02 U	0.002 U
Bromoform	0.002	mg/kg	0.002 U	0.02 U	0.02 U	0.002 U
2-Butanone	0.002	mg/kg	0.002 U	0.02 U	0.02 U	0.002 U
Carbon Disulfide	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
Carbon Tetrachloride	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
Chlorobenzene	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
Chloroethane	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
Chloroform	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
Chloromethane	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
Dibromochloromethane	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
1,1-Dichloroethane	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
1,2-Dichloroethane	0.001	mg/kg	0.12	0.01 U	0.01 U	0.001 U
1,1-Dichloroethene	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
1,2-Dichloroethene (total)	0.001	mg/kg	0.001 U	0.01	0.01 U	0.001 U
1,2-Dichloropropane	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
cis-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
trans-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
Ethylbenzene	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
2-Hexanone	0.002	mg/kg	0.002 U	0.02 U	0.02 U	0.002 U

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface.
- (c) The sample was diluted for analysis purposes
- (d) "mg/kg" indicates milligrams per kilogram.
- (e) "U" indicates the compound was not detected.

Prepared by: LH  
Checked by: ELR

Table 2-2  
TCL Volatile Organic Compound Results for Surface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

		Solid Waste Management Unit				
		Sample ID, Interval and Collection Date				
Parameters	MDL <sup>(a)</sup>	Units	BRL-SS-MW1-0002 MW-1 0-2 <sup>(b)</sup> 09/26/94	BRL-SS-MW2-0002 MW-2 0-2 09/29/94	BRL-SS-MW2-0002 MW-2 0-2 09/29/94 Dilution <sup>(c)</sup>	BRL-SS-MW3-0002 MW-3 0-2 09/29/94
<b>Target Compound List</b>						
<b>Volatile Organic</b>						
<b>Compounds</b>						
<b>(continued)</b>						
Methylene Chloride	0.001	mg/kg	0.15	0.49	10	0.1
4-Methyl-2-Pentanone	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
Styrene	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
1,1,2,2-Tetrachloroethane	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
Tetrachloroethene	0.004	mg/kg	0.12	13	12	0.008
Toluene	0.001	mg/kg	0.006	0.037	0.01 U	0.005
1,1,1-Trichlorethane	0.001	mg/kg	0.008	0.01 U	0.01 U	0.001 U
1,1,2-Trichlorethane	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
Trichloroethene	0.001	mg/kg	0.011	0.083	0.01 U	0.001 U
Vinyl Chloride	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
Xylene (total)	0.001	mg/kg	0.001 U	0.01 U	0.01 U	0.001 U
<b>Miscellaneous</b>						
Moisture	0.1	percent	7.8	12	12	12
Dilution Factor			1.0	10.0	100.0	1.0

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface.
- (c) The sample was diluted for analysis purposes
- (d) "mg/kg" indicates milligrams per kilogram.
- (e) "U" indicates the compound was not detected.

Prepared by: LH  
checked by: ELR

Table 2-2  
TCL Volatile Organic Compound Results for Surface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

Parameters	MDL <sup>(a)</sup>	Units	Solid Waste Management Unit	AOC-1 Storm Sewer System	AOC-2 Activated Carbon System	
			Sample ID, Interval and Collection Date			
			BRL-SS-SB3-0002 SB-3 0-2 <sup>(b)</sup> 09/29/94	BRL-SS-MW4-0002 MW-4 0-2 10/03/94	BRL-SS-MW5-0002 MW-5 0-2 10/04/94	BRL-SS-MW9-0002 MW-9 0-2 10/04/94
<u>Target Compound List</u> <u>Volatile Organic</u> <u>Compounds</u>						
Acetone	0.003	mg/kg <sup>(d)</sup>	0.31	0.083	0.042	
Benzene	0.001	mg/kg	0.02	0.006	0.002	
Bromodichloromethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
Bromomethane	0.002	mg/kg	0.002 U	0.002 U	0.002 U	
Bromoform	0.002	mg/kg	0.002 U	0.002 U	0.002 U	
2-Butanone	0.002	mg/kg	0.002 U	0.002 U	0.002 U	
Carbon Disulfide	0.001	mg/kg	0.011	0.001 U	0.001 U	
Carbon Tetrachloride	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
Chlorobenzene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
Chloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
Chloroform	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
Chloromethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
Dibromochloromethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
1,1-Dichloroethane	0.001	mg/kg	0.22	0.001 U	0.001 U	
1,2-Dichloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
1,1-Dichloroethene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
1,2-Dichloroethene (total)	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
1,2-Dichloropropane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
cis-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
trans-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
Ethylbenzene	0.001	mg/kg	0.017	0.025	0.001 U	
2-Hexanone	0.002	mg/kg	0.002 U	0.002 U	0.002 U	

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface.
- (c) The sample was diluted for analysis purposes
- (d) "mg/kg" indicates milligrams per kilogram.
- (e) "U" indicates the compound was not detected.

Prepared by: LH  
Checked by: ELR

Table 2-2  
TCL Volatile Organic Compound Results for Surface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

Parameters	MDL <sup>(a)</sup>	Units	Solid Waste Management Unit	AOC-1 Storm Sewer System	AOC-2 Activated Carbon System	
			Sample ID, Interval and Collection Date			
			BRL-SS-SB3-0002 SB-3 0-2 <sup>(b)</sup> 09/29/94	BRL-SS-MW4-0002 MW-4 0-2 10/03/94	BRL-SS-MW5-0002 MW-5 0-2 10/04/94	BRL-SS-MW9-0002 MW-9 0-2 10/04/94
<u>Target Compound List</u> <u>Volatile Organic Compounds</u> <u>(continued)</u>						
Methylene Chloride	0.001	mg/kg	0.12	0.13	0.095	
4-Methyl-2-Pentanone	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
Styrene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
1,1,2,2-Tetrachloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
Tetrachloroethene	0.004	mg/kg	0.082	0.004 U	0.004 U	
Toluene	0.001	mg/kg	0.13	0.055	0.002	
1,1,1-Trichlorethane	0.001	mg/kg	0.084	0.001 U	0.001 U	
1,1,2-Trichlorethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
Trichloroethene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
Vinyl Chloride	0.001	mg/kg	0.001 U	0.001 U	0.001 U	
Xylene (total)	0.001	mg/kg	0.028	0.38	0.001 U	
<u>Miscellaneous</u>						
Moisture	0.1	percent	15	20	20	
Dilution Factor			1.0	1.0	1.0	

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface.
- (c) The sample was diluted for analysis purposes
- (d) "mg/kg" indicates milligrams per kilogram.
- (e) "U" indicates the compound was not detected.

Prepared by: LH  
Checked by: ELR

Table 2-2  
TCL Volatile Organic Compound Results for Surface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

AOC-3 Drum Storage Area						
Sample ID, Interval and Collection Date						
Parameters	MDL <sup>(a)</sup>	Units	BRL-SS-SB1-0002 SB-1 0-2 <sup>(b)</sup> 09/29/94	BRL-SS-SB2-0002 SB-2 0-2 10/05/94	BRL-SS-MW6-0002 MW-6 0-2 09/27/94	BRL-SS-MW7-0002 MW-7 0-2 09/27/94
<b>Target Compound List</b>						
<b><u>Volatile Organic Compounds</u></b>						
Acetone	0.003	mg/kg <sup>(d)</sup>	0.21	0.069	0.17	0.40
Benzene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Bromodichloromethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Bromomethane	0.002	mg/kg	0.002 U	0.002 U	0.002 U	0.002 U
Bromoform	0.002	mg/kg	0.002 U	0.002 U	0.002 U	0.002 U
2-Butanone	0.002	mg/kg	0.002 U	0.002 U	0.002 U	0.002 U
Carbon Disulfide	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Carbon Tetrachloride	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Chlorobenzene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Chloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Chloroform	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Chloromethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Dibromochloromethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloroethene (total)	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloropropane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
cis-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
trans-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Ethylbenzene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
2-Hexanone	0.002	mg/kg	0.002 U	0.002 U	0.002 U	0.002 U

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface.
- (c) The sample was diluted for analysis purposes
- (d) "mg/kg" indicates milligrams per kilogram.
- (e) "U" indicates the compound was not detected.

Prepared by: LH  
checked by: ELR

Table 2-2  
TCL Volatile Organic Compound Results for Surface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

		AOC-3 Drum Storage Area				
		Sample ID, Interval and Collection Date				
Parameters	MDL <sup>(a)</sup>	Units	BRL-SS-SB1-0002	BRL-SS-SB2-0002	BRL-SS-MW6-0002	BRL-SS-MW7-0002
			SB-1 0-2 <sup>(b)</sup> 09/29/94	SB-2 0-2 10/05/94	MW-6 0-2 09/27/94	MW-7 0-2 09/27/94
<u>Target Compound List</u>						
<u>Volatile Organic Compounds</u>						
<u>(continued)</u>						
Methylene Chloride	0.001	mg/kg	0.072	0.17	0.14	0.16
4-Methyl-2-Pentanone	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Styrene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2,2-Tetrachloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Tetrachloroethene	0.004	mg/kg	0.004 U	0.004 U	0.004 U	0.004 U
Toluene	0.001	mg/kg	0.003	0.003	0.073	0.007
1,1,1-Trichloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2-Trichloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Trichloroethene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Vinyl Chloride	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Xylene (total)	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
<u>Miscellaneous</u>						
Moisture	0.1	percent	15	27	13	19
Dilution Factor			1.0	1.0	1.0	1.0

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface.
- (c) The sample was diluted for analysis purposes
- (d) "mg/kg" indicates milligrams per kilogram.
- (e) "U" indicates the compound was not detected.

Prepared by: LH  
Checked by: ELR

Table 2-2  
 TCL Volatile Organic Compound Results for Surface Soil Samples  
 RCRA Facility Investigation  
 AlliedSignal, Inc. Buffalo Research Laboratory  
 Buffalo, New York

Parameters	MDL <sup>(a)</sup>	Units	AOC-3 Drum Storage Area	Outside of Operations Area
			Sample ID, Interval and Collection Date	
			BRL-SS-MW8-0002 MW-8 0-2 <sup>(a)</sup> 10/03/94	BRL-SS-MW-10-0002 MW-10 0-2 09/28/94
<u>Target Compound List</u>				
<u>Volatile Organic Compounds</u>				
Acetone	0.003	mg/kg <sup>(d)</sup>	0.40	0.27
Benzene	0.001	mg/kg	0.001 U	0.003
Bromodichloromethane	0.001	mg/kg	0.001 U	0.001 U
Bromomethane	0.002	mg/kg	0.002 U	0.002 U
Bromoform	0.002	mg/kg	0.002 U	0.002 U
2-Butanone	0.002	mg/kg	0.12	0.002 U
Carbon Disulfide	0.001	mg/kg	0.001 U	0.001 U
Carbon Tetrachloride	0.001	mg/kg	0.001 U	0.001 U
Chlorobenzene	0.001	mg/kg	0.001 U	0.001 U
Chloroethane	0.001	mg/kg	0.001 U	0.001 U
Chloroform	0.001	mg/kg	0.001 U	0.001 U
Chloromethane	0.001	mg/kg	0.001 U	0.001 U
Dibromochloromethane	0.001	mg/kg	0.001 U	0.001 U
1,1-Dichloroethane	0.001	mg/kg	0.001 U	0.001 U
1,2-Dichloroethane	0.001	mg/kg	0.001 U	0.001 U
1,1-Dichloroethene	0.001	mg/kg	0.001 U	0.001 U
1,2-Dichloroethene (total)	0.001	mg/kg	0.001 U	0.001 U
1,2-Dichloropropane	0.001	mg/kg	0.001 U	0.001 U
cis-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.001 U
trans-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.001 U
Ethylbenzene	0.001	mg/kg	0.001 U	0.001 U

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface.
- (c) The sample was diluted for analysis purposes
- (d) "mg/kg" indicates milligrams per kilogram.
- (e) "U" indicates the compound was not detected.

Prepared by: LH  
 checked by: ELR

Table 2-2  
 TCL Volatile Organic Compound Results for Surface Soil Samples  
 RCRA Facility Investigation  
 AlliedSignal, Inc. Buffalo Research Laboratory  
 Buffalo, New York

Parameters	MDL <sup>(a)</sup>	Units	AOC-3 Drum Storage Area	Outside of Operations Area
			Sample ID, Interval and Collection Date	
			BRL-SS-MW8-0002 MW-8 0-2 <sup>(b)</sup> 10/03/94	BRL-SS-MW-10-0002 MW-10 0-2 09/28/94
<b><u>Target Compound List</u></b> <b><u>Volatile Organic</u></b> <b><u>Compounds</u></b> <b><u>(continued)</u></b>				
2-Hexanone	0.002	mg/kg	0.002 U	0.002 U
Methylene Chloride	0.001	mg/kg	0.25	0.18
4-Methyl-2-Pentanone	0.001	mg/kg	0.001 U	0.001 U
Styrene	0.001	mg/kg	0.001 U	0.001 U
1,1,2,2-Tetrachloroethane	0.001	mg/kg	0.001 U	0.001 U
Tetrachloroethene	0.004	mg/kg	0.004 U	0.004 U
Toluene	0.001	mg/kg	0.001 U	0.019
1,1,1-Trichlorethane	0.001	mg/kg	0.001 U	0.001 U
1,1,2-Trichlorethane	0.001	mg/kg	0.001 U	0.001 U
Trichloroethene	0.001	mg/kg	0.001 U	0.001 U
Vinyl Chloride	0.001	mg/kg	0.001 U	0.001 U
Xylene (total)	0.001	mg/kg	0.001 U	0.011
<b><u>Miscellaneous</u></b>				
Moisture	0.1	percent	21	25
Dilution Factor			1.0	1.0

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface.
- (c) The sample was diluted for analysis purposes
- (d) "mg/kg" indicates milligrams per kilogram.
- (e) "U" indicates the compound was not detected.

Prepared by: LH  
 Checked by: AR



Table 2-3  
**Applicable Soil and Sediment Action Levels and Recommended Soil Cleanup Objectives**  
 RCRA Facility Investigation  
 AlliedSignal, Inc. Buffalo Research Laboratory  
 Buffalo, New York

Parameters	New York State Soil/Sediment Action Level <sup>(a)</sup> (mg/kg) <sup>(b)</sup>	Eastern USA Background (mg/kg)	Cleanup Objectives <sup>(c)</sup> (mg/kg)
<b>INORGANICS</b>			
Arsenic	24	3-12	7.5 or site-specific background
Barium	4000	15-600	300 or site-specific background
Cadmium	80	0.1 - 1	site specific background
Chromium (total)	--- <sup>(d)</sup>	1.5-40	10 or site-specific background
Lead	500	200 - 500	site-specific background
Mercury	20	0.001 - 0.2	0.1
Selenium	---	0.1 - 3.9	2 or site specific background
Silver	200	---	site specific background
Cyanide (total) <sup>(e)</sup>	2000	---	---

Parameters	New York State Soil/Sediment Action Level <sup>(a)</sup> (mg/kg) <sup>(c)</sup>	New York State Soil Cleanup Values Protective of Groundwater Quality <sup>(f)</sup> (mg/kg)	U.S. EPA Health Based Soil Cleanup Objectives <sup>(g)</sup> (mg/kg)
<b>TARGET COMPOUND LIST</b>			
<b>VOLATILE ORGANIC COMPOUNDS</b>			
Acetone	8000	0.11	0.2
Benzene	24	0.06	0.06
Bromodichloromethane	5.4	---	--
Bromomethane	80	---	--
Bromoform	89	---	--
2-Butanone	4000	0.3	0.3
Carbon Disulfide	8000	2.7	2.7
Carbon Tetrachloride	5.4	0.6	0.6
Chlorobenzene	2000	1.7	1.7
Chloroethane	540	1.9	1.9
Chloroform	110	0.3	0.3
Chloromethane	--	--	--
Dibromochloromethane	8.3	--	--
1,1-Dichloroethane	8000	0.2	0.2
1,2-Dichloroethane	7.7	0.1	0.1
1,1-Dichloroethene	--	0.4	0.4
1,2-Dichloroethene (total)	--	--	--
1,2-Dichloropropane	10	--	--
cis-1,3-Dichloropropene	--	--	--
trans-1,3-Dichloropropene	--	--	--
Ethylbenzene	8000	5.5	5.5
2-Hexanone	--	--	--
Methylene Chloride	93	0.1	0.1
4-Methyl-2-Pentanone	4000	1	1
Styrene	23	--	--

NOTES:

- (a) As defined in NYSDEC TAGM #3028.
- (b) "mg/kg" indicates milligrams per kilogram.
- (c) Recommended objectives are average background concentrations as reported in a 1984 survey of referenced material by E. Carol McGovern, NYSDEC, and as presented in TAGM #4060.
- (d) "--" indicates a concentration has not been defined.
- (e) Site-specific forms of cyanide are to be taken into consideration when establishing soil cleanup objectives.
- (f) As defined in NYSDEC TAGM #4046.
- (g) As defined in NYSDEC TAGM #4046. TAGM #4046 also requires the Total VOCs <10 mg/kg.

Prepared by:     LH      
 Checked by:     ELR

Table 2-3  
**Applicable Soil and Sediment Action Levels and Recommended Soil Cleanup Objectives**  
 RCRA Facility Investigation  
 AlliedSignal, Inc. Buffalo Research Laboratory  
 Buffalo, New York

Parameters	New York State Soil/Sediment Action Level <sup>(a)</sup> (mg/kg) <sup>(c)</sup>	New York State Soil Cleanup Values Protective of Groundwater Quality <sup>(f)</sup> (mg/kg)	U.S. EPA Health Based Soil Cleanup Objectives <sup>(b)</sup> (mg/kg)
<b><u>TARGET COMPOUND LIST</u></b>			
<b><u>VOLATILE ORGANIC</u></b>			
<b><u>COMPOUNDS</u></b>			
<b><u>(continued)</u></b>			
1,1,2,2-Tetrachloroethane	35	0.6	0.6
Tetrachloroethene	--	1.4	1.4
Toluene	20000	1.5	1.5
1,1,1-Trichloroethane	7000	0.76	0.8
1,1,2-Trichloroethane	120	--	--
Trichloroethene	64	0.7	0.7
Vinyl Chloride	0.36	0.12	0.2
Xylene (total)	200000	1.2	1.2

NOTES:

- (a) As defined in NYSDEC TAGM #3028.
- (b) "mg/kg" indicates milligrams per kilogram.
- (c) Recommended objectives are average background concentrations as reported in a 1984 survey of referenced material by E. Carol McGovern, NYSDEC, and as presented in TAGM #4060.
- (d) "--" indicates a concentration has not been defined.
- (e) Site-specific forms of cyanide are to be taken into consideration when establishing soil cleanup objectives.
- (f) As defined in NYSDEC TAGM #4046.
- (g) As defined in NYSDEC TAGM #4046. TAGM #4046 also requires the Total VOCs <10 mg/kg.

Prepared by:     LH      
 Checked by:     ER

Table 2-4  
 Inorganic Results for Subsurface Soil Samples  
 RCRA Facility Investigation  
 AlliedSignal, Inc. Buffalo Research Laboratory  
 Buffalo, New York

		Solid Waste Management Unit				
		Sample ID, Interval and Collection Date				
Parameters	MDL <sup>(a)</sup>	Units	BRL-SB-MW1-0810 MW-1 8-10 <sup>(b)</sup> 09/26/94	BRL-SB-MW2-0810 MW-2 8-10 09/29/94	BRL-SB-MW2-0810D MW-2 8-10 (duplicate) 09/29/94	BRL-SB-MW3-0810 MW-3 8-10 09/29/94
<b><u>INORGANICS</u></b>						
Arsenic	0.5	mg/kg <sup>(c)</sup>	7.4 J <sup>(d)</sup>	13 J	7.3 J	4.7 J
Barium	0.1	mg/kg	90.3 J	88.6 J	87.5 J	81.5 J
Cadmium	0.2	mg/kg	0.8	0.6	0.5	0.2
Chromium (total)	5	mg/kg	24	23	25	19
Lead	10	mg/kg	14 J	15 J	14 J	14 J
Mercury	0.04	mg/kg	0.04 U <sup>(e)</sup>	0.04 U	0.04 U	0.04 J
Selenium	0.2	mg/kg	1.4	1.0 U	4.2	1 U
Silver	0.5	mg/kg	2.1 J	0.8 J	2.4 J	0.9 J
Cyanide (total)	0.010	mg/kg	0.05 U	0.06 U	0.065 U	0.05 U
<b><u>MISCELLANEOUS</u></b>						
Moisture content	0.1	percent	22	23	22	18
Cation Exchange Capacity	1	meq/100g <sup>(f)</sup>	-- <sup>(g)</sup>	19	14	--
Total Organic Carbon	500	mg/kg	--	12000	7400	--

NOTES:

- (a) "MDL" indicates Method Detection Limit.
- (b) Sample interval is expressed in feet below ground surface.
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "J" indicates the value is estimated.
- (e) "U" indicates the compound was not detected.
- (f) "meq/100g" indicates milliequivalents per 100 grams.
- (g) "--" indicates not analyzed.

Prepared by: LH  
 Checked by: ELR

Table 2-4  
 Inorganic Results for Subsurface Soil Samples  
 RCRA Facility Investigation  
 AlliedSignal, Inc. Buffalo Research Laboratory  
 Buffalo, New York

Parameters	MDL <sup>(a)</sup>	Units	Solid Waste Management Unit	AOC-1 -Storm Sewer System	AOC-2 - Activated Carbon System	
			Sample ID, Interval and Collection Date			
			BRL-SB-SB3-0810 SB3 8-10 09/29/94	BRL-SB-MW4-0810 MW-4 8-10 10/04/94	BRL-SB-MW5-0810 MW-5 8-10 10/04/94	BRL-SB-MW9-0810 MW-9 8-10 10/04/94
<b><u>INORGANICS</u></b>						
Arsenic	0.5	mg/kg <sup>(c)</sup>	7.5 J	9.9 J	8.2 J	7.0 J
Barium	0.1	mg/kg	90.9 J	125 J	79.3 J	85.5 J
Cadmium	0.2	mg/kg	8.4	0.8	1.2	0.5
Chromium (total)	5	mg/kg	158	22	19	42
Lead	10	mg/kg	211 J	20 U	45 J	15 J
Mercury	0.04	mg/kg	0.04U	0.04 U	3.2 J	0.04 U
Selenium	0.2	mg/kg	1 U	1 U	1 U	1 U
Silver	0.5	mg/kg	0.7 J	0.7	2.6 J	0.5 U
Cyanide (total)	0.010	mg/kg	0.05 U	0.05 U	0.05 U	0.05 U
<b><u>MISCELLANEOUS</u></b>						
Moisture content	0.1	percent	20	23	21	24
Cation Exchange Capacity	1	meq/100g <sup>(f)</sup>	15	--	--	--
Total Organic Carbon	500	mg/kg	7700	--	--	--

NOTES:

- (a) "MDL" indicates Method Detection Limit.
- (b) Sample interval is expressed in feet below ground surface.
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "J" indicates the value is estimated.
- (e) "U" indicates the compound was not detected.
- (f) "meq/100g" indicates milliequivalents per 100 grams.
- (g) "--" indicates not analyzed.

Prepared by: LH  
 Checked by: ELR

Table 2-4  
 Inorganic Results for Subsurface Soil Samples  
 RCRA Facility Investigation  
 AlliedSignal, Inc. Buffalo Research Laboratory  
 Buffalo, New York

			AOC-3 - Drum Storage Area				Outside of Operations Area
			Sample ID, Interval and Collection Date				
Parameters	MDL <sup>(a)</sup>	Units	BRL-SB-SB1-0810 SB1 8-10 09/29/94	BRL-SB-MW6-0810 MW-6 8-10 09/27/94	BRL-SB-MW7-0810 MW-7 8-10 09/27/94	BRL-SB-MW8-0810 MW-8 8-10 10/03/94	BRL-SB-MW10-0810 MW-10 8-10 09/28/94
<b><u>INORGANICS</u></b>							
Arsenic	0.5	mg/kg <sup>(c)</sup>	4.4 J	8.3 J	15.6 J	4.3 J	7.2 J
Barium	0.1	mg/kg	68.1 J	90.8 J	83.5 J	97.7 J	101 J
Cadmium	0.2	mg/kg	0.6	0.64	0.5	0.5	0.2
Chromium (total)	5	mg/kg	24	17.6	24	23	21
Lead	10	mg/kg	19 J	14.4 J	13 J	21 J	19 J
Mercury	0.04	mg/kg	0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
Selenium	0.2	mg/kg	1 U	1.3	3.4	1 U	1 U
Silver	0.5	mg/kg	0.60 J	1.4 J	0.56 J	0.90 J	1.6 J
Cyanide (total)	0.010	mg/kg	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
<b><u>MISCELLANEOUS</u></b>							
Moisture content	0.1	percent	22	22	19	22	23
Cation Exchange Capacity	1	meq/100g <sup>(f)</sup>	19	--	--	--	--
Total Organic Carbon	500	mg/kg	7100	--	--	--	--

NOTES:

- (a) "MDL" indicates Method Detection Limit.
- (b) Sample interval is expressed in feet below ground surface.
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "J" indicates the value is estimated.
- (e) "U" indicates the compound was not detected.
- (f) "meq/100g" indicates milliequivalents per 100 grams.
- (g) "--" indicates not analyzed.

Prepared by: LH  
 Checked by: ER

Table 2-5  
TCL Volatile Organic Compound Results for Subsurface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

		Solid Waste Management Unit				
		Sample ID, Interval and Collection Date				
Parameters	MCL <sup>(a)</sup>	Units	BRL-SB-MW1-0810	BRL-SB-MW2-0810	BRL-SB-MW3-0810	BRL-SB-SB3-0810
			MW-1 8-10 <sup>(b)</sup> 09/26/94	MW-2 8-10 09/29/94	MW-3 8-10 09/29/94	SB-3 8-10 09/29/94
<b>Target Compound List</b>						
<b>Volatile Organic Compounds</b>						
Acetone	0.003	mg/kg <sup>(c)</sup>	2.1	0.22	0.62	0.15
Benzene	0.001	mg/kg	0.005 U <sup>(d)</sup>	0.001 U	0.001 U	0.001 U
Bromodichloromethane	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
Bromomethane	0.002	mg/kg	0.01 U	0.001 U	0.002 U	0.002 U
Bromoform	0.002	mg/kg	0.01 U	0.001 U	0.002 U	0.002 U
2-Butanone	0.002	mg/kg	0.005 U	0.001 U	0.002 U	0.002 U
Carbon Disulfide	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
Carbon Tetrachloride	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
Chlorobenzene	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
Chloroethane	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
Chloroform	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
Chloromethane	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
Dibromochloromethane	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethane	0.001	mg/kg	0.005 U	0.001 U	0.009	0.001 U
1,2-Dichloroethane	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethene	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
1,2-Dichloroethene (total)	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
1,2-Dichloropropane	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
cis-1,3-Dichloropropene	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
trans-1,3-Dichloropropene	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
Ethylbenzene	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
2-Hexanone	0.002	mg/kg	0.01 U	0.002 U	0.002 U	0.002 U
Methylene Chloride	0.001	mg/kg	0.69	0.059	0.15	0.064

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface.
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "U" indicates the compound was not detected.

Prepared by: LIA  
Checked by: EUR

Table 2-5  
TCL Volatile Organic Compound Results for Subsurface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

Solid Waste Management Unit						
Sample ID, Interval and Collection Date						
Parameters	MCL <sup>(a)</sup>	Units	BRL-SB-MW1-0810 MW-1 8-10 <sup>(b)</sup> 09/26/94	BRL-SB-MW2-0810 MW-2 8-10 09/29/94	BRL-SB-MW3-0810 MW-3 8-10 09/29/94	BRL-SB-SB3-0810 SB-3 8-10 09/29/94
<u>Target Compound List</u>						
<u>Volatile Organic</u>						
<u>Compounds</u>						
<u>(continued)</u>						
4-Methyl-2-Pentanone	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
Styrene	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
1,1,2,2-Tetrachloroethane	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
Tetrachloroethene	0.004	mg/kg	0.02 U	0.004 U	0.004 U	0.004 U
Toluene	0.001	mg/kg	0.012	0.001	0.005	0.002
1,1,1-Trichloroethane	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
1,1,2-Trichloroethane	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
Trichloroethene	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
Vinyl Chloride	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
Xylene (total)	0.001	mg/kg	0.005 U	0.001 U	0.001 U	0.001 U
<u>Miscellaneous</u>						
Moisture	0.1	percent	22	23	18	20
Dilution Factor			5.0	1.0	1.0	1.0

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface.
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "U" indicates the compound was not detected.

Prepared by: LH  
Checked by: ER

Table 2-5  
TCL Volatile Organic Compound Results for Subsurface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

Parameters	MCL <sup>(a)</sup>	Units	Solid Waste Management Unit	AOC-1 Storm Sewer System	
			Sample ID, Interval and Collection Date		
			BRL-SB-MW4-0810 MW-4 8-10 10/03/94	BRL-SB-MW5-0810 MW-5 8-10 10/04/94	BRL-SB-MW9-0810 MW-9 8-10 10/04/94
<u>Target Compound List</u> <u>Volatile Organic</u> <u>Compounds</u>					
Acetone	0.003	mg/kg <sup>(c)</sup>	0.058	0.11	0.085
Benzene	0.001	mg/kg	0.005	0.001 U	0.001 U
Bromodichloromethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U
Bromomethane	0.002	mg/kg	0.002 U	0.002 U	0.002 U
Bromoform	0.002	mg/kg	0.002 U	0.002 U	0.002 U
2-Butanone	0.002	mg/kg	0.002 U	0.002 U	0.002 U
Carbon Disulfide	0.001	mg/kg	0.001 U	0.001 U	0.001 U
Carbon Tetrachloride	0.001	mg/kg	0.001 U	0.001 U	0.001 U
Chlorobenzene	0.001	mg/kg	0.001 U	0.001 U	0.001 U
Chloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U
Chloroform	0.001	mg/kg	0.001 U	0.001 U	0.001 U
Chloromethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U
Dibromochloromethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U
1,1-Dichloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U
1,2-Dichloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U
1,1-Dichloroethene	0.001	mg/kg	0.001 U	0.001 U	0.001 U
1,2-Dichloroethene (total)	0.001	mg/kg	0.001 U	0.001 U	0.001 U
1,2-Dichloropropane	0.001	mg/kg	0.001 U	0.001 U	0.001 U
cis-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.001 U	0.001 U
trans-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.001 U	0.001 U
Ethylbenzene	0.001	mg/kg	0.001 U	0.001 U	0.001 U
2-Hexanone	0.002	mg/kg	0.002 U	0.002 U	0.002 U

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface..
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "U" indicates the compound was not detected.

Prepared by: LH  
Checked by: Eu



Table 2-5  
TCL Volatile Organic Compound Results for Subsurface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

Parameters	MCL <sup>(a)</sup>	Units	Solid Waste	AOC-1 Storm	
			Management Unit	Sewer System	
			Sample ID, Interval and Collection Date		
			BRL-SB-MW4-0810 MW-4 8-10 10/03/94	BRL-SB-MW5-0810 MW-5 8-10 10/04/94	BRL-SB-MW9-0810 MW-9 8-10 10/04/94
<b><u>Target Compound List</u></b>					
<b><u>Volatile Organic Compounds</u></b>					
<b><u>(continued)</u></b>					
Methylene Chloride	0.001	mg/kg	0.14	0.17	0.16
4-Methyl-2-Pentanone	0.001	mg/kg	0.001 U	0.001 U	0.001 U
Styrene	0.001	mg/kg	0.001 U	0.001 U	0.001 U
1,1,2,2-Tetrachloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U
Tetrachloroethene	0.004	mg/kg	0.004 U	0.004 U	0.004 U
Toluene	0.001	mg/kg	0.002	0.005	0.001
1,1,1-Trichloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U
1,1,2-Trichloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U
Trichloroethene	0.001	mg/kg	0.001 U	0.001 U	0.001 U
Vinyl Chloride	0.001	mg/kg	0.001 U	0.001 U	0.001 U
Xylene (total)	0.001	mg/kg	0.02	0.001 U	0.001 U
<b><u>Miscellaneous</u></b>					
Moisture	0.1	percent	23	21	24
Dilution Factor			1.0	1.0	1.0

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface.
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "U" indicates the compound was not detected.

Prepared by: LH  
Checked by: er

Table 2-5  
TCL Volatile Organic Compound Results for Subsurface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

		AOC-3 Drum Storage Area				
		Sample ID, Interval and Collection Date				
Parameters	MCL <sup>(a)</sup>	Units	BRL-SB-MW9-0810D MW-9 8-10 10/04/94	BRL-SB-SB1-0810 SB-1 8-10 09/29/94	BRL-SB-MW6-0810 MW-6 8-10 09/27/94	BRL-SB-MW7-0810 MW-7 8-10 09/27/94
<u>Target Compound List</u>						
<u>Volatile Organic</u>						
<u>Compounds</u>						
Acetone	0.003	mg/kg <sup>(c)</sup>	0.10	0.20	0.15	0.17
Benzene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Bromodichloromethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Bromomethane	0.002	mg/kg	0.002 U	0.002 U	0.002 U	0.002 U
Bromoform	0.002	mg/kg	0.002 U	0.002 U	0.002 U	0.002 U
2-Butanone	0.002	mg/kg	0.002 U	0.002 U	0.002 U	0.002 U
Carbon Disulfide	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Carbon Tetrachloride	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Chlorobenzene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Chloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Chloroform	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Chloromethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Dibromochloromethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,1-Dichloroethene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloroethene (total)	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,2-Dichloropropane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
cis-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
trans-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Ethylbenzene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
2-Hexanone	0.002	mg/kg	0.002 U	0.002 U	0.002 U	0.002 U

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface..
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "U" indicates the compound was not detected.

Prepared by: CH  
Checked by: CH

Table 2-5  
TCL Volatile Organic Compound Results for Subsurface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

AOC-3 Drum Storage Area						
Sample ID, Interval and Collection Date						
Parameters	MCL <sup>(a)</sup>	Units	BRL-SB-MW9-0810D MW-9 8-10 10/04/94	BRL-SB-SB1-0810 SB-1 8-10 09/29/94	BRL-SB-MW6-0810 MW-6 8-10 09/27/94	BRL-SB-MW7-0810 MW-7 8-10 09/27/94
<u>Target Compound List</u>						
<u>Volatile Organic</u>						
<u>Compounds</u>						
<u>(continued)</u>						
Methylene Chloride	0.001	mg/kg	0.16	0.07	0.099	0.21
4-Methyl-2-Pentanone	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Styrene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2,2-Tetrachloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Tetrachloroethene	0.004	mg/kg	0.004 U	0.004 U	0.004 U	0.004 U
Toluene	0.001	mg/kg	0.003	0.004	0.017	0.007
1,1,1-Trichloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
1,1,2-Trichloroethane	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Trichloroethene	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Vinyl Chloride	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
Xylene (total)	0.001	mg/kg	0.001 U	0.001 U	0.001 U	0.001 U
<u>Miscellaneous</u>						
Moisture	0.1	percent	24	22	22	19
Dilution Factor			1.0	1.0	1.0	1.0

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface..
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "U" indicates the compound was not detected.

Prepared by: LH  
Checked by: ELR

Table 2-5  
TCL Volatile Organic Compound Results for Subsurface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

Parameters	MCL <sup>(a)</sup>	Units	AOC-3 Drum Storage Area	Outside of Operations Area
			Sample ID, Interval and Collection Date	
			BRL-SB-MW8-0810 MW-8 8-10 <sup>(b)</sup> 10/03/94	BRL-SB-MW-10-0810 MW-10 8-10 09/28/94
<u>Target Compound List</u> <u>Volatile Organic</u> <u>Compounds</u>				
Acetone	0.003	mg/kg <sup>(c)</sup>	0.10	0.81
Benzene	0.001	mg/kg	0.03	0.0010
Bromodichloromethane	0.001	mg/kg	0.001 U	0.001 U
Bromomethane	0.002	mg/kg	0.002 U	0.002 U
Bromoform	0.002	mg/kg	0.002 U	0.002 U
2-Butanone	0.002	mg/kg	0.002 U	0.002 U
Carbon Disulfide	0.001	mg/kg	0.001 U	0.001 U
Carbon Tetrachloride	0.001	mg/kg	0.001 U	0.001 U
Chlorobenzene	0.001	mg/kg	0.001 U	0.001 U
Chloroethane	0.001	mg/kg	0.001 U	0.001 U
Chloroform	0.001	mg/kg	0.001 U	0.001 U
Chloromethane	0.001	mg/kg	0.001 U	0.001 U
Dibromochloromethane	0.001	mg/kg	0.001 U	0.001 U
1,1-Dichloroethane	0.001	mg/kg	0.001 U	0.001 U
1,2-Dichloroethane	0.001	mg/kg	0.001 U	0.001 U
1,1-Dichloroethene	0.001	mg/kg	0.001 U	0.001 U
1,2-Dichloroethene (total)	0.001	mg/kg	0.001 U	0.001 U
1,2-Dichloropropane	0.001	mg/kg	0.001 U	0.001 U
cis-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.001 U
trans-1,3-Dichloropropene	0.001	mg/kg	0.001 U	0.001 U
Ethylbenzene	0.001	mg/kg	0.001 U	0.001 U

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface.
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "U" indicates the compound was not detected.

Prepared by: LH  
Checked by: er

Table 2-5  
TCL Volatile Organic Compound Results for Subsurface Soil Samples  
RCRA Facility Investigation  
AlliedSignal, Inc. Buffalo Research Laboratory  
Buffalo, New York

Parameters	MCL <sup>(a)</sup>	Units	AOC-3 Drum Storage Area	Outside of Operations Area
			Sample ID, Interval and Collection Date	
			BRL-SB-MW8-0810 MW-8 8-10 <sup>(b)</sup> 10/03/94	BRL-SB-MW-10-0810 MW-10 8-10 09/28/94
<u>Target Compound List</u> <u>Volatile Organic</u> <u>Compounds</u> <u>(continued)</u>				
2-Hexanone	0.002	mg/kg	0.002 U	0.002 U
Methylene Chloride	0.001	mg/kg	0.12	0.20
4-Methyl-2-Pentanone	0.001	mg/kg	0.001 U	0.001 U
Styrene	0.001	mg/kg	0.001 U	0.001 U
1,1,2,2-Tetrachloroethane	0.001	mg/kg	0.001 U	0.001 U
Tetrachloroethene	0.004	mg/kg	0.004 U	0.004 U
Toluene	0.001	mg/kg	0.007	0.009
1,1,1-Trichlorethane	0.001	mg/kg	0.001 U	0.001 U
1,1,2-Trichlorethane	0.001	mg/kg	0.001 U	0.001 U
Trichloroethene	0.001	mg/kg	0.001 U	0.001 U
Vinyl Chloride	0.001	mg/kg	0.001 U	0.001 U
Xylene (total)	0.001	mg/kg	0.001 U	0.001 U
<u>Miscellaneous</u>				
Moisture	0.1	percent	22	23
Dilution Factor			1.0	1.0

NOTES:

- (a) "MDL" indicates Method Detection Limit
- (b) Sample interval is expressed in feet below ground surface..
- (c) "mg/kg" indicates milligrams per kilogram.
- (d) "U" indicates the compound was not detected.

Prepared by: LH  
Checked by: EUR

Table 2-6  
 Potentiometric Surface Elevation Data  
 RCRA Facility Investigation  
 AlliedSignal Inc., Buffalo Research Laboratory  
 Buffalo, New York

Well Identification	TOC <sup>(a)</sup> Elevation (ft-msl) <sup>(b)</sup>	October 17, 1994		November 8, 1994		November 15, 1994		January 17, 1995	
		Depth to Water (feet)	Groundwater Elevation (ft-msl)	Depth to Water (feet)	Groundwater Elevation (ft-msl)	Depth to Water (feet)	Groundwater Elevation (ft-msl)	Depth to Water (feet)	Groundwater Elevation (ft-msl)
MW-1	585.69	3.26	582.43	5.04	580.65	3.59	582.10	2.55	583.14
MW-2	587.32	5.09	582.23	4.38	582.94	4.73	582.59	4.43	582.89
MW-3	587.55	5.41	582.14	5.13	582.42	5.30	582.25	5.20	582.35
MW-4	583.87	3.18	580.69	4.30	579.57	2.96	580.91	2.86	581.01
MW-5	583.47	4.96	578.51	4.65	578.82	4.76	578.71	4.77	578.70
MW-6	585.22	2.68	582.54	2.49	582.73	2.55	582.67	2.54	582.68
MW-7	585.42	3.71	581.71	3.36	582.06	3.62	581.80	3.38	582.04
MW-8	587.94	5.55	582.39	5.40	582.54	5.53	582.41	5.82	582.12
MW-9	584.48	2.39	582.09	1.83	582.65	2.09	582.39	2.02	582.46
MW-10	587.85	5.31	582.54	3.44	584.41	3.98	583.87	3.40	584.45

NOTES:

- (a) "TOC" indicates the marked top of well casing (riser) or top-of-casing.  
 (b) "ft-msl" indicates feet above mean sea level.

Prepared by: LH  
 Checked by: ELR

Table 2-7  
 Aquifer Characteristics  
 RCRA Facility Investigation  
 AlliedSignal, Inc. Buffalo Research Laboratory  
 Buffalo, New York

Monitoring Well	Transmissivity (ft <sup>2</sup> /sec) <sup>(b)</sup>	Hydraulic Conductivity <sup>(a)</sup> (cm/sec) <sup>(c)</sup>	Storativity
MW-1	2.8E-09	3.5E-09	1.0E-02
MW-2	1.1E-06	1.4E-06	1.0E-03
MW-3	--(d)	--	--
MW-4	1.5E-05	1.9E-05	1.0E-09
MW-5	1.1E-06	1.4E-06	1.0E-03
MW-6	2.6E-06	3.2E-06	1.0E-03
MW-7	--	--	--
MW-8	--	--	--
MW-9	8.7E-07	1.1E-06	1.0E-03
MW-10	1.2E-06	1.0E-05	

NOTES:

- (a) Values of hydraulic conductivity were calculated from slug tests using the Cooper et. al. method.
- (b) "ft<sup>2</sup>/sec" indicates square feet per second.
- (c) "cm/sec" indicates centimeters per second.
- (d) "--" indicates the analysis was not performed because well construction altered the test performance.

Prepared by:     LH      
 Checked by:     ELR

Table 2-8  
 Inorganic Results for Groundwater Samples  
 RCRA Facility Investigation  
 AlliedSignal Inc., Buffalo Research Laboratory  
 Buffalo, New York

Parameters	Units	Solid Waste Management Unit						AOC-1 Storm Sewer System	
		BRL-MW1-1094 MW-1 10/17/94	BRL-MW1-0195 MW-1 01/18/95	BRL-MW2-1094 MW-2 10/17/94	BRL-MW2-0195 MW-2 01/18/95	BRL-MW3-1094 MW-3 10/17/94	BRL-MW3-0195 MW-3 01/18/95	BRL-MW4-1094 MW-4 10/17/94	BRL-MW4-1094D <sup>(i)</sup> MW-4 10/17/94
<b>INORGANICS</b>									
Arsenic	mg/l <sup>(a)</sup>	0.003 B <sup>(b)</sup>	0.0025 U <sup>(c)</sup>	0.002 U	0.0029 B	0.002 U	0.003 B	0.002 U	0.002 U
Barium	mg/l	0.102 B	0.0676	0.197 B	0.157 B	0.111 B	0.129 B	0.183 B	0.179 B
Cadmium	mg/l	0.002 U	0.001 U	0.002 U	0.0010 B	0.002 U	0.0010 U	0.002 U	0.002 U
Chromium (total)	mg/l	0.004 U	0.0014 J <sup>(d)</sup>	0.004 U	0.0010 U	0.004 U	0.0010 U	0.004 U	0.004 U
Lead	mg/l	0.022 U	0.0040 J	0.022 U	0.0040 J	0.022 U	0.0028 J	0.022 U	0.022 U
Mercury	mg/l	0.00005 U	0.0001 U	0.00005 U	0.0001 U	0.00005 U	0.0001 U	0.00005 U	0.00005 U
Selenium	mg/l	0.002 U	0.0036 U	0.002 U	0.0036 U	0.005 B	0.0036 U	0.002 U	0.003 B
Silver	mg/l	R <sup>(e)</sup>	0.0023 UJ <sup>(f)</sup>	R	0.0023 UJ	0.026 J	0.0023 UJ	R	R
Cyanide (total)	mg/l	0.002 U	0.0050 U	0.002 U	0.0050 U	0.002 B	0.0050 U	0.002 U	0.002 U
<b>MISCELLANEOUS</b>									
pH		7.24	7.00	7.36	7.10	7.24	7.20	7.46	7.52
Conductivity	umhos/cm <sup>(g)</sup>	2000	2070	1200	1180	1600	1450	1200	1200
Field pH		7.1	6.5	7.0	7.7	7.0	7.9	7.1	7.1
Field Conductivity	umhos/cm	970	2190	1070	1450	1220	1900	1180	1180
Turbidity	NTU <sup>(h)</sup>	3.8	39	2.8	38	2.97	36	4.19	4.19

NOTES:

- (a) "mg/l" indicates milligrams per liter.
- (b) "B" indicates compound was detected in a blank.
- (c) "U" indicates the compound was not detected.
- (d) "J" indicates the value is estimated.
- (e) "R" indicates the result is rejected and unusable.
- (f) "UJ" indicates the reported quantitation limit is qualified as estimated.
- (g) "umhos/cm" indicates micro mhos per centimeter.
- (h) "NTU" indicates nephelometric units of turbidity.
- (i) "D" indicates duplicate sample.
- (j) "--" indicates analysis not conducted.

Prepared by: LH  
 Checked by: ELR



Table 2-8  
 Inorganic Results for Groundwater Samples  
 RCRA Facility Investigation  
 AlliedSignal Inc., Buffalo Research Laboratory  
 Buffalo, New York

Parameters	Units	AOC-1 Storm Sewer System				AOC 3 Drum Storage Area			
		BRL-MW4-0195 MW-4 01/18/95	BRL-MW4-0195D MW-4 01/18/95	BRL-MW5-1094 MW-5 10/17/94	BRL-MW5-0195 MW-5 01/18/95	BRL-MW6-1094 MW-6 10/17/94	BRL-MW6-0195 MW-6 01/18/95	BRL-MW7-1094 MW-7 10/17/94	BRL-MW7-0195 MW-7 01/18/95
<b><u>INORGANICS</u></b>									
Arsenic	mg/l	0.0025 U	0.0056 B	0.002 U	0.0025 U	0.002 U	0.0025 U	0.002 U	0.0027 B
Barium	mg/l	0.243	0.238	0.071 B	0.074 B	0.084 B	0.0615 B	0.176 B	0.204
Cadmium	mg/l	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.002 U	0.0010 U	0.002 U	0.0294
Chromium (total)	mg/l	0.0010 U	0.0010 U	0.004 U	0.0010 U	0.004 U	0.0011 J	0.004 U	0.0010
Lead	mg/l	0.0012 U	0.0041 J	0.022 U	0.0057 J	0.022 U	0.0046 J	0.022 U	0.0062 J
Mercury	mg/l	0.0001 U	0.0001 U	0.00005 U	0.0001 U	0.00005 U	0.0001 U	0.00005 U	0.0001 U
Selenium	mg/l	0.0036 U	0.0036 U	0.002 U	0.0036 U	0.003 B	0.0036 U	0.002 U	0.0036 U
Silver	mg/l	0.0023 UJ	0.0023 UJ	R	0.0023 UJ	R	0.0023 UJ	R	0.0023 UJ
Cyanide (total)	mg/l	0.0050 U	0.0050 U	0.002 U	0.0050 U	0.002 U	0.0050 U	0.002 U	0.0050 U
<b><u>MISCELLANEOUS</u></b>									
pH		7.80	7.30	7.53	7.60	7.45	7.30	7.30	6.70
Conductivity	umhos/cm	1020	1020	1300	1180	1400	1000	1400	1320
Field pH		7.9	7.9	7.1	7.0	7.8	7.8	6.3	6.8
Field Conductivity	umhos/cm	4430	4430	1170	1190	900	1080	950	990
Turbidity	NTU	27	27	2.99	15	3.21	27	5.31	15

NOTES:

- (a) "mg/l" indicates milligrams per liter.
- (b) "B" indicates compound was detected in a blank.
- (c) "U" indicates the compound was not detected.
- (d) "J" indicates the value is estimated.
- (e) "R" indicates the result is rejected and unusable.
- (f) "UJ" indicates the reported quantitation limit is qualified as estimated.
- (g) "umhos/cm" indicates micro mhos per centimeter.
- (h) "NTU" indicates nephelometric units of turbidity.
- (i) "D" indicates duplicate sample.
- (j) "--" indicates analysis not conducted.

Prepared by: LA  
 Checked by: ELR

Table 2-8  
 Inorganic Results for Groundwater Samples  
 RCRA Facility Investigation  
 AlliedSignal Inc., Buffalo Research Laboratory  
 Buffalo, New York

Parameters	Units	AOC 3 Drum Storage Area		AOC 2 ACTIVATED CARBON SYSTEM		BACKGROUND		EQUIPMENT BLANKS	
		BRL-MW8-1094 MW-8 10/17/94	BRL-MW8-0195 MW-8 01/18/95	BRL-MW9-1094 MW-9 10/17/94	BRL-MW9-0195 MW-9 01/18/95	BRL-MW10-1094 MW-10 10/17/94	BRL-MW10-0195 MW-10 01/18/95	BRL-BB-EB 1094 BB-EB 10/18/94	BRL-BB-EB 0195 BB-EB 01/18/95
<b><u>INORGANICS</u></b>									
Arsenic	mg/l	0.002 U	0.0025 U	0.002 U	0.0025 U	0.004 B	0.0025 U	0.002 U	0.0025 U
Barium	mg/l	0.09 B	0.0772 B	0.149 B	0.134 B	0.033 B	0.0223 B	0.001 U	0.001 U
Cadmium	mg/l	0.002 U	0.0010 U	0.002 U	0.0010 U	0.002 U	0.0010 U	0.002 U	0.001 U
Chromium (total)	mg/l	0.004 U	0.0014 J	0.004 U	0.0010 U	0.004 U	0.0176 J	0.004 U	0.001 U
Lead	mg/l	0.022 U	0.0012 U	0.022 U	0.0012 U	0.022 U	0.0012 U	0.022 U	0.0514 J
Mercury	mg/l	0.00005 U	0.0001 U	0.00005 U	0.0001 U	0.00005 U	0.0001 U	0.00005 U	0.0001 U
Selenium	mg/l	0.002 U	0.0036 U	0.002 B	0.0036 U	0.002 U	0.0036 U	0.002 U	0.0036 U
Silver	mg/l	R	0.0023 UJ	R	0.0023 UJ	R	0.0023 UJ	R	0.0023 UJ
Cyanide (total)	mg/l	0.002 U	0.0050 U	0.002 U	0.0050 U	0.002 U	0.0050 U	0.002 U	0.005 U
<b><u>MISCELLANEOUS</u></b>									
pH		7.61	7.30	7.47	7.00	7.13	6.90	-- (f)	--
Conductivity	umhos/cm	880	971	1500	1580	2900	3210	--	--
Field pH		7.7	7.6	6.9	6.8	6.67	6.27	--	--
Field Conductivity	umhos/cm	1080	1090	1010	990	1020	3480	--	--
Turbidity	NTU	4.71	14	3.54	16	4.7	38	--	--

NOTES:

- (a) "mg/l" indicates milligrams per liter.
- (b) "B" indicates compound was detected in a blank.
- (c) "U" indicates the compound was not detected.
- (d) "J" indicates the value is estimated.
- (e) "R" indicates the result is rejected and unusable.
- (f) "UJ" indicates the reported quantitation limit is qualified as estimated.
- (g) "umhos/cm" indicates micro mhos per centimeter.
- (h) "NTU" indicates nephelometric units of turbidity.
- (i) "D" indicates duplicate sample.
- (j) "--" indicates analysis not conducted.

Prepared by: LA  
 Checked by: EUR

**Table 2-9**  
**Target Compound List Volatile Organic Compound Results for Groundwater Samples**  
**RCRA Facility Investigation**  
**AlliedSignal Inc., Buffalo Research Laboratory, Buffalo, New York**

Parameters	Units	Solid Waste Management Unit						AOC-1 Storm Sewer System	
		BRL-MW1-1094	BRL-MW1-0195	BRL-MW2-1094	BRL-MW2-0195	BRL-MW3-1094	BRL-MW3-0195	BRL-MW4-1094	BRL-MW4-1094D <sup>(d)</sup>
		MW-1 10/17/94	MW-1 01/18/95	MW-2 10/17/94	MW-2 01/18/95	MW-3 10/17/94	MW-3 01/18/95	MW-4 10/17/94	MW-4 10/17/94
Acetone	µg/L <sup>(a)</sup>	12	10 U <sup>(b)</sup>	11	6 J <sup>(c)</sup>	7	59	6	6
Benzene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
Bromodichloromethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
Bromomethane	µg/L	2 U	10 U	2 U	10 U	2 U	10 U	2 U	2 U
Bromoform	µg/L	2 U	10 U	2 U	10 U	2 U	10 U	2 U	2 U
2-Butanone	µg/L	2 U	10 U	2 U	10 U	2 U	6 J	2 U	2 U
Carbon Disulfide	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
Carbon Tetrachloride	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
Chlorobenzene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
Chloroethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
Chloroform	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
Chloromethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
Dibromochloromethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
1,1-Dichloroethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
1,2-Dichloroethane	µg/L	11	10 U	1 U	10 U	1 U	10 U	1 U	1 U
1,1-Dichloroethene	µg/L	1 U	10 U	1 U	10 U	4	10 U	1 U	1 U
1,2-Dichloroethene (total)	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
1,2-Dichloropropane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
cis-1,3-Dichloropropene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
trans-1,3-Dichloropropene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
Ethylbenzene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
2-Hexanone	µg/L	2 U	10 U	2 U	10 U	2 U	10 U	2 U	2 U
Methylene Chloride	µg/L	11	10 U	8	10 U	8	10 U	8	8
4-Methyl-2-Pentanone	µg/L	1 U	10 U	1 U	R	1 U	R <sup>(e)</sup>	1 U	1 U
Styrene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
1,1,1,2-Tetrachloroethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
Tetrachloroethene	µg/L	4 U	10 U	4 U	10 U	4 U	10 U	4 U	4 U
Toluene	µg/L	1 U	10 U	1 U	3 J	1 U	10 U	1 U	1 U
1,1,1-Trichloroethane	µg/L	1 U	10 U	1 U	10 U	1 U	10	1 U	1 U
1,1,2-Trichloroethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
Trichloroethene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
Vinyl Chloride	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U
Xylene (total)	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	1 U

(a) "µg/L" indicates micrograms per liter.

(b) "U" indicates the compound was not detected.

(c) "J" indicates the value is estimated.

(d) "D" indicates duplicate analysis.

(e) "R" indicates the result is rejected and unusable.

Prepared by: LH  
Checked by: ELR

Table 2-9  
 Target Compound List Volatile Organic Compound Results for Groundwater Samples  
 RCRA Facility Investigation  
 AlliedSignal Inc., Buffalo Research Laboratory, Buffalo, New York

Parameters	Units	AOC-1 Storm Sewer System				AOC-3 Drum Storage Area			
		BRL-MW4-0195 MW-4 01/18/95	BRL-MW4-0195D MW-4 01/18/95	BRL-MW5-1094 MW-5 10/17/94	BRL-MW5-0195 MW-5 01/18/95	BRL-MW6-1094 MW-6 10/17/94	BRL-MW6-0195 MW-6 01/18/95	BRL-MW7-1094 MW-7 10/17/94	BRL-MW7-0195 MW-7 01/18/95
Acetone	µg/L <sup>(a)</sup>	10 U	10 U	5	10 U	4	10 U	9	10 U
Benzene	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Bromodichloromethane	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Bromomethane	µg/L	10 U	10 U	2 U	10 U	2 U	10 U	2 U	10 U
Bromoform	µg/L	10 U	10 U	2 U	10 U	2 U	10 U	2 U	10 U
2-Butanone	µg/L	10 U	10 U	2 U	10 U	2 U	10 U	2 U	10 U
Carbon Disulfide	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Carbon Tetrachloride	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Chlorobenzene	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Chloroethane	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Chloroform	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Chloromethane	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Dibromochloromethane	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,1-Dichloroethane	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,2-Dichloroethane	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,1-Dichloroethene	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,2-Dichloroethene (total)	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,2-Dichloropropane	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
cis-1,3-Dichloropropene	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
trans-1,3-Dichloropropene	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Ethylbenzene	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
2-Hexanone	µg/L	10 U	10 U	2 U	10 U	2 U	10 U	2 U	10 U
Methylene Chloride	µg/L	10 U	10 U	12	10 U	5	10 U	8	10 U
4-Methyl-2-Pentanone	µg/L	R	10 U	1 U	R	1 U	10 U	1 U	10 U
Styrene	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,1,2,2-Tetrachloroethane	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Tetrachloroethene	µg/L	10 U	10 U	4 U	10 U	4 U	10 U	4 U	10 U
Toluene	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,1,1-Trichloroethane	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,1,2-Trichloroethane	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Trichloroethene	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Vinyl Chloride	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Xylene (total)	µg/L	10 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U

(a) "µg/L" indicates micrograms per liter.

(b) "U" indicates the compound was not detected.

(c) "J" indicates the value is estimated.

(d) "D" indicates duplicate analysis.

(e) "R" indicates the result is rejected and unusable

Prepared by: LH  
 Checked by: ELR

**Table 2-9**  
**Target Compound List Volatile Organic Compound Results for Groundwater Samples**  
**RCRA Facility Investigation**  
**AlliedSignal Inc., Buffalo Research Laboratory, Buffalo, New York**

Parameters	Units	AOC-3 Drum Storage Area		AOC-2 Activated Carbon System		Background		Equipment Blanks		Trip Blanks	
		BRL-MW8-1094 MW-8 10/17/94	BRL-MW8-0195 MW-8 01/18/95	BRL-MW9-1094 MW-9 10/17/94	BRL-MW9-0195 MW-9 01/18/95	BRL-MW-10-1094 MW-10 10/17/94	BRL-MW-10-0195 MW-10 01/18/95	BRL-BBEB-1094 BB-EB 10/17/94	BRL-BBEB-0195 BB-EB 01/18/95	BRL-TB05-1018 TB05 10/17/94	BRL-TB06-1095 TB06 01/18/95
Acetone	µg/L <sup>(a)</sup>	6	10 U	27	18	21	5 J	3	10 U	28	10 U
Benzene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Bromodichloromethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Bromomethane	µg/L	2 U	10 U	2 U	10 U	2 U	10 U	2 U	10 U	2 U	10 U
Bromoform	µg/L	2 U	10 U	2 U	10 U	2 U	10 U	2 U	10 U	2 U	10 U
2-Butanone	µg/L	2 U	10 U	2 U	10 U	2 U	10 U	2 U	10 U	2 U	10 U
Carbon Disulfide	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	2	10 U
Carbon Tetrachloride	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Chlorobenzene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Chloroethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Chloroform	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Chloromethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Dibromochloromethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,1-Dichloroethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,2-Dichloroethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,1-Dichloroethene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,2-Dichloroethene (total)	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,2-Dichloropropane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
cis-1,3-Dichloropropene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
trans-1,3-Dichloropropene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Ethylbenzene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
2-Hexanone	µg/L	2 U	10 U	2 U	10 U	2 U	10 U	2 U	10 U	2 U	10 U
Methylene Chloride	µg/L	8	10 U	19	10 U	16	10 U	22	3 J	17	3 J
4-Methyl-2-Pentanone	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	R <sup>(e)</sup>	1 U	10 U
Styrene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,1,2,2-Tetrachloroethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Tetrachloroethene	µg/L	4 U	10 U	4 U	10 U	4 U	10 U	4 U	10 U	4 U	10 U
Toluene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,1,1-Trichloroethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
1,1,2-Trichloroethane	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Trichloroethene	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Vinyl Chloride	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U
Xylene (total)	µg/L	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U	1 U	10 U

(a) "µg/L" indicates micrograms per liter.

(b) "U" indicates the compound was not detected.

(c) "J" indicates the value is estimated.

(d) "D" indicates duplicate analysis.

(e) "R" indicates the result is rejected and unusable

Prepared by: LH  
Checked by: ELR

Table 2-10  
**Applicable Groundwater Action Levels and Maximum Contaminant Levels**  
**RCRA Facility Investigation**  
**AlliedSignal Inc., Buffalo Research Laboratory, Buffalo, New York**

Parameters	Maximum Contaminant Level <sup>(a)</sup>	New York State Groundwater Action Level <sup>(b)</sup>
<b><u>INORGANICS</u></b>	<b>(mg/l) <sup>(c)</sup></b>	<b>(mg/l)</b>
Arsenic	0.05	0.025
Barium	0.2	1
Cadmium	0.0	0.0
Chromium (total)	0.1	0.05
Lead	0.05	0.015
Mercury	0.002	0.0
Selenium	0.05	0.01
Silver	0.01 <sup>(d)</sup>	0.05
Cyanide (total)	-- <sup>(e)</sup>	<1
<b>TARGET COMPOUND LIST</b>		
<b><u>VOLATILE ORGANIC COMPOUNDS</u></b>	<b>(µg/L) <sup>(f)</sup></b>	<b>(µg/L)</b>
Acetone	--	3500
Benzene	5.0	0.7
Bromodichloromethane	--	50
Bromomethane	--	5.0
Bromoform	--	50
2-Butanone	--	1800
Carbon Disulfide	--	3500
Carbon Tetrachloride	5.0	5.0
Chlorobenzene	--	5.0
Chloroethane	--	5.0
Chloroform	--	7.0
Chloromethane	--	--
Dibromochloromethane	--	5.0
1,1-Dichloroethane	--	5.0
1,2-Dichloroethane	5.0	5.0
1,1-Dichloroethene	--	--
1,2-Dichloroethene (total)	--	--
1,2-Dichloropropane	5.0	5.0
cis-1,3-Dichloropropene	--	5.0
trans-1,3-Dichloropropene	--	5.0
Ethylbenzene	700	5.0
2-Hexanone	--	50
Methylene Chloride	--	5.0
4-Methyl-2-Pentanone	--	1800
Styrene	100	5.0
1,1,2,2-Tetrachloroethane	--	5.0
Tetrachloroethene	--	--
Toluene	1000	5.0
1,1,1-Trichloroethane	200	5.0
1,1,2-Trichloroethane	5.0	5.0
Trichloroethene	5.0	5.0
Vinyl Chloride	2.0	2.0
Xylene (total)	10000	5.0

NOTES:

- (a) As promulgated by the U.S. EPA under the National Primary Drinking Water Regulations.
- (b) As defined in NYSDEC TAGM #3026.
- (c) "mg/l" indicates milligrams per liter.
- (d) National Secondary Drinking Water Regulations. Secondary Maximum Contaminant Level.
- (e) "--" indicates a concentration has not been defined.
- (f) "µg/L" indicates micrograms per liter.

Prepared by:           LH            
Checked by:           EUR

Table 2-11  
**Inorganic and TCL Volatile Organic Compounds Results for Storm Sewer Sediment Samples**  
**RCRA Facility Investigation**  
**AlliedSignal Inc., Buffalo Research Laboratory, Buffalo, New York**

Parameters	Units	Sediments		Equipment	Trip Blank
		BRL-SD-SW-1094 SW 10/17/94	BRL-SD-SW-1094D SW 10/17/94	BRL-SD-PSEB-1094 Ponar Sampler 10/17/94 (mg/l) <sup>(a)</sup>	BRL-TBO5-1018 TB05 10/18/94
<b><u>INORGANICS</u></b>					
Arsenic	mg/kg <sup>(b)</sup>	8.2 J <sup>(c)</sup>	6.5 J	0.002 U <sup>(d)</sup>	-- <sup>(e)</sup>
Barium	mg/kg	71.1 J	95.5 J	0.0010 U	--
Cadmium	mg/kg	22.2	1.6 U	0.0020 U	--
Chromium (total)	mg/kg	16.0 J	11.0 J	0.0040 U	--
Lead	mg/kg	29.0 J	17.0 J	0.0220 U	--
Mercury	mg/kg	0.89 J	0.56 J	0.00005 U	--
Selenium	mg/kg	1.00 U	1.0 J	0.0020 U	--
Silver	mg/kg	0.50 U	0.50 U	R <sup>(f)</sup>	--
Cyanide (total)	mg/kg	0.05 U	0.05 U	0.0020 U	--
<b><u>TARGET COMPOUND LIST</u></b>					
<b><u>VOLATILE ORGANIC COMPOUNDS</u></b>					
				$\mu\text{g/L}$ <sup>(g)</sup>	$\mu\text{g/L}$
Acetone	mg/kg	0.036	0.036	4	28
Benzene	mg/kg	0.001 U	0.001 U	1 U	1 U
Bromodichloromethane	mg/kg	0.001 U	0.001 U	1 U	1 U
Bromomethane	mg/kg	0.002 U	0.002 U	2 U	2 U
Bromoform	mg/kg	0.002 U	0.002 U	2 U	2 U
2-Butanone	mg/kg	0.002 U	0.002 U	2 U	2 U
Carbon Disulfide	mg/kg	0.001 U	0.001 U	1 U	2
Carbon Tetrachloride	mg/kg	0.001 U	0.001 U	1 U	1 U
Chlorobenzene	mg/kg	0.001 U	0.001 U	1 U	1 U
Chloroethane	mg/kg	0.001 U	0.001 U	1 U	1 U
Chloroform	mg/kg	0.001 U	0.001 U	1 U	1 U
Chloromethane	mg/kg	0.001 U	0.001 U	1 U	1 U
Dibromochloromethane	mg/kg	0.001 U	0.001 U	1 U	1 U
1,1-Dichloroethane	mg/kg	0.001 U	0.001 U	1 U	1 U
1,2-Dichloroethane	mg/kg	0.001 U	0.001 U	1 U	1 U
1,1-Dichloroethene	mg/kg	0.001 U	0.001 U	1 U	1 U
1,2-Dichloroethene (total)	mg/kg	0.001 U	0.001 U	1 U	1 U
1,2-Dichloropropane	mg/kg	0.001 U	0.001 U	1 U	1 U
cis-1,3-Dichloropropene	mg/kg	0.001 U	0.001 U	1 U	1 U
trans-1,3-Dichloropropene	mg/kg	0.001 U	0.001 U	1 U	1 U
Ethylbenzene	mg/kg	0.001 U	0.001 U	1 U	1 U
2-Hexanone	mg/kg	0.002 U	0.002 U	2 U	2 U
Methylene Chloride	mg/kg	0.2	0.19	21	17
4-Methyl-2-Pentanone	mg/kg	0.001 U	0.001 U	1 U	1 U
Styrene	mg/kg	0.001 U	0.001 U	1 U	1 U
1,1,2,2-Tetrachloroethane	mg/kg	0.001 U	0.001 U	1 U	1 U
Tetrachloroethene	mg/kg	0.004 U	0.004 U	4 U	4 U
Toluene	mg/kg	0.001 U	0.001 U	1 U	1 U
1,1,1-Trichloroethane	mg/kg	0.001 U	0.001 U	1 U	1 U
1,1,2-Trichloroethane	mg/kg	0.001 U	0.001 U	1 U	1 U
Trichloroethene	mg/kg	0.001 U	0.001 U	1 U	1 U
Vinyl Chloride	mg/kg	0.001 U	0.001 U	1 U	1 U
Xylene (total)	mg/kg	0.001 U	0.001 U	1 U	1 U
<b><u>MISCELLANEOUS</u></b>					
Moisture Content	percent	17	17	-	--

NOTES:

- (a) "mg/l" indicates milligrams per liter.  
 (b) "mg/kg" indicates milligrams per kilogram.  
 (c) "J" indicates the value is estimated.  
 (d) "U" indicates the compound was not detected.

- (e) "--" indicates the analysis was not performed.  
 (f) "R" indicates the results is rejected and unusable.  
 (g) " $\mu\text{g/L}$ " indicates micrograms per liter.

Prepared by: LH  
 Checked by: ELR

Table 2-12  
**Inorganic Results for Storm Sewer Water Samples**  
**RCRA Facility Investigation**  
**AlliedSignal Inc., Buffalo Research Laboratory**  
**Buffalo, New York**

Parameters	Units	Southeast Sewers				Ramp Drain		Sink RM 161
		In Facility		Off-Site		In Facility		In Facility
		BRL-SW-SE-1094 10/17/94	BRL-SW-SE-0195 01/19/95	BRL-SW-OSE-1094 10/17/94	BRL-SW-OSE-0195 01/19/95	BRL-SW-RMP-1094 10/17/94	BRL-SW-RMP-0195 01/19/95	BRL-161W-0195 01/19/95
<b>INORGANICS</b>								
Arsenic	mg/l <sup>(a)</sup>	0.002 U <sup>(b)</sup>	0.0025 U	0.004 B <sup>(c)</sup>	0.004 B	0.015	0.0184	0.0025 U
Barium	mg/l	0.01 B	0.0213 B	0.028 B	0.0238 B	0.066 B	0.0278 B	0.0191 B
Cadmium	mg/l	0.002 U	0.0010 U	0.002 U	0.0010 U	0.002 U	0.0010 U	0.0010 U
Chromium (total)	mg/l	0.004 U	0.0010 U	0.009 B	0.0016 J <sup>(d)</sup>	0.004 U	0.0010 U	0.0010 U
Lead	mg/l	0.022 U	0.0148 J	0.024	0.0181 J	0.022 U	0.0046 J	0.0031 J
Mercury	mg/l	0.00005 U	0.0001 U	0.00005 U	0.0001 U	0.00005 U	0.0001 U	0.0001 U
Selenium	mg/l	0.002 U	0.0036 U	0.003 B	0.0036 U	0.004 B	0.0036 U	0.0036 U
Silver	mg/l	R <sup>(e)</sup>	0.0023 UJ <sup>(f)</sup>	R	0.0023 UJ	R	0.0023 UJ	0.0023 UJ
Cyanide (total)	mg/l	0.002 U	0.0050 U	0.002 U	0.0050 U	0.002 U	0.0050 U	0.0050 U
<b>MISCELLANEOUS</b>								
pH		8.01	7.40	8.12	7.50	7.27	7.80	7.50
Conductivity	umhos/cm <sup>(g)</sup>	280	330	350	351	2100	866	249

NOTES:

- (a) "mg/l" indicates milligrams per liter.
- (b) "U" indicates the compound was not detected.
- (c) "B" indicates compound was detected in a blank.
- (d) "J" indicates the value is estimated.
- (e) "R" indicates the result is rejected and unusable.
- (f) "UJ" indicates the reported quantitation limit is qualified as estimated.
- (g) "umhos/cm" indicates micro mhos per centimeter.
- (h) "D" indicates duplicate sample.

Prepared by:     LH      
Checked by:     ELR



Table 2-12  
 Inorganic Results for Storm Sewer Water Samples  
 RCRA Facility Investigation  
 AlliedSignal Inc., Buffalo Research Laboratory  
 Buffalo, New York

Parameters	Units	Southwest Sewers						Equipment Blanks	
		In Facility				Off-Site		Pump Blank	
		BRL-SW-SW-1094 10/17/94	BRL-SW-SW-1094D <sup>(h)</sup> 10/17/94	BRL-SW-SW-0195 01/19/95	BRL-SW-SW-0195D 01/19/95	BRL-SW-OSW-1094 10/17/94	BRL-SW-OSW-0195 01/19/95	BRL-SW-BBEB-1094 10/17/94)	BRL-SW-BBEB-0195 01/19/95
<b>INORGANICS</b>									
Arsenic	mg/l <sup>(a)</sup>	0.01 B	0.013	0.0104	0.0068 B	0.002 B	0.0028 B	0.002 U	0.0025 U
Barium	mg/l	0.076 B	0.085 B	0.0434 B	0.0417 B	0.014 B	0.0193 B	0.003 B	0.001 U
Cadmium	mg/l	0.002 U	0.002 U	0.0010 U	0.0010 U	0.002 U	0.0010 U	0.002 U	0.0251
Chromium (total)	mg/l	0.004 U	0.004 U	0.0023 J	0.0026 J	0.004 U	0.0012 J	0.004 U	0.001 U
Lead	mg/l	0.022 U	0.022 U	0.033 J	0.0149 J	0.022 U	0.0246 J	0.022 U	0.0074 J
Mercury	mg/l	0.00005 U	0.0005 U	0.0001 U	0.0001 U	0.00005 U	0.0001 U	0.00005 U	0.0001 U
Selenium	mg/l	0.002 U	0.003	0.003 U	0.0036 B	0.003 B	0.0036 U	0.002 U	0.0036 U
Silver	mg/l	R <sup>(e)</sup>	0.044 J	0.0023 UJ <sup>(f)</sup>	0.0023 UJ	R	0.0023 UJ	R	0.0023 UJ
Cyanide (total)	mg/l	0.002 U	0.0020	0.0050 U	0.0050 U	0.002 U	0.0050 U	0.0002 U	0.005 U
<b>MISCELLANEOUS</b>									
pH		8.06	8.04	7.90	7.90	7.99	7.80	--	--
Conductivity	umhos/cm <sup>(g)</sup>	2200	2300	1590	1640	300	303	--	--

NOTES:

- (a) "mg/l" indicates milligrams per liter.
- (b) "U" indicates the compound was not detected.
- (c) "B" indicates compound was detected in a blank.
- (d) "J" indicates the value is estimated.
- (e) "R" indicates the result is rejected and unusable.
- (f) "UJ" indicates the reported quantitation limit is qualified as estimated.
- (g) "umhos/cm" indicates micro mhos per centimeter.
- (h) "D" indicates duplicate sample.

Prepared by: LA  
 Checked by: ELF

Table 2-13  
TCL VOC Results for Storm Sewer Water Samples  
RCRA Facility Investigation  
AlliedSignal Inc., Buffalo Research Laboratory, Buffalo, New York

Parameters	Units	Southeast Sewers				Ramp Drain		Sink RM 161
		In Facility		Off-Site		In Facility		In Facility
		BRL-SW-SE-1094 10/17/94	BRL-SW-SE-0195 01/19/95	BRL-SW-OSE-1094 10/17/94	BRL-SW-OSE-0195 01/19/95	BRL-SW-RMP-1094 10/17/94	BRL-SW-RMP-0195 01/19/95	BRL-161W-0195 01/19/95
<b>Target Compound List Volatile Organic Compounds</b>								
Acetone	µg/l <sup>(a)</sup>	62	10 U <sup>(b)</sup>	12	8700	8	10 U	10 U
Benzene	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
Bromodichloromethane	µg/l	3	3 J <sup>(c)</sup>	2	1000 U	1 U	10 U	5 J
Bromomethane	µg/l	2 U	10 U	2 U	1000 U	2 U	10 U	10 U
Bromoform	µg/l	2 U	10 U	2 U	1000 U	2 U	10 U	10 U
2-Butanone	µg/l	2 U	10 U	2 U	1000 U	2 U	10 U	10 U
Carbon Disulfide	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
Carbon Tetrachloride	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
Chlorobenzene	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
Chloroethane	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
Chloroform	µg/l	5	4 J	3	1000 U	1 U	10 U	5 J
Chloromethane	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
Dibromochloromethane	µg/l	2	3 J	1	1000 U	1 U	10 U	3 J
1,1-Dichloroethane	µg/l	1 U	10 U	1 U	1000 U	1	10 U	10 U
1,2-Dichloroethane	µg/l	1 U	10 U	2	1000 U	1 U	10 U	10 U
1,1-Dichloroethene	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
1,2-Dichloroethene (total)	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
1,2-Dichloropropane	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
cis-1,3-Dichloropropene	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
trans-1,3-Dichloropropene	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
Ethylbenzene	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
2-Hexanone	µg/l	1 U	10 U	1 U	1000 U	2 U	10 U	10 U
Methylene Chloride	µg/l	21	10 U	12	1000 U	10	10 U	10 U
4-Methyl-2-Pentanone	µg/l	3	10 U	1 U	1000 U	1 U	10 U	10 U
Styrene	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
1,1,2,2-Tetrachloroethane	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
Tetrachloroethene	µg/l	4 U	10 U	4 U	1000 U	4 U	10 U	10 U
Toluene	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
1,1,1-Trichloroethane	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
1,1,2-Trichloroethane	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
Trichloroethene	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
Vinyl Chloride	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U
Xylene (total)	µg/l	1 U	10 U	1 U	1000 U	1 U	10 U	10 U

NOTES: (a) "µg/l" indicates micrograms per liter.  
(b) "U" indicates the compound was not detected.  
(c) "J" indicates the value is estimated.  
(d) "D" indicates duplicate sample.

Prepared by: CH  
Checked by: ER

Table 2-13  
TCL VOC Results for Storm Sewer Water Samples  
RCRA Facility Investigation  
AlliedSignal Inc., Buffalo Research Laboratory, Buffalo, New York

Parameters	Units	Southwest Sewers						Equipment Blanks	
		In Facility				Off-Site		Pump Blank	
		BRL-SW-SW-1094 10/17/94	BRL-SW-SW-1094D <sup>(d)</sup> 10/17/94	BRL-SW-SW-0195 01/19/95	BRL-SW-SW-0195D 01/19/95	BRL-SW-OSW-1094 10/17/94	BRL-SW-OSW-0195 01/19/95	BRL-SW-BBEB-1094 10/17/94	BRL-SW-BBEB-0195 01/19/95
<b>Target Compound List Volatile Organic Compounds</b>									
Acetone	µg/l	39	21	12	8 J	10	10 U	2	10 U
Benzene	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
Bromodichloromethane	µg/l	1 U	1 U	10 U	10 U	2	10 U	1 U	10 U
Bromomethane	µg/l	2 U	2 U	10 U	10 U	2 U	10 U	2 U	10 U
Bromoform	µg/l	2 U	2 U	10 U	10 U	2 U	10 U	2 U	10 U
2-Butanone	µg/l	2 U	2 U	10 U	10 U	2 U	10 U	2 U	10 U
Carbon Disulfide	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
Carbon Tetrachloride	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
Chlorobenzene	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
Chloroethane	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
Chloroform	µg/l	1 U	1 U	10 U	10 U	3	10 U	1 U	10 U
Chloromethane	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
Dibromochloromethane	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
1,1-Dichloroethane	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
1,2-Dichloroethane	µg/l	1 U	1 U	10 U	10 U	1	10 U	1 U	10 U
1,1-Dichloroethene	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
1,2-Dichloroethene (total)	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
1,2-Dichloropropane	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
cis-1,3-Dichloropropene	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
trans-1,3-Dichloropropene	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
Ethylbenzene	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
2-Hexanone	µg/l	2 U	2 U	10 U	10 U	2 U	10 U	2 U	10 U
Methylene Chloride	µg/l	12	14	10 U	10 U	9	10 U	26	10 U
4-Methyl-2-Pentanone	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
Styrene	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
1,1,2,2-Tetrachloroethane	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
Tetrachloroethene	µg/l	4 U	4 U	10 U	10 U	4 U	10 U	4 U	10 U
Toluene	µg/l	1 U	1 U	10 U	10 U	1 U	4 J	1 U	10 U
1,1,1-Trichloroethane	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
1,1,2-Trichloroethane	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
Trichloroethene	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
Vinyl Chloride	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U
Xylene (total)	µg/l	1 U	1 U	10 U	10 U	1 U	10 U	1 U	10 U

- NOTES:
- (a) "µg/l" indicates micrograms per liter.
  - (b) "U" indicates the compound was not detected.
  - (c) "J" indicates the value is estimated.
  - (d) "D" indicates duplicate sample.

Prepared by:         LH          
Checked by:         ELR

Table 2-13  
TCL VOC Results for Storm Sewer Water Samples  
RCRA Facility Investigation  
AlliedSignal Inc., Buffalo Research Laboratory, Buffalo, New York

Parameters	Units	Trip Blanks	
		BRL-TB05-1018 10/18/94	BRL-TB07-0119 01/19/95
<b>Target Compound List Volatile Organic Compounds</b>			
Acetone	µg/l	28	10 U
Benzene	µg/l	1 U	10 U
Bromodichloromethane	µg/l	1 U	10 U
Bromomethane	µg/l	2 U	10 U
Bromoform	µg/l	2 U	10 U
2-Butanone	µg/l	2 U	10 U
Carbon Disulfide	µg/l	2	10 U
Carbon Tetrachloride	µg/l	1 U	10 U
Chlorobenzene	µg/l	1 U	10 U
Chloroethane	µg/l	1 U	10 U
Chloroform	µg/l	1 U	10 U
Chloromethane	µg/l	1 U	10 U
Dibromochloromethane	µg/l	1 U	10 U
1,1-Dichloroethane	µg/l	1 U	10 U
1,2-Dichloroethane	µg/l	1 U	10 U
1,1-Dichloroethene	µg/l	1 U	10 U
1,2-Dichloroethene (total)	µg/l	1 U	10 U
1,2-Dichloropropane	µg/l	1 U	10 U
cis-1,3-Dichloropropene	µg/l	1 U	10 U
trans-1,3-Dichloropropene	µg/l	1 U	10 U
Ethylbenzene	µg/l	1 U	10 U
2-Hexanone	µg/l	2 U	10 U
Methylene Chloride	µg/l	17	10 U
4-Methyl-2-Pentanone	µg/l	1 U	10 U
Styrene	µg/l	1 U	10 U
1,1,2,2-Tetrachloroethane	µg/l	1 U	10 U
Tetrachloroethene	µg/l	4 U	10 U
Toluene	µg/l	1 U	10 U
1,1,1-Trichloroethane	µg/l	1 U	10 U
1,1,2-Trichloroethane	µg/l	1 U	10 U
Trichloroethene	µg/l	1 U	10 U
Vinyl Chloride	µg/l	1 U	10 U
Xylene (total)	µg/l	1 U	10 U

- NOTES: (a) "µg/l" indicates micrograms per liter.  
(b) "U" indicates the compound was not detected.  
(c) "J" indicates the value is estimated.  
(d) "D" indicates duplicate sample.

Prepared by:     LH      
Checked by:     EUR

Table 2-14  
 BPDES Daily Maximum Discharge Limits  
 RCRA Facility Investigation  
 AlliedSignal, Inc., Buffalo Research Laboratory  
 Buffalo, New York

Parameters	Daily Maximum (ug/l) <sup>(a)</sup>
<b><u>INORGANICS</u></b>	
Arsenic	-- (b)
Barium	--
Chromium (total)	--
Lead	690
Selenium	--
Silver	--
<b><u>TARGET COMPOUND LIST</u></b> <b><u>VOLATILE ORGANIC COMPOUNDS</u></b>	
Acetone	--
Bromodichloromethane	--
Chloroform	325
Dibromochloromethane	--
1,2-Dichloroethane	--
Methylene Chloride	295
4-Methyl-2-Pentanone	--
Toluene	74

NOTES:

- (a) "ug/l" indicates micrograms per liter.  
 (b) "--" indicates no limitation is specified in the permit.

Prepared by:   LH    
 Checked by:   ER



**APPENDIX A  
ANALYTICAL RESULTS  
ADDITIONAL SURFACE SOIL SAMPLES**



Environmental  
Services

Quanterra Incorporated  
450 William Pitt Way  
Pittsburgh, Pennsylvania 15238

412 820-8380 Telephone  
412 820-2080 Fax

## ANALYTICAL REPORT

PROJECT NO. HARDING LAWSON

HARDING LAWSON

Lot #: C6J110114

ERIC REISINGER

Harding Lawson Associates

QUANTERRA INCORPORATED

A handwritten signature in cursive script that reads "Adrinna S. Washington".

Adrinna Washington  
Project Manager

October 31, 1996





Environmental  
Services

CASE NARRATIVE  
Harding Lawson / Allied Signal-BRL

Quanterra Lot number: C6J110114

Shipment:

All sample were received in good condition and maintained at the proper temperature.

Metals:

Due to the limitation of the Ward software the sample identification numbers were truncated. The complete identification numbers are listed at the bottom of each Form I data sheet.

A matrix spike and duplicate were performed on sample BRL-CB1-0002. Due to the sample matrix, the percent recovery is outside QC limits.



Environmental  
Services

## SAMPLE SUMMARY

C6J110114

<u>WO #</u>	<u>SAMPLE#</u>	<u>CLIENT SAMPLE ID</u>	<u>DATE</u>	<u>TIME</u>
C6775	001	BRL-CB1-0002	10/10/96	13:45
C6776	002	BRL-CB2-0002	10/10/96	13:55
C6777	003	BRL-CB3-0002	10/10/96	14:05
C6778	004	BRL-CB4-0002	10/10/96	14:10
C6779	005	BRL-CB5-0002	10/10/96	14:20
C677A	006	BRL-CB6-0002	10/10/96	14:30
C677C	007	BRL-EB-1096	10/10/96	00:00

### NOTE (S) :

- The analytical results of the **samples** listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were **not** detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.



Environmental  
Services

## METHODS SUMMARY

C6J110114

<u>PARAMETER</u>	<u>ANALYTICAL METHOD</u>	<u>PREPARATION METHOD</u>
Arsenic (AA, Furnace Technique)	ICLP ILM03.0	ICLP ILM03.0
Total Residue as Percent Solids	MCAWW 160.3 MOD	MCAWW 160.3 MOD

### References:

- ICLP USEPA Contract Laboratory Program Statement of Work for Inorganics Analysis, Multi-Media, Multi-Concentration.
- MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

# Chain of Custody Record



QUA-4124-1

Client: **HARDING LAWSON ASSOCIATES** Project Manager: **D. CROWLEY** Date: **10/11/96** Chain Of Custody Number: **45009**

Address: **700 N BELL AVE** Telephone Number (Area Code)/Fax Number: **(412) 279-6661 / (412) 279-8567** Lab Number: \_\_\_\_\_ Page: **1 of 1**

City: **PITTSBURGH** State: **PA** Zip Code: **15106** Site Contact: **E. RESIGEN** Lab Contact: **A. WASHINGTON**

Project Name: **AlliedSignal BILL** Carrier/Waybill Number: \_\_\_\_\_

Sample I.D. No. and Description <small>(Containers for each sample may be combined on one line)</small>	Date	Time	Matrix			Containers & Preservatives						Analysis (Attach list if more space is needed)	Special Instructions/ Conditions of Receipt		
			Aqueous	Sed.	Soil	Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH				
BLL - CB1 - 0002	10/11/96	1345			X	1									
BLL - CB2 - 0002		1355			X	1									
BLL - CB3 - 0002		1405			X	1									
BLL - CB4 - 0002		1410			X	1									
BLL - CB5 - 0002		1420			X	1									
BLL - CB6 - 0002		1430			X	1									
BLL - EB - 1096			X												

Possible Hazard Identification:  Non-Hazard  Flammable  Skin Irritant  Poison B  Unknown

Sample Disposal:  Return To Client  Disposal By Lab  Archive For \_\_\_\_\_ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required:  24 Hours  48 Hours  7 Days  14 Days  21 Days  Other \_\_\_\_\_

QC Requirements (Specify): \_\_\_\_\_

1. Relinquished By:	Date: 10/11/96	Time: 0935	1. Received By:	Date: 10/11/96	Time: 0935
2. Relinquished By:	Date:	Time:	2. Received By:	Date:	Time:
3. Relinquished By:	Date:	Time:	3. Received By:	Date:	Time:

Comments: **WANT INDIVIDUAL REPORTS FOR "CB" AND "RB" SAMPLES.**

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: QUANTERRA\_PITTSBURGH Contract: HARDING\_LA  
Lab Code: QESPA Case No.: 16865 SAS No.: SDG No.:HL1  
SOW No.: ILM03.0

EPA Sample No.	Lab Sample ID
CB1002	C6775
CB1002D	C6775X
CB1002S	C6775S
CB2002	C6776
CB3002	C6777
CB4002	C6778
CB5002	C6779
CB6002	C677A
EB1096	C677C

Were ICP interelement corrections applied ? Yes/No YES  
Were ICP background corrections applied ? Yes/No YES  
If yes - were raw data generated before application of background corrections ? Yes/No NO

Comments:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Admonia S. Washington Name: Admonia S. Washington  
Date: 10-31-96 Title: Project Manager

REVIEWED BY: AR  
DATE: 10/30/96

1  
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

CB1002

Lab Name: QUANTERRA\_PITTSBURGH Contract: HARDING\_LA

Lab Code: QESPA Case No.: 16865 SAS No.: SDG No.: HL1

Matrix (soil/water): SOIL Lab Sample ID: C6775

Level (low/med): LOW Date Received: 10/11/96

% Solids: 82.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	48.7			F

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: BROWN Clarity After: Artifacts: YES

Comments:  
BRL-CB1-0002  
C6J110114001  
ARTIFACTS: STONES

1  
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

CB2002

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_ Contract: HARDING\_LA

Lab Code: QESPA\_ Case No.: 16865\_ SAS No.: \_\_\_\_\_ SDG No.: HL1\_\_\_\_

Matrix (soil/water): SOIL\_ Lab Sample ID: C6776

Level (low/med): LOW\_ Date Received: 10/11/96

% Solids: \_80.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	Q	M
7440-38-2	Arsenic	21.9		F

Color Before: BROWN\_\_\_\_\_ Clarity Before: \_\_\_\_\_ Texture: MEDIUM

Color After: BROWN\_\_\_\_\_ Clarity After: \_\_\_\_\_ Artifacts: YES\_\_\_\_

Comments:  
BRL-CB2-0002\_\_\_\_\_  
C6J110114002\_\_\_\_\_  
ARTIFACTS: STONES & ROOTS\_\_\_\_\_

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1  
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

CB3002

Lab Name: QUANTERRA\_PITTSBURGH Contract: HARDING\_LA

Lab Code: QESPA Case No.: 16865 SAS No.: SDG No.: HL1

Matrix (soil/water): SOIL Lab Sample ID: C6777

Level (low/med): LOW Date Received: 10/11/96

% Solids: 70.6

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	86.7			F

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: BROWN Clarity After: Artifacts: YES

Comments:  
BRL-CB3-0002  
C6J110114003  
ARTIFACTS: STONES, ROOTS & GRASS



1  
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

CB4002

Lab Name: QUANTERRA\_PITTSBURGH Contract: HARDING\_LA

Lab Code: QESPA Case No.: 16865 SAS No.: SDG No.: HL1

Matrix (soil/water): SOIL Lab Sample ID: C6778

Level (low/med): LOW Date Received: 10/11/96

% Solids: 81.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	54.9			F

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: BROWN Clarity After: Artifacts: YES

Comments:  
BRL-CB4-0002  
C6J110114004  
ARTIFACTS: STONES, ROOTS & GRASS

0005

1  
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

CB5002

Lab Name: QUANTERRA\_PITTSBURGH Contract: HARDING\_LA

Lab Code: QESPA Case No.: 16865 SAS No.: SDG No.: HL1

Matrix (soil/water): SOIL Lab Sample ID: C6779

Level (low/med): LDW Date Received: 10/11/96

% Solids: 78.8

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7440-38-2	Arsenic	18.7			F

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: BROWN Clarity After: Artifacts: YES

Comments:  
BRL-CB5-0002  
C6J110114005  
ARTIFACTS: STONES & ROOTS

1  
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

CB6002

Lab Name: QUANTERRA\_PITTSBURGH Contract: HARDING\_LA

Lab Code: QESPA Case No.: 16865 SAS No.: SDG No.: HL1

Matrix (soil/water): SOIL Lab Sample ID: C677A

Level (low/med): LOW Date Received: 10/11/96

% Solids: 80.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	Q	M
7440-38-2	Arsenic	210		F

Color Before: BROWN Clarity Before: Texture: MEDIUM

Color After: BROWN Clarity After: Artifacts: YES

Comments:  
BRL-CB6-0002  
C6J110114006  
ARTIFACTS: STONES & ROOTS

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1  
INORGANIC ANALYSES DATA SHEET

EPA SAMPLE NO.

EB1096

Lab Name: QUANTERRA\_PITTSBURGH Contract: HARDING\_LA

Lab Code: QESPA\_ Case No.: 16865\_ SAS No.: \_ SDG No.: HL1\_

Matrix (soil/water): WATER Lab Sample ID: C677C

Level (low/med): LOW\_ Date Received: 10/11/96

% Solids: \_0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L\_

CAS No.	Analyte	Concentration	U	Q	M
7440-38-2	Arsenic	1.8	U	W	F

Color Before: COLORLESS Clarity Before: CLEAR\_ Texture: \_\_\_\_\_  
Color After: COLORLESS Clarity After: CLEAR\_ Artifacts: \_\_\_\_\_

Comments:  
BRL-EB-1096  
C6J110114007  
\_\_\_\_\_  
\_\_\_\_\_

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_

Contract: HARDING\_LA

Lab Code: QESPA\_

Case No.: 16865\_

SAS No.: \_\_\_\_\_

SDG No.: HL1\_\_\_\_\_

Initial Calibration Source: ULTRA\_\_\_\_\_

Continuing Calibration Source: ULTRA\_\_\_\_\_

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration				M	
	True	Found	%R(1)	True	Found	%R(1)	Found		%R(1)
Arsenic	40.0	39.80	99.5	50.0	52.70	105.4	53.70	107.4	F

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

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2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: QUANTERRA\_PITTSBURGH Contract: HARDING\_LA  
 Lab Code: QESPA\_ Case No.: 16865\_ SAS No.:            SDG No.: HL1  
 Initial Calibration Source: ULTRA  
 Continuing Calibration Source: ULTRA

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Arsenic	40.0	41.50	103.8	50.0	50.10	100.2	51.30	102.6	F

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_ Contract: HARDING\_LA  
Lab Code: GESFA\_ Case No.: 16865\_ SAS No.: \_\_\_\_\_ SDG No.: HL1\_\_\_\_  
Initial Calibration Source: ULTRA\_\_\_\_\_  
Continuing Calibration Source: ULTRA\_\_\_\_\_

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration				M	
	True	Found	%R(1)	True	Found	%R(1)	Found		%R(1)
Arsenic				50.0	53.30	106.6	52.50	105.0	F

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

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2A

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_      Contract: HARDING\_LA  
 Lab Code: QESPA\_      Case No.: 16865\_      SAS No.: \_\_\_\_\_      SDG No.: HL1\_  
 Initial Calibration Source: ULTRA\_\_\_\_\_  
 Continuing Calibration Source: ULTRA\_\_\_\_\_

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration				M	
	True	Found	%R(1)	True	Found	%R(1)	Found		%R(1)
Arsenic				50.0	51.80	103.6	49.40	98.8	F

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115



INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_

Contract: HARDING\_LA

Lab Code: QESPA\_

Case No.: 16865\_

SAS No.: \_\_\_\_\_

SDG No.: HL1\_\_\_\_\_

Initial Calibration Source: ULTRA\_\_\_\_\_

Continuing Calibration Source: ULTRA\_\_\_\_\_

Concentration Units: ug/L

Analyte	Initial Calibration			True	Continuing Calibration			M	
	True	Found	%R(1)		Found	%R(1)	Found		%R(1)
Arsenic				50.0	50.20	100.4	47.80	95.6	F

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

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2B

CRDL STANDARD FOR AA AND ICP

Lab Name: QUANTERRA\_PITTSBURGH

Contract: HARDING\_LA

Lab Code: QESPA\_ Case No.: 16865\_

SAS No.: SDG No.: HL1

AA CRDL Standard Source: ULTRA

ICP CRDL Standard Source: ULTRA

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
	True	Found	%R	True	Initial Found	%R	Final Found	%R
Arsenic	10.0	9.90	99.0					

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2B

CRDL STANDARD FOR AA AND ICP

Lab Name: QUANTERRA\_PITTSBURGH

Contract: HARDING\_LA

Lab Code: QESPA

Case No.: 16865

SAS No.:

SDG No.: HL1

AA CRDL Standard Source: ULTRA

ICP CRDL Standard Source: ULTRA

Concentration Units: ug/L

Analyte	CRDL Standard for AA			CRDL Standard for ICP				
	True	Found	%R	True	Initial Found	%R	Final Found	%R
Arsenic	10.0	9.70	97.0					

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3  
BLANKS

Lab Name: QUANTERRA\_PITTSBURGH

Contract: HARDING\_LA

Lab Code: QESPA

Case No.: 16865

SAS No.:

SDG No.: HL1

Preparation Blank Matrix (soil/water): WATER

Preparation Blank Concentration Units (ug/L or mg/kg): UG/L

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Preparation Blank	C	M
			1	C	2	C	3	C			
Arsenic	1.8	U	1.8	U	1.8	U			1.800	U	F

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3  
BLANKS

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_ Contract: HARDING\_LA  
 Lab Code: QESPA\_ Case No.: 16865\_ SAS No.: \_\_\_\_\_ SDG No.: HL1\_  
 Preparation Blank Matrix (soil/water): SOIL\_  
 Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration Blank (ug/L)						Prepa- ration Blank	C	M
			1	C	2	C	3	C			
Arsenic	1.8	U	1.8	U	1.8	U	1.8	U	0.360	U	F

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3  
BLANKS

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_ Contract: HARDING\_LA  
 Lab Code: QESPA\_ Case No.: 16865\_ SAS No.: \_\_\_\_\_ SDG No.: HL1\_\_\_\_  
 Preparation Blank Matrix (soil/water): \_\_\_\_\_  
 Preparation Blank Concentration Units (ug/L or mg/kg): \_\_\_\_\_

Analyte	Initial Calib. Blank (ug/L)	Continuing Calibration Blank (ug/L)						Preparation Blank	M
		C1	1	C	2	C	3		
Arsenic			1.8_U		1.8_U		1.8_U		F

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3  
BLANKS

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_

Contract: HARDING\_LA

Lab Code: QESPA\_

Case No.: 16865\_

SAS No.: \_\_\_\_\_

SDG No.: HL1\_\_\_

Preparation Blank Matrix (soil/water): \_\_\_\_\_

Preparation Blank Concentration Units (ug/L or mg/kg): \_\_\_\_\_

Analyte	Initial Calib. Blank (ug/L)	C	Continuing Calibration						Preparation Blank	C	M
			1	C	2	C	3	C			
Arsenic			1.8	U	1.8	U				F	





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6  
 DUPLICATES

EPA SAMPLE NO.

CB1002D

Lab Name: QUANTERRA\_PITTSBURGH Contract: HARDING\_LA

Lab Code: QESPA\_ Case No.: 16865\_ SAS No.: \_ SDG No.: HL1\_

Matrix (soil/water): SOIL\_ Level (low/med): \_LOW\_

% Solids for Sample: \_82.7 % Solids for Duplicate: \_82.7

Concentration Units (ug/L or mg/kg dry weight): MG/KG

Analyte	Control Limit	Sample (S) C	Duplicate (D) C	RPD	Q	M
Arsenic		48.7304	45.3446	7.2		F

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6  
DUPLICATES

EPA SAMPLE NO.

LCSWD

Lab Name: QUANTERRA\_PITTSBURGH \_\_\_\_\_ Contract: HARDING\_LA \_\_\_\_\_

Lab Code: QESPA\_ \_\_\_\_\_ Case No.: 16865\_ \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: HL1 \_\_\_\_\_

Matrix (soil/water): WATER \_\_\_\_\_ Level (low/med): LOW \_\_\_\_\_

% Solids for Sample: 0.0 \_\_\_\_\_ % Solids for Duplicate: 0.0 \_\_\_\_\_

Concentration Units (ug/L or mg/kg dry weight): ug/L\_

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Arsenic	10.0	42.0000		42.7000		1.7		F

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LABORATORY CONTROL SAMPLE

Lab Name: QUANTERRA\_PITTSBURGH

Contract: HARDING\_LA

Lab Code: QESPA\_

Case No.: 16865\_

SAS No.: \_\_\_\_\_

SDG No.: HL1

Solid LCS Source: ERA

Aqueous LCS Source: \_\_\_\_\_

Analyte	Aqueous (ug/L)			Solid (mg/kg)			Limits	%R	
	True	Found	%R	True	Found	C			
Arsenic				228.0	233.0		112.0	340.0	102.2

0023

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LABORATORY CONTROL SAMPLE

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_

Contract: HARDING\_LA

Lab Code: QESPA\_

Case No.: 16865\_

SAS No.: \_\_\_\_\_

SDG No.: HL1\_\_\_\_\_

Solid LCS Source: \_\_\_\_\_

Aqueous LCS Source: ULTRA\_\_\_\_\_

Analyte	Aqueous (ug/L)			Solid (mg/kg)				
	True	Found	%R	True	Found	C	Limits	%R
Arsenic	40.0	42.00	105.0					

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LABORATORY CONTROL SAMPLE

Lab Name: QUANTERRA\_PITTSBURGH \_\_\_\_\_ Contract: HARDING\_LA  
 Lab Code: QESPA\_ Case No.: 16865\_ SAS No.: \_\_\_\_\_ SDG No.: HL1\_\_\_\_  
 Solid LCS Source: \_\_\_\_\_  
 Aqueous LCS Source: ULTRA\_\_\_\_\_

Analyte	Aqueous (ug/L)			Solid (mg/kg)				
	True	Found	%R	True	Found	C	Limits	%R
Arsenic	40.01	42.70	106.8					

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STANDARD ADDITION RESULTS

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_

Contract: HARDING\_LA

Lab Code: QESPA\_

Case No.: 16865\_

SAS No.: \_\_\_\_\_

SDG No.: HL1 \_\_\_\_\_

Concentration Units: ug/L

EPA Sample No.	An	0 ADD		1 ADD		2 ADD		3 ADD		Final Conc.	r	IQ
		ABS	CON	ABS	CON	ABS	CON	ABS	CON			

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10  
Instrument Detection Limits (Quarterly)

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_ Contract: HARDING\_LA  
Lab Code: QESFA\_ Case No.: 16865\_ SAS No.: \_\_\_\_\_ SDG No.: HL1\_\_\_\_  
ICP ID Number: \_\_\_\_\_ Date: 10/15/96  
Flame AA ID Number : \_\_\_\_\_  
Furnace AA ID Number : PR5100\_\_\_\_\_

Analyte	Wave-length (nm)	Back-ground	CRDL (ug/L)	IDL (ug/L)	M
Arsenic	193.70	BZ	10	1.8	F

Comments:

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PREPARATION LOG

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_ Contract: HARDING\_LA  
 Lab Code: QESPA\_ Case No.: \_16865\_ SAS No.: \_\_\_\_\_ SDG No.:HL1\_\_\_\_  
 Method: F\_

EPA Sample No.	Preparation Date	Weight (gram)	Volume (mL)
EB1096	10/15/96		100
LCSW	10/15/96		100
LCSWD	10/15/96		100
PBW	10/15/96		100

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14  
ANALYSIS RUN LOG

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_

Contract: HARDING\_LA

Lab Code: QESPA\_ Case No.: 16865\_

SAS No.: \_\_\_\_\_ SDG No.: HL1\_\_\_\_\_

Instrument ID Number: PR5100\_\_\_\_\_

Method: F\_

Start Date: 10/21/96

End Date: 10/21/96

EPA Sample No.	D/F	Time	% R	Analytes															
				A	S														
IS0	1.00	0923		X															
IS10	1.00	0927		X															
IS50	1.00	0931		X															
IS100	1.00	0935		X															
ICV	1.00	0939		X															
ICB	1.00	0943		X															
ICRA	1.00	0946		X															
ICCV	1.00	0950		X															
ICCB	1.00	0954		X															
IPBW	1.00	0958		X															
IPBWA	1.00	1001	110.5	X															
ILCSW	1.00	1005		X															
ILCSWA	1.00	1009	106.5	X															
ILCSWD	1.00	1013		X															
ILCSWDA	1.00	1016	110.0	X															
IEB1096	1.00	1020		X															
IEB1096A	1.00	1024	116.0	X															
ICCV	1.00	1028		X															
ICCB	1.00	1032		X															
IPBS	1.00	1035																	
IPBS	1.00	1047																	
IPBSA	1.00	1051	121.0																
IPBS	1.00	1113																	
IPBSA	1.00	1117	109.5																
ICCV	1.00	1121																	
ICCB	1.00	1124																	
ILCSS	25.00	1132																	
ILCSSA	25.00	1136	122.5																
ICB1002	1.00	1139																	
ICB1002D	1.00	1143																	
ICB1002S	1.00	1147																	
ICB1002	5.00	1149																	

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ANALYSIS RUN LOG

Lab Name: QUANTERRA\_PITTSBURGH

Contract: HARDING\_LA

Lab Code: QESPA Case No.: 16865

SAS No.: SDG No.: HL1

Instrument ID Number: PR5100

Method: F

Start Date: 10/22/96

End Date: 10/22/96

EPA Sample No.	D/F	Time	% R	Analytes															
				A	S														
IS0	1.00	1022		X															
IS10	1.00	1025		X															
IS50	1.00	1029		X															
IS100	1.00	1033		X															
ICV	1.00	1037		X															
ICB	1.00	1041		X															
ICRA	1.00	1045		X															
ICCV	1.00	1048		X															
ICCB	1.00	1052		X															
IPBS	1.00	1135		X															
IPBSA	1.00	1139	109.5	X															
LCSS	25.00	1143		X															
LCSSA	25.00	1146	120.0	X															
CB100E	1.00	1150																	
CB100EA	1.00	1154	97.0																
CB100ED	1.00	1158																	
CB100EDA	1.00	1201	107.0																
CCV	1.00	1205		X															
CCB	1.00	1209		X															
CB100ES	1.00	1213																	
CB200E	1.00	1217																	
CB200EA	1.00	1220	107.0																
CB300E	1.00	1224																	
CB300EA	1.00	1228	65.0																
CB400E	1.00	1232																	
CB400EA	1.00	1235	90.0																
CCV	1.00	1239		X															
CCB	1.00	1243		X															
CB500E	1.00	1247		X															
CB500EA	1.00	1250	114.0	X															
CB600E	1.00	1254																	
CB600EA	1.00	1258	0.0																

14  
ANALYSIS RUN LOG

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_

Contract: HARDING\_LA

Lab Code: QESPA\_ Case No.: 16865\_

SAS No.: \_\_\_\_\_ SDG No.: HL1\_\_\_\_\_

Instrument ID Number: PR5100\_\_\_\_\_

Method: F\_

Start Date: 10/22/96

End Date: 10/22/96

EPA Sample No.	D/F	Time	% R	Analytes															
				A	S														
ZZZZZZ	1.00	1302																	
ZZZZZZ	1.00	1306																	
ZZZZZZ	1.00	1310																	
ZZZZZZ	1.00	1313																	
CCV	1.00	1317		X															
CCB	1.00	1321		X															
ZZZZZZ	1.00	1325																	
ZZZZZZ	1.00	1329																	
ZZZZZZ	1.00	1333																	
ZZZZZZ	1.00	1337																	
ZZZZZZ	1.00	1340																	
ZZZZZZ	1.00	1344																	
ZZZZZZ	1.00	1348																	
ZZZZZZ	1.00	1352																	
CCV	1.00	1356		X															
CCB	1.00	1400		X															
CB1002	5.00	1458		X															
CB1002A	5.00	1502	104.5	X															
CB1002D	5.00	1506		X															
CB1002DA	5.00	1510	95.0	X															
CB1002S	5.00	1513		X															
CB2002	2.00	1517		X															
CB2002A	2.00	1521	103.0	X															
CCV	1.00	1525		X															
CCB	1.00	1528		X															
CB3002	5.00	1532		X															
CB3002A	5.00	1536	93.5	X															
CB4002	5.00	1540		X															
CB4002A	5.00	1544	95.5	X															
CB6002	10.00	1547																	
CB6002A	10.00	1551	94.0																
ZZZZZZ	1.00	1555																	

14  
ANALYSIS RUN LOG

Lab Name: QUANTERRA\_PITTSBURGH\_\_\_\_\_

Contract: HARDING\_LA

Lab Code: QESPA\_ Case No.: 16865\_

SAS No.: \_\_\_\_\_ SDG No.: HL1\_\_\_\_\_

Instrument ID Number: PR5100\_\_\_\_\_

Method: F\_

Start Date: 10/22/96

End Date: 10/22/96

EPA Sample No.	D/F	Time	% R	Analytes													
				A	S												
ZZZZZZ	1.00	1559															
CCV	1.00	1602		X													
CCB	1.00	1606		X													
ZZZZZZ0	1.00	1622															
ZZZZZZ1	1.00	1624															
ZZZZZZ2	1.00	1626															
ZZZZZZ3	1.00	1628															
CB6002	20.00	1636		X													
CB6002A	20.00	1639	101.5	X													
ZZZZZZ	1.00	1704															
ZZZZZZ	1.00	1708															
ZZZZZZ	1.00	1712															
ZZZZZZ	1.00	1716															
ZZZZZZ	1.00	1720															
ZZZZZZ	1.00	1724															
CCV	1.00	1727		X													
CCB	1.00	1731		X													

0032.1

-----  
 Element File: AS\_FAST.GEL      Element: As      Wavelength: 193.7  
 Date: 10/21/96      Time: 09:21      Slit: 0.70 L  
 Data File: 11021ASA.DAT      ID/Wt File: ARSENIC.IDW      Lamp Current: 0  
 Technique: HGA      Calib. Type: Linear      Energy: 45  
 Remark 1: QUANTERRA PITT 450 WILLIAM PITT WAY PITTSBURGH PA 15238  
 Remark 2: UNITS PPB BZ BACKGROUND, INST#10 RAW DATA/ RUN SEQUENCE LOG  
 Remark 3: STDS:10(414-101-5) 50(414-101-6) 100(414-101-7) ITPA GFAA  
 Remark 4: CCV: 50(414-101-8)      PRS100      REVIEWED BY: *Euf 10-23-96*  
 Remark 5: ICV:40(414-85-2) CRA(10):414-97-1      ANALYST(S):RJC  
 -----

As      ID: BLANK      Seq. No.: 00001      A/S Pos.: 1      Date: 10/21/96

Replicate 1      *Blanked 10:21:20*      Time: 09:21      \* *CGJ1014 works*  
 Peak Area (A-s): -0.002      Peak Height (A): 0.013      *CP.*  
 Background Pk Area (A-s): 0.027      Background Pk Height (A): 0.019  
 Blank Corrected Pk Area (A-s): -0.002

Replicate 2      Time: 09:23  
 Peak Area (A-s): 0.005      Peak Height (A): 0.013  
 Background Pk Area (A-s): 0.036      Background Pk Height (A): 0.020  
 Blank Corrected Pk Area (A-s): 0.005

Mean Pk Area (A-s):      0.002      SD: 0.0052      RSD(X): 297.17

Auto-zero performed.

-----  
 As      ID: STANDARD 1      Seq. No.: 00002      A/S Pos.: 2      Date: 10/21/96

Replicate 1      Time: 09:25  
 Peak Area (A-s): 0.047      Peak Height (A): 0.058  
 Background Pk Area (A-s): 0.037      Background Pk Height (A): 0.020  
 Blank Corrected Pk Area (A-s): 0.045

Replicate 2      Time: 09:27  
 Peak Area (A-s): 0.046      Peak Height (A): 0.066  
 Background Pk Area (A-s): 0.036      Background Pk Height (A): 0.022  
 Blank Corrected Pk Area (A-s): 0.044

Mean Pk Area (A-s):      0.044      SD: 0.0008      RSD(X): 1.76

Standard number 1 applied. (10.0)  
 Correlation coefficient: 1.00000      Slope: 0.0044

-----  
 As      ID: STANDARD 2      Seq. No.: 00003      A/S Pos.: 3      Date: 10/21/96

Replicate 1      Time: 09:29  
 Peak Area (A-s): 0.250      Peak Height (A): 0.258  
 Background Pk Area (A-s): 0.040      Background Pk Height (A): 0.029  
 Blank Corrected Pk Area (A-s): 0.248  
 Concentration (ug/L ): 55.9

Replicate 2      Time: 09:31  
 Peak Area (A-s): 0.253      Peak Height (A): 0.255  
 Background Pk Area (A-s): 0.043      Background Pk Height (A): 0.023  
 Blank Corrected Pk Area (A-s): 0.251      *0033*

Concentration (ug/L ): 56.7

Mean Conc (ug/L ): 56.3 SD: 0.57 RSD(X): 1.00

Standard number 2 applied. [50.0]  
Correlation coefficient: 0.99924 Slope: 0.0050

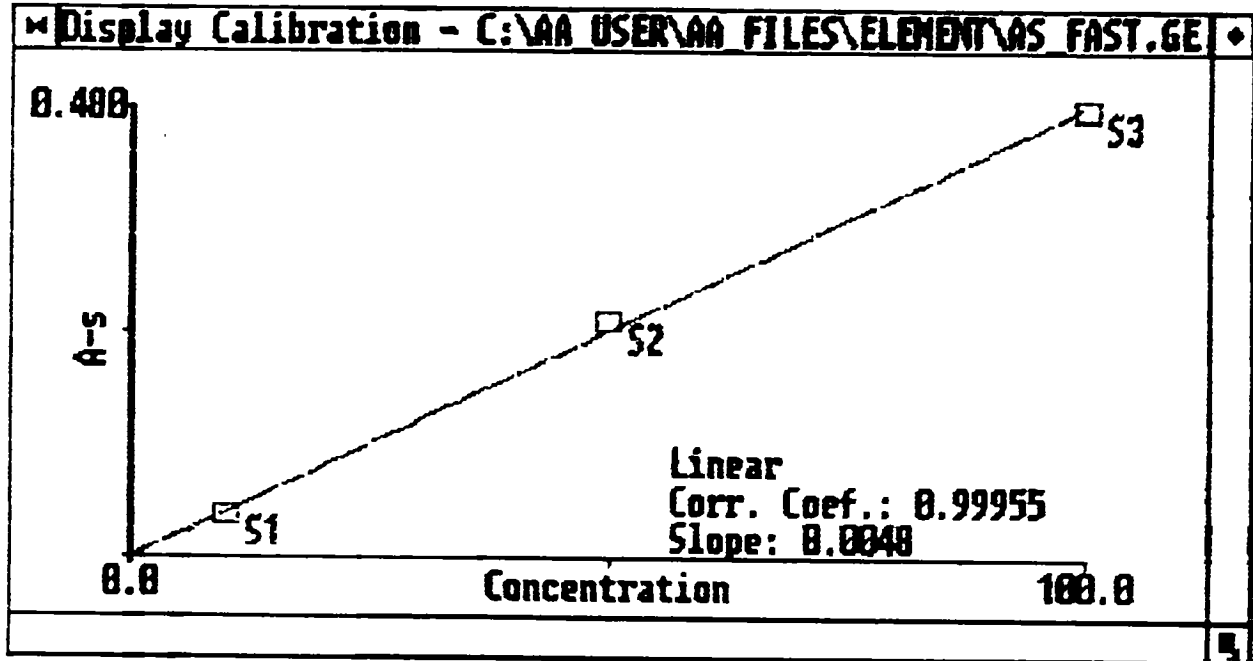
As ID: STANDARD 3 Seq. No.: 00004 A/S Pos.: 4 Date: 10/21/96

Replicate 1 Time: 09:33  
Peak Area (A-s): 0.478 Peak Height (A): 0.495  
Background Pk Area (A-s): 0.059 Background Pk Height (A): 0.043  
Blank Corrected Pk Area (A-s): 0.476  
Concentration (ug/L ): 95.7

Replicate 2 Time: 09:35  
Peak Area (A-s): 0.487 Peak Height (A): 0.680  
Background Pk Area (A-s): 0.048 Background Pk Height (A): 0.053  
Blank Corrected Pk Area (A-s): 0.485  
Concentration (ug/L ): 97.6

Mean Conc (ug/L ): 96.6 SD: 1.31 RSD(X): 1.36

Standard number 3 applied. [100.0]  
Correlation coefficient: 0.99955 Slope: 0.0048



As ID: ICV5-1 Seq. No.: 00005 A/S Pos.: 5 Date: 10/21/96

Replicate 1 Time: 09:37  
Peak Area (A-s): 0.195 Peak Height (A): 0.249  
Background Pk Area (A-s): 0.035 Background Pk Height (A): 0.025  
Blank Corrected Pk Area (A-s): 0.193

0034

Concentration (ug/L ): 39.9

Replicate 2  
Peak Area (A-s): 0.194  
Background Pk Area (A-s): 0.036  
Blank Corrected Pk Area (A-s): 0.192  
Concentration (ug/L ): 39.7

Time: 09:39  
Peak Height (A): 0.222  
Background Pk Height (A): 0.026

Mean Conc (ug/L ): 39.8 SD: 0.13 RSD(%): 0.34

As ID: ICB1 Seq. No.: 00006 A/S Pos.: 6 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.003  
Background Pk Area (A-s): 0.031  
Blank Corrected Pk Area (A-s): 0.001  
Concentration (ug/L ): 0.2

Time: 09:41  
Peak Height (A): 0.013  
Background Pk Height (A): 0.021

Replicate 2  
Peak Area (A-s): 0.006  
Background Pk Area (A-s): 0.023  
Blank Corrected Pk Area (A-s): 0.004  
Concentration (ug/L ): 0.8

Time: 09:43  
Peak Height (A): 0.014  
Background Pk Height (A): 0.016

Mean Conc (ug/L ): 0.5 SD: 0.44 RSD(%): 81.56

As ID: CRA-1 Seq. No.: 00007 A/S Pos.: 7 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.051  
Background Pk Area (A-s): 0.032  
Blank Corrected Pk Area (A-s): 0.049  
Concentration (ug/L ): 10.1

Time: 09:44  
Peak Height (A): 0.067  
Background Pk Height (A): 0.020

Replicate 2  
Peak Area (A-s): 0.048  
Background Pk Area (A-s): 0.029  
Blank Corrected Pk Area (A-s): 0.047  
Concentration (ug/L ): 9.6

Time: 09:46  
Peak Height (A): 0.066  
Background Pk Height (A): 0.018

Mean Conc (ug/L ): 9.9 SD: 0.34 RSD(%): 3.40

As ID: CCV5-1 Seq. No.: 00008 A/S Pos.: 8 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.259  
Background Pk Area (A-s): 0.045  
Blank Corrected Pk Area (A-s): 0.257  
Concentration (ug/L ): 53.2

Time: 09:48  
Peak Height (A): 0.332  
Background Pk Height (A): 0.030

Replicate 2  
Peak Area (A-s): 0.254  
Background Pk Area (A-s): 0.047  
Blank Corrected Pk Area (A-s): 0.253  
Concentration (ug/L ): 52.2

Time: 09:50  
Peak Height (A): 0.287  
Background Pk Height (A): 0.030



Mean Conc (ug/L ): 52.7 SD: 0.68 RSD(%): 1.29

As ID: CCBI Seq. No.: 00009 A/S Pos.: 9 Date: 10/21/96

Replicate 1 Time: 09:52  
Peak Area (A-s): -0.000 Peak Height (A): 0.011  
Background Pk Area (A-s): 0.033 Background Pk Height (A): 0.020  
Blank Corrected Pk Area (A-s): -0.002  
Concentration (ug/L ): -0.4

Replicate 2 Time: 09:54  
Peak Area (A-s): 0.004 Peak Height (A): 0.014  
Background Pk Area (A-s): 0.029 Background Pk Height (A): 0.019  
Blank Corrected Pk Area (A-s): 0.002  
Concentration (ug/L ): 0.4

Mean Conc (ug/L ): -0.0 SD: 0.55 RSD(%): 2069.89

As ID: PBW 10-15-2 Seq. No.: 00010 A/S Pos.: 10 Date: 10/21/96

Replicate 1 Time: 09:56  
Peak Area (A-s): -0.001 Peak Height (A): 0.015  
Background Pk Area (A-s): 0.029 Background Pk Height (A): 0.018  
Blank Corrected Pk Area (A-s): -0.003  
Concentration (ug/L ): -0.6

Replicate 2 Time: 09:58  
Peak Area (A-s): 0.004 Peak Height (A): 0.013  
Background Pk Area (A-s): 0.027 Background Pk Height (A): 0.021  
Blank Corrected Pk Area (A-s): 0.002  
Concentration (ug/L ): 0.5

Mean Conc (ug/L ): -0.0 SD: 0.78 RSD(%): 1920.67

As ID: PBWA 10-15-2 Seq. No.: 00011 A/S Pos.: 11 Date: 10/21/96

Replicate 1 Time: 10:00  
Peak Area (A-s): 0.107 Peak Height (A): 0.171  
Background Pk Area (A-s): 0.037 Background Pk Height (A): 0.025  
Blank Corrected Pk Area (A-s): 0.106  
Concentration (ug/L ): 21.8

Replicate 2 Time: 10:01  
Peak Area (A-s): 0.110 Peak Height (A): 0.177  
Background Pk Area (A-s): 0.039 Background Pk Height (A): 0.028  
Blank Corrected Pk Area (A-s): 0.108  
Concentration (ug/L ): 22.3

Mean Conc (ug/L ): 22.1 SD: 0.33 RSD(%): 1.49

As ID: LCSW 10-15-2 Seq. No.: 00012 A/S Pos.: 12 Date: 10/21/96

Replicate 1 Time: 10:03  
Peak Area (A-s): 0.207 Peak Height (A): 0.345  
Background Pk Area (A-s): 0.047 Background Pk Height (A): 0.032

50.000:110

0036

Blank Corrected Pk Area (A-s): 0.205  
Concentration (ug/L ): 42.3

Replicate 2  
Peak Area (A-s): 0.204  
Background Pk Area (A-s): 0.047  
Blank Corrected Pk Area (A-s): 0.202  
Concentration (ug/L ): 41.7

Time: 10:05  
Peak Height (A): 0.304  
Background Pk Height (A): 0.038

Mean Conc (ug/L ): 42.0 SD: 0.45 RSD(X): 1.08

As ID: LCSWA 10-15-2 Seq. No.: 00013 A/S Pos.: 13 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.314  
Background Pk Area (A-s): 0.050  
Blank Corrected Pk Area (A-s): 0.312  
Concentration (ug/L ): 64.5

Time: 10:07  
Peak Height (A): 0.450  
Background Pk Height (A): 0.040

Replicate 2  
Peak Area (A-s): 0.306  
Background Pk Area (A-s): 0.053  
Blank Corrected Pk Area (A-s): 0.304  
Concentration (ug/L ): 62.8

Time: 10:09  
Peak Height (A): 0.424  
Background Pk Height (A): 0.041

Mean Conc (ug/L ): 63.7 SD: 1.24 RSD(X): 1.94

As ID: LCSW D 10-15-2 Seq. No.: 00014 A/S Pos.: 14 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.207  
Background Pk Area (A-s): 0.049  
Blank Corrected Pk Area (A-s): 0.205  
Concentration (ug/L ): 42.3

Time: 10:11  
Peak Height (A): 0.305  
Background Pk Height (A): 0.032

Replicate 2  
Peak Area (A-s): 0.210  
Background Pk Area (A-s): 0.045  
Blank Corrected Pk Area (A-s): 0.208  
Concentration (ug/L ): 43.0

Time: 10:13  
Peak Height (A): 0.412  
Background Pk Height (A): 0.036

Mean Conc (ug/L ): 42.7 SD: 0.51 RSD(X): 1.20

As ID: LCSW DA 10-15-2 Seq. No.: 00015 A/S Pos.: 15 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.315  
Background Pk Area (A-s): 0.052  
Blank Corrected Pk Area (A-s): 0.313  
Concentration (ug/L ): 64.6

Time: 10:15  
Peak Height (A): 0.514  
Background Pk Height (A): 0.045

Replicate 2  
Peak Area (A-s): 0.316  
Background Pk Area (A-s): 0.047  
Blank Corrected Pk Area (A-s): 0.314  
Concentration (ug/L ): 64.8

Time: 10:16  
Peak Height (A): 0.481  
Background Pk Height (A): 0.041

Mean Conc (ug/L ): 64.7 SD: 0.14 RSD(%): 0.22  
*Sp. Rec: 110!*

As ID: C677C Seq. No.: 00016 A/S Pos.: 16 Date: 10/21/96

Replicate 1 Time: 10:18  
Peak Area (A-s): -0.001 Peak Height (A): 0.012  
Background Pk Area (A-s): 0.034 Background Pk Height (A): 0.023  
Blank Corrected Pk Area (A-s): -0.002  
Concentration (ug/L ): -0.5

Replicate 2 Time: 10:20  
Peak Area (A-s): 0.003 Peak Height (A): 0.013  
Background Pk Area (A-s): 0.033 Background Pk Height (A): 0.024  
Blank Corrected Pk Area (A-s): 0.001  
Concentration (ug/L ): 0.2

Mean Conc (ug/L ): -0.2 SD: 0.49 RSD(%): 289.19

As ID: C677CA Seq. No.: 00017 A/S Pos.: 17 Date: 10/21/96

Replicate 1 Time: 10:22  
Peak Area (A-s): 0.115 Peak Height (A): 0.161  
Background Pk Area (A-s): 0.031 Background Pk Height (A): 0.022  
Blank Corrected Pk Area (A-s): 0.113  
Concentration (ug/L ): 23.4

Replicate 2 Time: 10:24  
Peak Area (A-s): 0.113 Peak Height (A): 0.145  
Background Pk Area (A-s): 0.039 Background Pk Height (A): 0.023  
Blank Corrected Pk Area (A-s): 0.111  
Concentration (ug/L ): 23.0

Mean Conc (ug/L ): 23.2 SD: 0.28 RSD(%): 1.21  
*Sp. Rec: 116!*

As ID: CCV5-2 Seq. No.: 00018 A/S Pos.: 18 Date: 10/21/96

Replicate 1 Time: 10:26  
Peak Area (A-s): 0.262 Peak Height (A): 0.324  
Background Pk Area (A-s): 0.044 Background Pk Height (A): 0.029  
Blank Corrected Pk Area (A-s): 0.260  
Concentration (ug/L ): 53.7

Replicate 2 Time: 10:28  
Peak Area (A-s): 0.262 Peak Height (A): 0.303  
Background Pk Area (A-s): 0.046 Background Pk Height (A): 0.032  
Blank Corrected Pk Area (A-s): 0.260  
Concentration (ug/L ): 53.7

Mean Conc (ug/L ): 53.7 SD: 0.01 RSD(%): 0.03

As ID: CCB2 Seq. No.: 00019 A/S Pos.: 19 Date: 10/21/96

Replicate 1 Time: 10:30  
Peak Area (A-s): 0.004 Peak Height (A): 0.012  
Background Pk Area (A-s): 0.032 Background Pk Height (A): 0.023  
*0038*

Blank Corrected Pk Area (A-s): 0.003  
Concentration (ug/L ): 0.5

Replicate 2  
Peak Area (A-s): 0.004  
Background Pk Area (A-s): 0.030  
Blank Corrected Pk Area (A-s): 0.002  
Concentration (ug/L ): 0.4

Time: 10:32  
Peak Height (A): 0.011  
Background Pk Height (A): 0.018

Mean Conc (ug/L ): 0.5 SD: 0.05 RSD(X): 11.11

As ID: PBS 10-15-1 Seq. No.: 00020 A/S Pos.: 20 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.001  
Background Pk Area (A-s): 0.028  
Blank Corrected Pk Area (A-s): -0.001  
Concentration (ug/L ): -0.2

Time: 10:33  
Peak Height (A): 0.014  
Background Pk Height (A): 0.020

Replicate 2  
Peak Area (A-s): -0.004  
Background Pk Area (A-s): 0.030  
Blank Corrected Pk Area (A-s): -0.005  
Concentration (ug/L ): -1.1

Time: 10:35  
Peak Height (A): 0.011  
Background Pk Height (A): 0.022

Mean Conc (ug/L ): -0.7 SD: 0.63 RSD(X): 94.96 <sup>10219</sup>

VOID: ANALYTICAL  
SAKE DOES NOT  
IMMEDIATELY  
FOLLOW  
(AUTOSAMPLER  
MALFUNCTION)

As ID: PBS 10-15-1 Seq. No.: 00022 A/S Pos.: 20 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.006  
Background Pk Area (A-s): 0.016  
Blank Corrected Pk Area (A-s): 0.004  
Concentration (ug/L ): 0.8

Time: 10:45  
Peak Height (A): 0.013  
Background Pk Height (A): 0.014

Replicate 2  
Peak Area (A-s): 0.007  
Background Pk Area (A-s): 0.025  
Blank Corrected Pk Area (A-s): 0.005  
Concentration (ug/L ): 1.1

Time: 10:47  
Peak Height (A): 0.013  
Background Pk Height (A): 0.018

Mean Conc (ug/L ): 0.9 SD: 0.17

VOID: ANALYTICAL  
SAKE RECOVERY,  
OF PREP BLANK  
EXCEEDS  
15%  
-SAMPLE WILL BE  
RESAVED & RERUN  
RSD(X): 17.74 <sup>10219</sup>

As ID: PBSA 10-15-1 Seq. No.: 00023 A/S Pos.: 21 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.119  
Background Pk Area (A-s): 0.014  
Blank Corrected Pk Area (A-s): 0.117  
Concentration (ug/L ): 24.1

Time: 10:49  
Peak Height (A): 0.311  
Background Pk Height (A): 0.021

Replicate 2  
Peak Area (A-s): 0.119  
Background Pk Area (A-s): 0.026  
Blank Corrected Pk Area (A-s): 0.117  
Concentration (ug/L ): 24.2

Time: 10:51  
Peak Height (A): 0.214  
Background Pk Height (A): 0.022

0039

↑ VUID: SEE  
PREVIOUS PAGE  
PB 10-21-96  
RSD(%): 0.18  
↓ SQ. REC: 121.1

Mean Conc (ug/L ): 24.2 SD: 0.04

As ID: PBS 10-15-1 Seq. No.: 00024 A/S Pos.: 22 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.001  
Background Pk Area (A-s): 0.028  
Blank Corrected Pk Area (A-s): -0.001  
Concentration (ug/L ): -0.1

Time: 11:11  
Peak Height (A): 0.014  
Background Pk Height (A): 0.019

Replicate 2  
Peak Area (A-s): 0.003  
Background Pk Area (A-s): 0.020  
Blank Corrected Pk Area (A-s): 0.002  
Concentration (ug/L ): 0.3

Time: 11:13  
Peak Height (A): 0.014  
Background Pk Height (A): 0.017  
NOTE: PBS 10-15-1 WILL  
BE RE-RUN WITH  
ASSOCIATED SAMPLE  
ON  
ANOTHER SAMPLE CUR  
PB 10-21-96

Mean Conc (ug/L ): 0.1 SD: 0.30 RSD(%): 297.18

As ID: PBSA 10-15-1 Seq. No.: 00025 A/S Pos.: 23 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.109  
Background Pk Area (A-s): 0.034  
Blank Corrected Pk Area (A-s): 0.107  
Concentration (ug/L ): 22.1

Time: 11:15  
Peak Height (A): 0.123  
Background Pk Height (A): 0.022

Replicate 2  
Peak Area (A-s): 0.107  
Background Pk Area (A-s): 0.025  
Blank Corrected Pk Area (A-s): 0.105  
Concentration (ug/L ): 21.7

Time: 11:17  
Peak Height (A): 0.175  
Background Pk Height (A): 0.022

Mean Conc (ug/L ): 21.9 SD: 0.31 RSD(%): 1.42

As ID: CCV5-3 Seq. No.: 00026 A/S Pos.: 24 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.267  
Background Pk Area (A-s): 0.030  
Blank Corrected Pk Area (A-s): 0.265  
Concentration (ug/L ): 54.7

Time: 11:19  
Peak Height (A): 0.332  
Background Pk Height (A): 0.032

Replicate 2  
Peak Area (A-s): 0.252  
Background Pk Area (A-s): 0.047  
Blank Corrected Pk Area (A-s): 0.250  
Concentration (ug/L ): 51.7

Time: 11:21  
Peak Height (A): 0.312  
Background Pk Height (A): 0.029

Mean Conc (ug/L ): 53.2 SD: 2.13 RSD(%): 4.01

As ID: CCB3 Seq. No.: 00027 A/S Pos.: 25 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.000  
Background Pk Area (A-s): 0.030

Time: 11:22  
Peak Height (A): 0.015  
Background Pk Height (A): 0.020

0040

Blank Corrected Pk Area (A-s): -0.002  
Concentration (ug/L ): -0.3

Replicate 2  
Peak Area (A-s): 0.003  
Background Pk Area (A-s): 0.028  
Blank Corrected Pk Area (A-s): 0.001  
Concentration (ug/L ): 0.3

Time: 11:24  
Peak Height (A): 0.016  
Background Pk Height (A): 0.017

Mean Conc (ug/L ): -0.0 SD: 0.44 RSD(%): 4354.80

As ID: LCSS 10-15-1x25 Seq. No.: 00028 A/S Pos.: 26 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.252  
Background Pk Area (A-s): 0.051  
Blank Corrected Pk Area (A-s): 0.250  
Concentration (ug/L ): 51.7

Time: 11:30  
Peak Height (A): 0.301  
Background Pk Height (A): 0.048

VOID: CCV54 E  
CCBA NOT  
ANALYZED. DUE  
TO  
AUTOSAMPLER  
MALFUNCTION.  
RB  
0210

Replicate 2  
Peak Area (A-s): 0.239  
Background Pk Area (A-s): 0.056  
Blank Corrected Pk Area (A-s): 0.237  
Concentration (ug/L ): 49.0

Time: 11:32  
Peak Height (A): 0.239  
Background Pk Height (A): 0.044

Mean Conc (ug/L ): 50.3 SD: 1.91 RSD(%): 3.79

As ID: LCSSA10-15-1x25 Seq. No.: 00029 A/S Pos.: 27 Date: 10/21/96

Replicate 1  
Peak Area (A-s): 0.360  
Background Pk Area (A-s): 0.053  
Blank Corrected Pk Area (A-s): 0.358  
Concentration (ug/L ): 74.0

Time: 11:34  
Peak Height (A): 0.427  
Background Pk Height (A): 0.051

Replicate 2  
Peak Area (A-s): 0.368  
Background Pk Area (A-s): 0.058  
Blank Corrected Pk Area (A-s): 0.366  
Concentration (ug/L ): 75.6

Time: 11:36  
Peak Height (A): 0.390  
Background Pk Height (A): 0.048

Mean Conc (ug/L ): 74.8 SD: 1.16 RSD(%): 1.56

As ID: C6775 Seq. No.: 00030 A/S Pos.: 28 Date: 10/21/96

Sample abs. is greater than that of the largest standard.  
Replicate 1  
Peak Area (A-s): 0.977  
Background Pk Area (A-s): 0.461  
Blank Corrected Pk Area (A-s): 0.975  
Concentration (ug/L ): 201.5

Time: 11:38  
Peak Height (A): 1.017  
Background Pk Height (A): 0.434

Sample abs. is greater than that of the largest standard.  
Replicate 2  
Peak Area (A-s): 0.986  
Background Pk Area (A-s): 0.526

Time: 11:39  
Peak Height (A): 1.053  
Background Pk Height (A): 0.473

0041

Blank Corrected Pk Area (A-g): 0.984  
Concentration (ug/L ): 203.3

Sample abs. is greater than that of the largest standard.  
Mean Conc (ug/L ): 202.4 SD: 1.28

RSD(%): 0.63

As ID: C6775D Seq. No.: 00031 A/S Pos.: 29 Date: 10/21/96

Sample abs. is greater than that of the largest standard.

Replicate 1 Time: 11:41  
Peak Area (A-g): 0.918 Peak Height (A): 1.050  
Background Pk Area (A-g): 0.510 Background Pk Height (A): 0.507  
Blank Corrected Pk Area (A-g): 0.916  
Concentration (ug/L ): 189.4

VOID: CCVS-49 COI  
NOT ANALYZED  
DUE TO AUTO-SAMPLER  
MALFUNCTION.  
R36 10/21/96

Sample abs. is greater than that of the largest standard.

Replicate 2 Time: 11:43  
Peak Area (A-g): 0.921 Peak Height (A): 0.945  
Background Pk Area (A-g): 0.513 Background Pk Height (A): 0.477  
Blank Corrected Pk Area (A-g): 0.919  
Concentration (ug/L ): 190.0

Sample abs. is greater than that of the largest standard.

Mean Conc (ug/L ): 189.7 SD: 0.42 RSD(%): 0.22

As ID: C6775S Seq. No.: 00032 A/S Pos.: 30 Date: 10/21/96

Sample abs. is greater than that of the largest standard.

Replicate 1 Time: 11:45  
Peak Area (A-g): 1.058 Peak Height (A): 1.246  
Background Pk Area (A-g): 0.573 Background Pk Height (A): 0.568  
Blank Corrected Pk Area (A-g): 1.056  
Concentration (ug/L ): 218.1

Sample abs. is greater than that of the largest standard.

Replicate 2 Time: 11:47  
Peak Area (A-g): 1.071 Peak Height (A): 1.169  
Background Pk Area (A-g): 0.576 Background Pk Height (A): 0.559  
Blank Corrected Pk Area (A-g): 1.070  
Concentration (ug/L ): 221.0

Sample abs. is greater than that of the largest standard.

Mean Conc (ug/L ): 219.6 SD: 2.01 RSD(%): 0.92

As ID: C6775 x5 Seq. No.: 00033 A/S Pos.: 31 Date: 10/21/96

Replicate 1 Time: 11:49  
Peak Area (A-g): 0.218 Peak Height (A): 0.262  
Background Pk Area (A-g): 0.169 Background Pk Height (A): 0.182  
Blank Corrected Pk Area (A-g): 0.217  
Concentration (ug/L ): 44.7

END OF ANALYSIS  
R36 10/21/96

0041.1

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

PI 2 1-8

-----  
 Element File: AS\_FAST.GEL      Element: As      Wavelength: 193.7  
 Date: 10/22/96      Time: 10:20      Slit: 0.70 L  
 Data File: 11022ASA.DAT      ID/Wt File: ARSENIC.IDW      Lamp Current: 0  
 Technique: HGA      Calib. Type: Linear      Energy: 49  
 Remark 1: QUANTERRA PITT 450 WILLIAM PITT WAY PITTSBURGH PA 15238  
 Remark 2: UNITS PPB BZ BACKGROUND, INST#10 RAW DATA/ RUN SEQUENCE LOG  
 Remark 3: STDS:10(414-101-9) 50(414-101-10) 100(414-101-11) ITPA GFAA  
 Remark 4: CCV: 50(414-101-12) PR5100      REVIEWED BY: *Amu Qjed 10/23/96*  
 Remark 5: ICV:40(414-85-2) CRA(10):414-97-1      ANALYST(S):EMF  
 -----

As      ID: BLANK      Seq. No.: 00001      A/S Pos.: 1      Date: 10/22/96

Replicate 1      Time: 10:20  
 Peak Area (A-s): 0.004      Peak Height (A): 0.012  
 Background Pk Area (A-s): 0.033      Background Pk Height (A): 0.032  
 Blank Corrected Pk Area (A-s): 0.004  
*\*C6J110114 - CLPILM03.0*

Replicate 2      Time: 10:22  
 Peak Area (A-s): -0.001      Peak Height (A): 0.009  
 Background Pk Area (A-s): 0.023      Background Pk Height (A): 0.014  
 Blank Corrected Pk Area (A-s): -0.001  
*\*C6J106179 - 206.2*

Mean Pk Area (A-s):      0.002      SD: 0.0031      RSD(%): 192.47

Auto-zero performed.

-----  
 As      ID: STANDARD 1      Seq. No.: 00002      A/S Pos.: 2      Date: 10/22/96

Replicate 1      Time: 10:23  
 Peak Area (A-s): 0.050      Peak Height (A): 0.056  
 Background Pk Area (A-s): 0.031      Background Pk Height (A): 0.019  
 Blank Corrected Pk Area (A-s): 0.049

Replicate 2      Time: 10:25  
 Peak Area (A-s): 0.050      Peak Height (A): 0.055  
 Background Pk Area (A-s): 0.033      Background Pk Height (A): 0.019  
 Blank Corrected Pk Area (A-s): 0.048

Mean Pk Area (A-s):      0.048      SD: 0.0003      RSD(%): 0.65

Standard number 1 applied. [10.0]  
 Correlation coefficient: 1.00000      Slope: 0.0048

-----  
 As      ID: STANDARD 2      Seq. No.: 00003      A/S Pos.: 3      Date: 10/22/96

Replicate 1      Time: 10:27  
 Peak Area (A-s): 0.235      Peak Height (A): 0.244  
 Background Pk Area (A-s): 0.048      Background Pk Height (A): 0.027  
 Blank Corrected Pk Area (A-s): 0.233  
 Concentration (ug/L ): 48.3

Replicate 2      Time: 10:29  
 Peak Area (A-s): 0.255      Peak Height (A): 0.390  
 Background Pk Area (A-s): 0.036      Background Pk Height (A): 0.029  
 Blank Corrected Pk Area (A-s): 0.253  
*0042*



GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Concentration (ug/L ): 52.3

Mean Conc (ug/L ): 50.3 SD: 2.88 RSD(%): 5.72

Standard number 2 applied. [50.0]  
Correlation coefficient: 1.00000 Slope: 0.0049

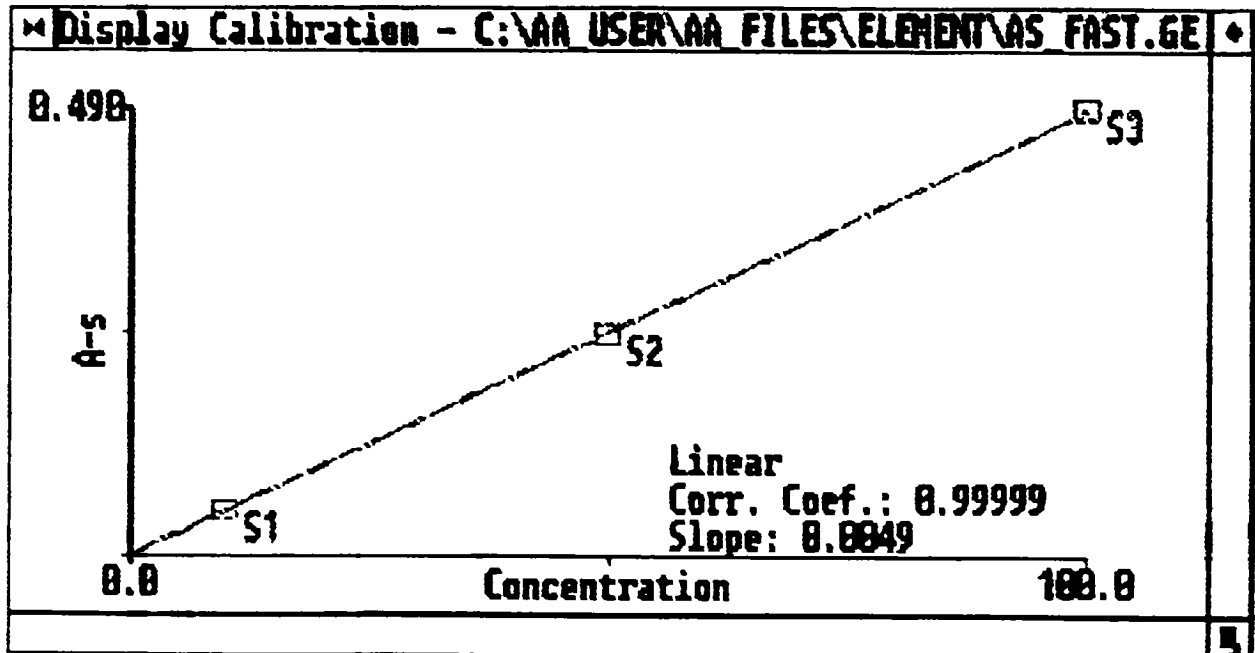
As ID: STANDARD 3 Seq. No.: 00004 A/S Pos.: 4 Date: 10/22/96

Replicate 1 Time: 10:31  
Peak Area (A-s): 0.488 Peak Height (A): 0.515  
Background Pk Area (A-s): 0.059 Background Pk Height (A): 0.041  
Blank Corrected Pk Area (A-s): 0.486  
Concentration (ug/L ): 99.9

Replicate 2 Time: 10:33  
Peak Area (A-s): 0.495 Peak Height (A): 0.541  
Background Pk Area (A-s): 0.061 Background Pk Height (A): 0.047  
Blank Corrected Pk Area (A-s): 0.494  
Concentration (ug/L ): 101.5

Mean Conc (ug/L ): 100.7 SD: 1.12 RSD(%): 1.11

Standard number 3 applied. [100.0]  
Correlation coefficient: 0.99999 Slope: 0.0049



As ID: ICV5-1 Seq. No.: 00005 A/S Pos.: 5 Date: 10/22/96

Replicate 1 Time: 10:35  
Peak Area (A-s): 0.202 Peak Height (A): 0.238  
Background Pk Area (A-s): 0.041 Background Pk Height (A): 0.028  
Blank Corrected Pk Area (A-s): 0.201

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Concentration (ug/L ): 41.1

Replicate 2  
Peak Area (A-s): 0.207  
Background Pk Area (A-s): 0.038  
Blank Corrected Pk Area (A-s): 0.206  
Concentration (ug/L ): 42.0

Time: 10:37  
Peak Height (A): 0.251  
Background Pk Height (A): 0.024

Mean Conc (ug/L ): 41.5 SD: 0.67 RSD(%): 1.62

As ID: ICB1 Seq. No.: 00006 A/S Pos.: 6 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.002  
Background Pk Area (A-s): 0.026  
Blank Corrected Pk Area (A-s): 0.001  
Concentration (ug/L ): 0.2

Time: 10:39  
Peak Height (A): 0.011  
Background Pk Height (A): 0.014

Replicate 2  
Peak Area (A-s): 0.004  
Background Pk Area (A-s): 0.028  
Blank Corrected Pk Area (A-s): 0.002  
Concentration (ug/L ): 0.5

Time: 10:41  
Peak Height (A): 0.009  
Background Pk Height (A): 0.018

Mean Conc (ug/L ): 0.3 SD: 0.22 RSD(%): 68.87

As ID: CRA-1 Seq. No.: 00007 A/S Pos.: 7 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.049  
Background Pk Area (A-s): 0.034  
Blank Corrected Pk Area (A-s): 0.048  
Concentration (ug/L ): 9.7

Time: 10:43  
Peak Height (A): 0.052  
Background Pk Height (A): 0.018

Replicate 2  
Peak Area (A-s): 0.049  
Background Pk Area (A-s): 0.030  
Blank Corrected Pk Area (A-s): 0.048  
Concentration (ug/L ): 9.8

Time: 10:45  
Peak Height (A): 0.060  
Background Pk Height (A): 0.016

Mean Conc (ug/L ): 9.7 SD: 0.01 RSD(%): 0.10

As ID: CCV5-1 Seq. No.: 00008 A/S Pos.: 8 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.244  
Background Pk Area (A-s): 0.042  
Blank Corrected Pk Area (A-s): 0.242  
Concentration (ug/L ): 49.5

Time: 10:46  
Peak Height (A): 0.269  
Background Pk Height (A): 0.029

Replicate 2  
Peak Area (A-s): 0.250  
Background Pk Area (A-s): 0.041  
Blank Corrected Pk Area (A-s): 0.248  
Concentration (ug/L ): 50.7

Time: 10:48  
Peak Height (A): 0.331  
Background Pk Height (A): 0.031

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Mean Conc (ug/L ): 50.1 SD: 0.84 RSD(%): 1.68

As ID: CCB1 Seq. No.: 00009 A/S Pos.: 9 Date: 10/22/96

Replicate 1 Time: 10:50  
Peak Area (A-s): 0.002 Peak Height (A): 0.010  
Background Pk Area (A-s): 0.026 Background Pk Height (A): 0.018  
Blank Corrected Pk Area (A-s): -0.000  
Concentration (ug/L ): -0.0

Replicate 2 Time: 10:52  
Peak Area (A-s): 0.004 Peak Height (A): 0.009  
Background Pk Area (A-s): 0.025 Background Pk Height (A): 0.016  
Blank Corrected Pk Area (A-s): 0.002  
Concentration (ug/L ): 0.4

Mean Conc (ug/L ): 0.2 SD: 0.30 RSD(%): 152.65

*06J110114, 06J110115*

As ID: FBS 10-15-1 Seq. No.: 00010 A/S Pos.: 1 Date: 10/22/96

Replicate 1 Time: 11:33  
Peak Area (A-s): -0.000 Peak Height (A): 0.009  
Background Pk Area (A-s): 0.017 Background Pk Height (A): 0.012  
Blank Corrected Pk Area (A-s): -0.002  
Concentration (ug/L ): -0.4

Replicate 2 Time: 11:35  
Peak Area (A-s): 0.003 Peak Height (A): 0.010  
Background Pk Area (A-s): 0.022 Background Pk Height (A): 0.014  
Blank Corrected Pk Area (A-s): 0.001  
Concentration (ug/L ): 0.3

Mean Conc (ug/L ): -0.1 SD: 0.48 RSD(%): 563.43

As ID: FBSA 10-15-1 Seq. No.: 00011 A/S Pos.: 2 Date: 10/22/96

Replicate 1 Time: 11:37  
Peak Area (A-s): 0.109 Peak Height (A): 0.178  
Background Pk Area (A-s): 0.026 Background Pk Height (A): 0.020  
Blank Corrected Pk Area (A-s): 0.107  
Concentration (ug/L ): 21.9

Replicate 2 Time: 11:39  
Peak Area (A-s): 0.109 Peak Height (A): 0.167  
Background Pk Area (A-s): 0.026 Background Pk Height (A): 0.018  
Blank Corrected Pk Area (A-s): 0.107  
Concentration (ug/L ): 21.9

Mean Conc (ug/L ): 21.9 SD: 0.04 RSD(%): 0.20

*SP. REC. = 110%*

As ID: LCSS 10-15-1x25 Seq. No.: 00012 A/S Pos.: 3 Date: 10/22/96

Replicate 1 Time: 11:41  
Peak Area (A-s): 0.237 Peak Height (A): 0.315  
Background Pk Area (A-s): 0.048 Background Pk Height (A): 0.036

*0045*

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Blank Corrected Pk Area (A-s): 0.235  
Concentration (ug/L ): 48.1

Replicate 2 Time: 11:43  
Peak Area (A-s): 0.222 Peak Height (A): 0.223  
Background Pk Area (A-s): 0.051 Background Pk Height (A): 0.038  
Blank Corrected Pk Area (A-s): 0.220  
Concentration (ug/L ): 45.0

Mean Conc (ug/L ): 46.6 SD: 2.19 RSD(%): 4.71

As ID: LCSSA10-15-1x25 Seq. No.: 00013 A/S Pos.: 4 Date: 10/22/96

Replicate 1 Time: 11:44  
Peak Area (A-s): 0.344 Peak Height (A): 0.370  
Background Pk Area (A-s): 0.059 Background Pk Height (A): 0.043  
Blank Corrected Pk Area (A-s): 0.342  
Concentration (ug/L ): 69.9

Replicate 2 Time: 11:46  
Peak Area (A-s): 0.351 Peak Height (A): 0.394  
Background Pk Area (A-s): 0.059 Background Pk Height (A): 0.046  
Blank Corrected Pk Area (A-s): 0.349  
Concentration (ug/L ): 71.3

Mean Conc (ug/L ): 70.6 SD: 0.99 RSD(%): 1.40

As ID: C6775 Seq. No.: 00014 A/S Pos.: 5 Date: 10/22/96

Sample abs. is greater than that of the largest standard.

Replicate 1 Time: 11:48  
Peak Area (A-s): 0.926 Peak Height (A): 0.712  
Background Pk Area (A-s): 0.414 Background Pk Height (A): 0.332  
Blank Corrected Pk Area (A-s): 0.925  
Concentration (ug/L ): 189.0

Sample abs. is greater than that of the largest standard.

Replicate 2 Time: 11:50  
Peak Area (A-s): 0.922 Peak Height (A): 1.028  
Background Pk Area (A-s): 0.473 Background Pk Height (A): 0.460  
Blank Corrected Pk Area (A-s): 0.920  
Concentration (ug/L ): 188.1

Sample abs. is greater than that of the largest standard.

Mean Conc (ug/L ): 188.6 SD: 0.69 RSD(%): 0.37

As ID: AC6775 Seq. No.: 00015 A/S Pos.: 6 Date: 10/22/96

Sample abs. is greater than that of the largest standard.

Replicate 1 Time: 11:52  
Peak Area (A-s): 1.012 Peak Height (A): 0.708  
Background Pk Area (A-s): 0.489 Background Pk Height (A): 0.361  
Blank Corrected Pk Area (A-s): 1.010  
Concentration (ug/L ): 206.5

Sample abs. is greater than that of the largest standard.

*S. REC = 120%*

*VOID: See  
printed message.  
EUF 10-22-96*

0046



GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Replicate 2  
Peak Area (A-s): 1.026  
Background Pk Area (A-s): 0.500  
Blank Corrected Pk Area (A-s): 1.024  
Concentration (ug/L ): 209.4

Time: 11:54  
Peak Height (A): 1.072  
Background Pk Height (A): 0.456

Sample abs. is greater than that of the largest standard.  
Mean Conc (ug/L ): 208.0 SD: 2.04

RSD(%): 0.98

*SP. REC. = 97%*

As ID: C6775D Seq. No.: 00016 A/S Pos.: 7 Date: 10/22/96

Sample abs. is greater than that of the largest standard.

Replicate 1  
Peak Area (A-s): 0.860  
Background Pk Area (A-s): 0.464  
Blank Corrected Pk Area (A-s): 0.858  
Concentration (ug/L ): 175.4

Time: 11:56  
Peak Height (A): 0.946  
Background Pk Height (A): 0.473

Sample abs. is greater than that of the largest standard.

Replicate 2  
Peak Area (A-s): 0.844  
Background Pk Area (A-s): 0.455  
Blank Corrected Pk Area (A-s): 0.842  
Concentration (ug/L ): 172.2

Time: 11:58  
Peak Height (A): 0.957  
Background Pk Height (A): 0.472

*VOID! See  
printed  
message.  
EUF 10-22-96*

Sample abs. is greater than that of the largest standard.  
Mean Conc (ug/L ): 173.8 SD: 2.29

RSD(%): 1.32

As ID: ~~AC6775D~~ *EUF 10-22-96*  
*AC6775D* Seq. No.: 00017 A/S Pos.: 8 Date: 10/22/96

Sample abs. is greater than that of the largest standard.

Replicate 1  
Peak Area (A-s): 0.941  
Background Pk Area (A-s): 0.457  
Blank Corrected Pk Area (A-s): 0.939  
Concentration (ug/L ): 192.0

Time: 12:00  
Peak Height (A): 1.008  
Background Pk Height (A): 0.471

Sample abs. is greater than that of the largest standard.

Replicate 2  
Peak Area (A-s): 0.972  
Background Pk Area (A-s): 0.473  
Blank Corrected Pk Area (A-s): 0.971  
Concentration (ug/L ): 198.4

Time: 12:01  
Peak Height (A): 0.945  
Background Pk Height (A): 0.448

Sample abs. is greater than that of the largest standard.  
Mean Conc (ug/L ): 195.2 SD: 4.57

RSD(%): 2.34

*SP. REC. = 107%*

As ID: CCV5-2 Seq. No.: 00018 A/S Pos.: 9 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.247  
Background Pk Area (A-s): 0.087  
Blank Corrected Pk Area (A-s): 0.245  
Concentration (ug/L ): 50.2

Time: 12:03  
Peak Height (A): 0.274  
Background Pk Height (A): 0.098

*NOT VOID, EUF 10-22-*

Replicate 2 Time: 12:05

0047

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Peak Area (A-s): 0.258  
Background Pk Area (A-s): 0.035  
Blank Corrected Pk Area (A-s): 0.256  
Concentration (ug/L ): 52.4

Peak Height (A): 0.332  
Background Pk Height (A): 0.031

Mean Conc (ug/L ): 51.3 SD: 1.57 RSD(%): 3.06

As ID: CCB2 Seq. No.: 00019 A/S Pos.: 10 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.004  
Background Pk Area (A-s): 0.022  
Blank Corrected Pk Area (A-s): 0.003  
Concentration (ug/L ): 0.6

Time: 12:07  
Peak Height (A): 0.010  
Background Pk Height (A): 0.014

Replicate 2  
Peak Area (A-s): 0.004  
Background Pk Area (A-s): 0.023  
Blank Corrected Pk Area (A-s): 0.002  
Concentration (ug/L ): 0.4

Time: 12:09  
Peak Height (A): 0.012  
Background Pk Height (A): 0.017

Mean Conc (ug/L ): 0.5 SD: 0.10 RSD(%): 20.57

As ID: C677955 Seq. No.: 00020 A/S Pos.: 11 Date: 10/22/96

*EUFI0-2296*

Sample abs. is greater than that of the largest standard.

Replicate 1  
Peak Area (A-s): 0.987  
Background Pk Area (A-s): 0.458  
Blank Corrected Pk Area (A-s): 0.986  
Concentration (ug/L ): 201.5

Time: 12:11  
Peak Height (A): 1.368  
Background Pk Height (A): 0.523

Sample abs. is greater than that of the largest standard.

Replicate 2  
Peak Area (A-s): 1.006  
Background Pk Area (A-s): 0.499  
Blank Corrected Pk Area (A-s): 1.005  
Concentration (ug/L ): 205.4

Time: 12:13  
Peak Height (A): 1.172  
Background Pk Height (A): 0.507

Sample abs. is greater than that of the largest standard.

Mean Conc (ug/L ): 203.5 SD: 2.75

RSD(%): 1.35

*MAT. SP. REC. = 37%*

As ID: C6776 Seq. No.: 00021 A/S Pos.: 12 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.425  
Background Pk Area (A-s): 0.426  
Blank Corrected Pk Area (A-s): 0.423  
Concentration (ug/L ): 86.6

Time: 12:15  
Peak Height (A): 0.354  
Background Pk Height (A): 0.313

Replicate 2  
Peak Area (A-s): 0.440  
Background Pk Area (A-s): 0.428  
Blank Corrected Pk Area (A-s): 0.438  
Concentration (ug/L ): 89.6

Time: 12:17  
Peak Height (A): 0.508  
Background Pk Height (A): 0.350

0048



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Mean Conc (ug/L ): 88.1 SD: 2.13 RSD(%): 2.42

As ID: AC6776 Seq. No.: 00022 A/S Pos.: 13 Date: 10/22/96

Replicate 1 Time: 12:18  
Peak Area (A-s): 0.538 Peak Height (A): 0.567  
Background Pk Area (A-s): 0.428 Background Pk Height (A): 0.351  
Blank Corrected Pk Area (A-s): 0.537  
Concentration (ug/L ): 109.7

Replicate 2 Time: 12:20  
Peak Area (A-s): 0.536 Peak Height (A): 0.537  
Background Pk Area (A-s): 0.425 Background Pk Height (A): 0.346  
Blank Corrected Pk Area (A-s): 0.534  
Concentration (ug/L ): 109.3

Mean Conc (ug/L ): 109.5 SD: 0.32 RSD(%): 0.30

As ID: C6777 Seq. No.: 00023 A/S Pos.: 14 Date: 10/22/96

Sample abs. is greater than that of the largest standard.  
Replicate 1 Time: 12:22  
Peak Area (A-s): 1.273 Peak Height (A): 1.691  
Background Pk Area (A-s): 0.454 Background Pk Height (A): 0.413  
Blank Corrected Pk Area (A-s): 1.271  
Concentration (ug/L ): 259.8

Sample abs. is greater than that of the largest standard.  
Replicate 2 Time: 12:24  
Peak Area (A-s): 1.277 Peak Height (A): 1.688  
Background Pk Area (A-s): 0.437 Background Pk Height (A): 0.392  
Blank Corrected Pk Area (A-s): 1.276  
Concentration (ug/L ): 260.8

Sample abs. is greater than that of the largest standard.  
Mean Conc (ug/L ): 260.3 SD: 0.69 RSD(%): 0.27

As ID: AC6777 Seq. No.: 00024 A/S Pos.: 15 Date: 10/22/96

Sample abs. is greater than that of the largest standard.  
Replicate 1 Time: 12:26  
Peak Area (A-s): 1.358 Peak Height (A): 1.785  
Background Pk Area (A-s): 0.454 Background Pk Height (A): 0.416  
Blank Corrected Pk Area (A-s): 1.356  
Concentration (ug/L ): 277.3

Sample abs. is greater than that of the largest standard.  
Replicate 2 Time: 12:28  
Peak Area (A-s): 1.319 Peak Height (A): 1.772  
Background Pk Area (A-s): 0.446 Background Pk Height (A): 0.420  
Blank Corrected Pk Area (A-s): 1.317  
Concentration (ug/L ): 269.3

Sample abs. is greater than that of the largest standard.  
Mean Conc (ug/L ): 273.3 SD: 5.67 RSD(%): 2.07

VOID: Conc. of analytical spike is greater than the largest standard.  
EUF 10-22-96

SP. REC = 107%

VOID: See Printed message.  
EUF 10-22-96

SP. REC. = 65%  
↓

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

As ID: C6778 Seq. No.: 00025 A/S Pos.: 16 Date: 10/22/96

Sample abs. is greater than that of the largest standard.

Replicate 1 Time: 12:30  
Peak Area (A-s): 0.853 Peak Height (A): 1.044  
Background Pk Area (A-s): 0.404 Background Pk Height (A): 0.427  
Blank Corrected Pk Area (A-s): 0.851  
Concentration (ug/L ): 174.0

VOID: See  
printed  
message.  
EMF  
10-22-96

Sample abs. is greater than that of the largest standard.

Replicate 2 Time: 12:32  
Peak Area (A-s): 0.856 Peak Height (A): 0.736  
Background Pk Area (A-s): 0.421 Background Pk Height (A): 0.371  
Blank Corrected Pk Area (A-s): 0.854  
Concentration (ug/L ): 174.7

Sample abs. is greater than that of the largest standard.

Mean Conc (ug/L ): 174.3 SD: 0.46 RSD (%): 0.26

As ID: AC6778 Seq. No.: 00026 A/S Pos.: 17 Date: 10/22/96

Sample abs. is greater than that of the largest standard.

Replicate 1 Time: 12:33  
Peak Area (A-s): 0.937 Peak Height (A): 1.108  
Background Pk Area (A-s): 0.420 Background Pk Height (A): 0.429  
Blank Corrected Pk Area (A-s): 0.935  
Concentration (ug/L ): 191.2

Sample abs. is greater than that of the largest standard.

Replicate 2 Time: 12:35  
Peak Area (A-s): 0.948 Peak Height (A): 1.124  
Background Pk Area (A-s): 0.424 Background Pk Height (A): 0.421  
Blank Corrected Pk Area (A-s): 0.947  
Concentration (ug/L ): 193.5

Sample abs. is greater than that of the largest standard.

Mean Conc (ug/L ): 192.4 SD: 1.62 RSD (%): 0.84

SP. ~~RET.~~ = 90%

As ID: CCV5-3 Seq. No.: 00027 A/S Pos.: 18 Date: 10/22/96

Replicate 1 Time: 12:37  
Peak Area (A-s): 0.265 Peak Height (A): 0.361  
Background Pk Area (A-s): 0.076 Background Pk Height (A): 0.085  
Blank Corrected Pk Area (A-s): 0.263  
Concentration (ug/L ): 53.8

Replicate 2 Time: 12:39  
Peak Area (A-s): 0.260 Peak Height (A): 0.369  
Background Pk Area (A-s): 0.035 Background Pk Height (A): 0.031  
Blank Corrected Pk Area (A-s): 0.259  
Concentration (ug/L ): 52.9

Mean Conc (ug/L ): 53.3 SD: 0.68 RSD (%): 1.28



GFAA-AS  
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As ID: CCB3 Seq. No.: 00028 A/S Pos.: 19 Date: 10/22/96

Replicate 1 Time: 12:41  
Peak Area (A-s): 0.005 Peak Height (A): 0.012  
Background Pk Area (A-s): 0.026 Background Pk Height (A): 0.017  
Blank Corrected Pk Area (A-s): 0.003  
Concentration (ug/L ): 0.6

Replicate 2 Time: 12:43  
Peak Area (A-s): 0.001 Peak Height (A): 0.011  
Background Pk Area (A-s): 0.023 Background Pk Height (A): 0.016  
Blank Corrected Pk Area (A-s): -0.001  
Concentration (ug/L ): -0.1

Mean Conc (ug/L ): 0.3 SD: 0.52 RSD(%): 200.66

As ID: C6779 Seq. No.: 00029 A/S Pos.: 20 Date: 10/22/96

Replicate 1 Time: 12:45  
Peak Area (A-s): 0.357 Peak Height (A): 0.404  
Background Pk Area (A-s): 0.377 Background Pk Height (A): 0.397  
Blank Corrected Pk Area (A-s): 0.355  
Concentration (ug/L ): 72.7

Replicate 2 Time: 12:47  
Peak Area (A-s): 0.366 Peak Height (A): 0.487  
Background Pk Area (A-s): 0.429 Background Pk Height (A): 0.473  
Blank Corrected Pk Area (A-s): 0.364  
Concentration (ug/L ): 74.4

Mean Conc (ug/L ): 73.5 SD: 1.24 RSD(%): 1.69

As ID: AC6779 Seq. No.: 00030 A/S Pos.: 21 Date: 10/22/96

Replicate 1 Time: 12:49  
Peak Area (A-s): 0.473 Peak Height (A): 0.723  
Background Pk Area (A-s): 0.437 Background Pk Height (A): 0.494  
Blank Corrected Pk Area (A-s): 0.472  
Concentration (ug/L ): 96.4

Replicate 2 Time: 12:50  
Peak Area (A-s): 0.472 Peak Height (A): 0.583  
Background Pk Area (A-s): 0.437 Background Pk Height (A): 0.458  
Blank Corrected Pk Area (A-s): 0.470  
Concentration (ug/L ): 96.1

Mean Conc (ug/L ): 96.3 SD: 0.22 RSD(%): 0.22

As ID: C677A Seq. No.: 00031 A/S Pos.: 22 Date: 10/22/96

Sample abs. is greater than that of the largest standard.

Replicate 1 Time: 12:52  
Peak Area (A-s): 2.403 Peak Height (A): 2.258  
Background Pk Area (A-s): 0.631 Background Pk Height (A): 0.601  
Blank Corrected Pk Area (A-s): 2.401

SP. REC. = 114%

VOID: See printed  
message. Euf  
10-22-96



GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

VOLD: See  
Printed message  
EUF 10-22-96

Concentration (ug/L ): 490.9

Sample abs. is greater than that of the largest standard.

Replicate 2 Time: 12:54  
Peak Area (A-s): 2.441 Peak Height (A): 2.488  
Background Pk Area (A-s): 0.623 Background Pk Height (A): 0.585

Blank Corrected Pk Area (A-s): 2.440

Concentration (ug/L ): 498.7

Sample abs. is greater than that of the largest standard.

Mean Conc (ug/L ): 494.8 SD: 5.50 RSD(%): 1.11

As ID: AC677A Seq. No.: 00032 A/S Pos.: 23 Date: 10/22/96

Sample abs. is greater than that of the largest standard.

Replicate 1 Time: 12:56  
Peak Area (A-s): 2.491 Peak Height (A): 2.272  
Background Pk Area (A-s): 0.628 Background Pk Height (A): 0.583

Blank Corrected Pk Area (A-s): 2.489

Concentration (ug/L ): 508.9

Sample abs. is greater than that of the largest standard.

Replicate 2 Time: 12:58  
Peak Area (A-s): 2.330 Peak Height (A): 2.159  
Background Pk Area (A-s): 0.629 Background Pk Height (A): 0.639

Blank Corrected Pk Area (A-s): 2.328

Concentration (ug/L ): 476.0

Sample abs. is greater than that of the largest standard.

Mean Conc (ug/L ): 492.4 SD: 23.28 RSD(%): 4.73

SP. REC. = 0%

As ID: C677E Seq. No.: 00033 A/S Pos.: 24 Date: 10/22/96

Replicate 1 Time: 13:00  
Peak Area (A-s): 0.514 Peak Height (A): 0.606  
Background Pk Area (A-s): 0.398 Background Pk Height (A): 0.399

Blank Corrected Pk Area (A-s): 0.512

Concentration (ug/L ): 104.7

Replicate 2 Time: 13:02  
Peak Area (A-s): 0.505 Peak Height (A): 0.588  
Background Pk Area (A-s): 0.393 Background Pk Height (A): 0.393

Blank Corrected Pk Area (A-s): 0.504

Concentration (ug/L ): 102.9

Mean Conc (ug/L ): 103.8 SD: 1.22 RSD(%): 1.18

As ID: AC677E Seq. No.: 00034 A/S Pos.: 25 Date: 10/22/96

Sample abs. is greater than that of the largest standard.

Replicate 1 Time: 13:04  
Peak Area (A-s): 0.591 Peak Height (A): 1.098  
Background Pk Area (A-s): 0.408 Background Pk Height (A): 0.490

Blank Corrected Pk Area (A-s): 0.590

Concentration (ug/L ): 120.5

0052



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VOID: See printed  
message. Euf  
10-22-96

Sample abs. is greater than that of the largest standard.

Replicate 2 Time: 13:06  
Peak Area (A-s): 0.615 Peak Height (A): 0.720  
Background Pk Area (A-s): 0.397 Background Pk Height (A): 0.388  
Blank Corrected Pk Area (A-s): 0.613  
Concentration (ug/L ): 125.4

Sample abs. is greater than that of the largest standard.

Mean Conc (ug/L ): 123.0 SD: 3.45 RSD(%): 2.81

SP. REC. = 96%

As ID: C677F Seq. No.: 00035 A/S Pos.: 26 Date: 10/22/96

Replicate 1 Time: 13:08  
Peak Area (A-s): 0.181 Peak Height (A): 0.203  
Background Pk Area (A-s): 0.364 Background Pk Height (A): 0.434  
Blank Corrected Pk Area (A-s): 0.179  
Concentration (ug/L ): 36.6

Replicate 2 Time: 13:10  
Peak Area (A-s): 0.188 Peak Height (A): 0.226  
Background Pk Area (A-s): 0.375 Background Pk Height (A): 0.447  
Blank Corrected Pk Area (A-s): 0.186  
Concentration (ug/L ): 38.0

Mean Conc (ug/L ): 37.3 SD: 1.01 RSD(%): 2.71

As ID: AC677F Seq. No.: 00036 A/S Pos.: 27 Date: 10/22/96

Replicate 1 Time: 13:12  
Peak Area (A-s): 0.287 Peak Height (A): 0.337  
Background Pk Area (A-s): 0.370 Background Pk Height (A): 0.424  
Blank Corrected Pk Area (A-s): 0.286  
Concentration (ug/L ): 58.4

Replicate 2 Time: 13:13  
Peak Area (A-s): 0.292 Peak Height (A): 0.349  
Background Pk Area (A-s): 0.367 Background Pk Height (A): 0.417  
Blank Corrected Pk Area (A-s): 0.290  
Concentration (ug/L ): 59.3

Mean Conc (ug/L ): 58.9 SD: 0.64 RSD(%): 1.08

SP. REC. = 108%

As ID: CCV5-4 Seq. No.: 00037 A/S Pos.: 28 Date: 10/22/96

Replicate 1 Time: 13:15  
Peak Area (A-s): 0.262 Peak Height (A): 0.398  
Background Pk Area (A-s): 0.071 Background Pk Height (A): 0.122  
Blank Corrected Pk Area (A-s): 0.260  
Concentration (ug/L ): 53.2

Replicate 2 Time: 13:17  
Peak Area (A-s): 0.256 Peak Height (A): 0.343  
Background Pk Area (A-s): 0.030 Background Pk Height (A): 0.026  
Blank Corrected Pk Area (A-s): 0.254  
Concentration (ug/L ): 51.9

0053

GFAA-AS  
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Mean Conc (ug/L ): 52.5 SD: 0.87 RSD(%): 1.67

As ID: CCB4 Seq. No.: 00038 A/S Pos.: 29 Date: 10/22/96

Replicate 1 Time: 13:19  
Peak Area (A-s): 0.001 Peak Height (A): 0.011  
Background Pk Area (A-s): 0.012 Background Pk Height (A): 0.011  
Blank Corrected Pk Area (A-s): -0.001  
Concentration (ug/L ): -0.2

Replicate 2 Time: 13:21  
Peak Area (A-s): 0.003 Peak Height (A): 0.010  
Background Pk Area (A-s): 0.016 Background Pk Height (A): 0.012  
Blank Corrected Pk Area (A-s): 0.001  
Concentration (ug/L ): 0.2

Mean Conc (ug/L ): 0.0 SD: 0.27 RSD(%): 1627.79

As ID: C677G Seq. No.: 00039 A/S Pos.: 30 Date: 10/22/96

Replicate 1 Time: 13:23  
Peak Area (A-s): 0.215 Peak Height (A): 0.259  
Background Pk Area (A-s): 0.345 Background Pk Height (A): 0.412  
Blank Corrected Pk Area (A-s): 0.213  
Concentration (ug/L ): 43.6

Replicate 2 Time: 13:25  
Peak Area (A-s): 0.235 Peak Height (A): 0.445  
Background Pk Area (A-s): 0.424 Background Pk Height (A): 0.515  
Blank Corrected Pk Area (A-s): 0.234  
Concentration (ug/L ): 47.7

Mean Conc (ug/L ): 45.7 SD: 2.94 RSD(%): 6.43

As ID: AC677G Seq. No.: 00040 A/S Pos.: 31 Date: 10/22/96

Replicate 1 Time: 13:27  
Peak Area (A-s): 0.328 Peak Height (A): 0.390  
Background Pk Area (A-s): 0.400 Background Pk Height (A): 0.442  
Blank Corrected Pk Area (A-s): 0.326  
Concentration (ug/L ): 66.7

Replicate 2 Time: 13:29  
Peak Area (A-s): 0.327 Peak Height (A): 0.390  
Background Pk Area (A-s): 0.404 Background Pk Height (A): 0.437  
Blank Corrected Pk Area (A-s): 0.325  
Concentration (ug/L ): 66.5

Mean Conc (ug/L ): 66.6 SD: 0.12 RSD(%): 0.18

As ID: C677H Seq. No.: 00041 A/S Pos.: 32 Date: 10/22/96

Replicate 1 Time: 13:31  
Peak Area (A-s): 0.395 Peak Height (A): 0.688  
Background Pk Area (A-s): 0.408 Background Pk Height (A): 0.478

SP. REC. = 1.04%

0054

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Blank Corrected Pk Area (A-s): 0.393  
Concentration (ug/L ): 80.3

Replicate 2  
Peak Area (A-s): 0.393  
Background Pk Area (A-s): 0.386  
Blank Corrected Pk Area (A-s): 0.392  
Concentration (ug/L ): 80.1

Time: 13:33  
Peak Height (A): 0.465  
Background Pk Height (A): 0.416

Mean Conc (ug/L ): 80.2 SD: 0.19 RSD(%): 0.23

As ID: AC677H Seq. No.: 00042 A/S Pos.: 33 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.490  
Background Pk Area (A-s): 0.407  
Blank Corrected Pk Area (A-s): 0.488  
Concentration (ug/L ): 99.7

Time: 13:35  
Peak Height (A): 0.806  
Background Pk Height (A): 0.485

Replicate 2  
Peak Area (A-s): 0.492  
Background Pk Area (A-s): 0.395  
Blank Corrected Pk Area (A-s): 0.490  
Concentration (ug/L ): 100.2

Time: 13:37  
Peak Height (A): 0.551  
Background Pk Height (A): 0.412

Mean Conc (ug/L ): 100.0 SD: 0.33 RSD(%): 0.33

*SP. REC. = 99%*

As ID: C677J Seq. No.: 00043 A/S Pos.: 34 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.321  
Background Pk Area (A-s): 0.345  
Blank Corrected Pk Area (A-s): 0.319  
Concentration (ug/L ): 65.3

Time: 13:38  
Peak Height (A): 0.337  
Background Pk Height (A): 0.373

Replicate 2  
Peak Area (A-s): 0.316  
Background Pk Area (A-s): 0.335  
Blank Corrected Pk Area (A-s): 0.314  
Concentration (ug/L ): 64.2

Time: 13:40  
Peak Height (A): 0.282  
Background Pk Height (A): 0.330

Mean Conc (ug/L ): 64.7 SD: 0.78 RSD(%): 1.21

As ID: AC677J Seq. No.: 00044 A/S Pos.: 35 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.414  
Background Pk Area (A-s): 0.358  
Blank Corrected Pk Area (A-s): 0.413  
Concentration (ug/L ): 84.3

Time: 13:42  
Peak Height (A): 0.735  
Background Pk Height (A): 0.478

Replicate 2  
Peak Area (A-s): 0.413  
Background Pk Area (A-s): 0.337  
Blank Corrected Pk Area (A-s): 0.411  
Concentration (ug/L ): 84.0

Time: 13:44  
Peak Height (A): 0.495  
Background Pk Height (A): 0.395

0055

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Mean Conc (ug/L ): 84.2 SD: 0.23 RSD(%): 0.28

SP. REC. = 98%

As ID: C677K Seq. No.: 00045 A/S Pos.: 36 Date: 10/22/96

Replicate 1 Time: 13:46  
Peak Area (A-s): 0.136 Peak Height (A): 0.183  
Background Pk Area (A-s): 0.307 Background Pk Height (A): 0.363  
Blank Corrected Pk Area (A-s): 0.134  
Concentration (ug/L ): 27.5

Replicate 2 Time: 13:48  
Peak Area (A-s): 0.131 Peak Height (A): 0.168  
Background Pk Area (A-s): 0.305 Background Pk Height (A): 0.327  
Blank Corrected Pk Area (A-s): 0.129  
Concentration (ug/L ): 26.4

Mean Conc (ug/L ): 26.9 SD: 0.75 RSD(%): 2.79

As ID: AC677K Seq. No.: 00046 A/S Pos.: 37 Date: 10/22/96

Replicate 1 Time: 13:50  
Peak Area (A-s): 0.247 Peak Height (A): 0.504  
Background Pk Area (A-s): 0.310 Background Pk Height (A): 0.513  
Blank Corrected Pk Area (A-s): 0.246  
Concentration (ug/L ): 50.2

Replicate 2 Time: 13:52  
Peak Area (A-s): 0.251 Peak Height (A): 0.323  
Background Pk Area (A-s): 0.301 Background Pk Height (A): 0.342  
Blank Corrected Pk Area (A-s): 0.249  
Concentration (ug/L ): 50.9

Mean Conc (ug/L ): 50.6 SD: 0.51 RSD(%): 1.01

SP. REC. = 118%

As ID: CCV5-5 Seq. No.: 00047 A/S Pos.: 38 Date: 10/22/96

Replicate 1 Time: 13:54  
Peak Area (A-s): 0.256 Peak Height (A): 0.495  
Background Pk Area (A-s): 0.052 Background Pk Height (A): 0.082  
Blank Corrected Pk Area (A-s): 0.255  
Concentration (ug/L ): 52.1

Replicate 2 Time: 13:56  
Peak Area (A-s): 0.254 Peak Height (A): 0.399  
Background Pk Area (A-s): 0.023 Background Pk Height (A): 0.033  
Blank Corrected Pk Area (A-s): 0.252  
Concentration (ug/L ): 51.6

Mean Conc (ug/L ): 51.8 SD: 0.35 RSD(%): 0.67

As ID: CC85 Seq. No.: 00048 A/S Pos.: 39 Date: 10/22/96

Replicate 1 Time: 13:58  
Peak Area (A-s): 0.003 Peak Height (A): 0.011  
Background Pk Area (A-s): 0.012 Background Pk Height (A): 0.010

0056

GFAA-AS  
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Blank Corrected Pk Area (A-s): 0.002  
Concentration (ug/L ): 0.3

Replicate 2  
Peak Area (A-s): 0.003  
Background Pk Area (A-s): 0.012  
Blank Corrected Pk Area (A-s): 0.001  
Concentration (ug/L ): 0.2

Time: 14:00  
Peak Height (A): 0.011  
Background Pk Height (A): 0.010

Mean Conc (ug/L ): 0.3 SD: 0.07 RSD(%): 25.75

As ID: C6775/5 Seq. No.: 00049 A/S Pos.: 1 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.198  
Background Pk Area (A-s): 0.068  
Blank Corrected Pk Area (A-s): 0.196  
Concentration (ug/L ): 40.1

Time: 14:56  
Peak Height (A): 0.378  
Background Pk Height (A): 0.111

Replicate 2  
Peak Area (A-s): 0.199  
Background Pk Area (A-s): 0.078  
Blank Corrected Pk Area (A-s): 0.198  
Concentration (ug/L ): 40.4

Time: 14:58  
Peak Height (A): 0.306  
Background Pk Height (A): 0.103

Mean Conc (ug/L ): 40.3 SD: 0.21 RSD(%): 0.53

As ID: AC6775/5 Seq. No.: 00050 A/S Pos.: 2 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.301  
Background Pk Area (A-s): 0.089  
Blank Corrected Pk Area (A-s): 0.300  
Concentration (ug/L ): 61.3

Time: 15:00  
Peak Height (A): 0.437  
Background Pk Height (A): 0.105

Replicate 2  
Peak Area (A-s): 0.300  
Background Pk Area (A-s): 0.090  
Blank Corrected Pk Area (A-s): 0.299  
Concentration (ug/L ): 61.1

Time: 15:02  
Peak Height (A): 0.321  
Background Pk Height (A): 0.093

Mean Conc (ug/L ): 61.2 SD: 0.16 RSD(%): 0.26

SP. REC. = 104%

As ID: C6775D/5 Seq. No.: 00051 A/S Pos.: 3 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.188  
Background Pk Area (A-s): 0.081  
Blank Corrected Pk Area (A-s): 0.186  
Concentration (ug/L ): 38.0

Time: 15:04  
Peak Height (A): 0.238  
Background Pk Height (A): 0.093

Replicate 2  
Peak Area (A-s): 0.183  
Background Pk Area (A-s): 0.076  
Blank Corrected Pk Area (A-s): 0.181  
Concentration (ug/L ): 37.1

Time: 15:06  
Peak Height (A): 0.284  
Background Pk Height (A): 0.097

0057

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Mean Conc (ug/L ): 37.5 SD: 0.69 RSD(%): 1.84

As ID: AC6775D/5 Seq. No.: 00052 A/S Pos.: 4 Date: 10/22/96

Replicate 1 Time: 15:08  
Peak Area (A-s): 0.276 Peak Height (A): 0.393  
Background Fk Area (A-s): 0.083 Background Fk Height (A): 0.099  
Blank Corrected Fk Area (A-s): 0.275  
Concentration (ug/L ): 56.2

Replicate 2 Time: 15:10  
Peak Area (A-s): 0.279 Peak Height (A): 0.375  
Background Fk Area (A-s): 0.082 Background Fk Height (A): 0.091  
Blank Corrected Fk Area (A-s): 0.278  
Concentration (ug/L ): 56.8

Mean Conc (ug/L ): 56.5 SD: 0.46 RSD(%): 0.81

*SP. REC. = 95%*

As ID: C6775S/5 Seq. No.: 00053 A/S Pos.: 5 Date: 10/22/96

Replicate 1 Time: 15:12  
Peak Area (A-s): 0.218 Peak Height (A): 0.226  
Background Fk Area (A-s): 0.090 Background Fk Height (A): 0.093  
Blank Corrected Fk Area (A-s): 0.217  
Concentration (ug/L ): 44.3

Replicate 2 Time: 15:13  
Peak Area (A-s): 0.224 Peak Height (A): 0.317  
Background Fk Area (A-s): 0.091 Background Fk Height (A): 0.110  
Blank Corrected Fk Area (A-s): 0.222  
Concentration (ug/L ): 45.4

Mean Conc (ug/L ): 44.9 SD: 0.76 RSD(%): 1.70

*MAT. SP. REC. = 58%*

As ID: C6776/2 Seq. No.: 00054 A/S Pos.: 6 Date: 10/22/96

Replicate 1 Time: 15:15  
Peak Area (A-s): 0.220 Peak Height (A): 0.219  
Background Fk Area (A-s): 0.169 Background Fk Height (A): 0.152  
Blank Corrected Fk Area (A-s): 0.218  
Concentration (ug/L ): 44.6

Replicate 2 Time: 15:17  
Peak Area (A-s): 0.216 Peak Height (A): 0.210  
Background Fk Area (A-s): 0.192 Background Fk Height (A): 0.172  
Blank Corrected Fk Area (A-s): 0.214  
Concentration (ug/L ): 43.7

Mean Conc (ug/L ): 44.2 SD: 0.57 RSD(%): 1.29

As ID: AC6776/2 Seq. No.: 00055 A/S Pos.: 7 Date: 10/22/96

Replicate 1 Time: 15:19  
Peak Area (A-s): 0.319 Peak Height (A): 0.315  
Background Fk Area (A-s): 0.193 Background Fk Height (A): 0.186

*0058*



GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Blank Corrected Pk Area (A-s): 0.317  
Concentration (ug/L ): 64.8

Replicate 2  
Peak Area (A-s): 0.319  
Background Pk Area (A-s): 0.192  
Blank Corrected Pk Area (A-s): 0.317  
Concentration (ug/L ): 64.8

Time: 15:21  
Peak Height (A): 0.316  
Background Pk Height (A): 0.174

Mean Conc (ug/L ): 64.8

SD: 0.04

RSD(%): 0.06

SP. REC. = 103%

As ID: CCV5-6 Seq. No.: 00056 A/S Pos.: 8 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.242  
Background Pk Area (A-s): 0.051  
Blank Corrected Pk Area (A-s): 0.240  
Concentration (ug/L ): 49.1

Time: 15:23  
Peak Height (A): 0.294  
Background Pk Height (A): 0.038

Replicate 2  
Peak Area (A-s): 0.245  
Background Pk Area (A-s): 0.029  
Blank Corrected Pk Area (A-s): 0.243  
Concentration (ug/L ): 49.7

Time: 15:25  
Peak Height (A): 0.307  
Background Pk Height (A): 0.026

Mean Conc (ug/L ): 49.4

SD: 0.40

RSD(%): 0.81

As ID: CCB6 Seq. No.: 00057 A/S Pos.: 9 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.002  
Background Pk Area (A-s): 0.014  
Blank Corrected Pk Area (A-s): 0.001  
Concentration (ug/L ): 0.1

Time: 15:27  
Peak Height (A): 0.011  
Background Pk Height (A): 0.009

Replicate 2  
Peak Area (A-s): 0.003  
Background Pk Area (A-s): 0.015  
Blank Corrected Pk Area (A-s): 0.001  
Concentration (ug/L ): 0.3

Time: 15:28  
Peak Height (A): 0.009  
Background Pk Height (A): 0.011

Mean Conc (ug/L ): 0.2

SD: 0.11

RSD(%): 47.21

As ID: C6777/5 Seq. No.: 00058 A/S Pos.: 10 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.300  
Background Pk Area (A-s): 0.072  
Blank Corrected Pk Area (A-s): 0.298  
Concentration (ug/L ): 60.9

Time: 15:30  
Peak Height (A): 0.342  
Background Pk Height (A): 0.069

Replicate 2  
Peak Area (A-s): 0.303  
Background Pk Area (A-s): 0.066  
Blank Corrected Pk Area (A-s): 0.301  
Concentration (ug/L ): 61.6

Time: 15:32  
Peak Height (A): 0.457  
Background Pk Height (A): 0.080

0059

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Mean Conc (ug/L ): 61.2 SD: 0.45 RSD(%): 0.73

As ID: AC6777/5 Seq. No.: 00059 A/S Pos.: 11 Date: 10/22/96

Replicate 1 Time: 15:34  
Peak Area (A-s): 0.392 Peak Height (A): 0.595  
Background Pk Area (A-s): 0.072 Background Pk Height (A): 0.084  
Blank Corrected Pk Area (A-s): 0.390  
Concentration (ug/L ): 79.7

Replicate 2 Time: 15:36  
Peak Area (A-s): 0.393 Peak Height (A): 0.537  
Background Pk Area (A-s): 0.076 Background Pk Height (A): 0.083  
Blank Corrected Pk Area (A-s): 0.391  
Concentration (ug/L ): 80.0

Mean Conc (ug/L ): 79.9 SD: 0.21 RSD(%): 0.26

SP. REC. = 94%

As ID: C6778/5 Seq. No.: 00060 A/S Pos.: 12 Date: 10/22/96

Replicate 1 Time: 15:38  
Peak Area (A-s): 0.220 Peak Height (A): 0.322  
Background Pk Area (A-s): 0.075 Background Pk Height (A): 0.091  
Blank Corrected Pk Area (A-s): 0.218  
Concentration (ug/L ): 44.5

Replicate 2 Time: 15:40  
Peak Area (A-s): 0.224 Peak Height (A): 0.325  
Background Pk Area (A-s): 0.083 Background Pk Height (A): 0.098  
Blank Corrected Pk Area (A-s): 0.223  
Concentration (ug/L ): 45.5

Mean Conc (ug/L ): 45.0 SD: 0.68 RSD(%): 1.51

As ID: AC6778/5 Seq. No.: 00061 A/S Pos.: 13 Date: 10/22/96

Replicate 1 Time: 15:42  
Peak Area (A-s): 0.316 Peak Height (A): 0.469  
Background Pk Area (A-s): 0.082 Background Pk Height (A): 0.094  
Blank Corrected Pk Area (A-s): 0.314  
Concentration (ug/L ): 64.3

Replicate 2 Time: 15:44  
Peak Area (A-s): 0.315 Peak Height (A): 0.370  
Background Pk Area (A-s): 0.083 Background Pk Height (A): 0.081  
Blank Corrected Pk Area (A-s): 0.313  
Concentration (ug/L ): 64.0

Mean Conc (ug/L ): 64.1 SD: 0.18 RSD(%): 0.28

SP. REC. = 96%

As ID: C677A/10 Seq. No.: 00062 A/S Pos.: 14 Date: 10/22/96

Replicate 1 Time: 15:45  
Peak Area (A-s): 0.405 Peak Height (A): 0.653  
Background Pk Area (A-s): 0.060 Background Pk Height (A): 0.078

VOID: See next page.  
EUF 10-22-96

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Blank Corrected Pk Area (A-s): 0.403  
Concentration (ug/L ): 82.4

Replicate 2  
Peak Area (A-s): 0.412  
Background Pk Area (A-s): 0.059  
Blank Corrected Pk Area (A-s): 0.410  
Concentration (ug/L ): 83.8

Time: 15:47  
Peak Height (A): 0.609  
Background Pk Height (A): 0.072

VOID: Conc. of Analytic  
Spike is greater than  
largest standard.  
EUF 102

Mean Conc (ug/L ): 83.1 SD: 1.03 RSD(%): 1.24

As ID: AC677A/10 Seq. No.: 00063 A/S Pos.: 15 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.500  
Background Pk Area (A-s): 0.064  
Blank Corrected Pk Area (A-s): 0.498  
Concentration (ug/L ): 101.9

Time: 15:49  
Peak Height (A): 0.756  
Background Pk Height (A): 0.081

Replicate 2  
Peak Area (A-s): 0.500  
Background Pk Area (A-s): 0.067  
Blank Corrected Pk Area (A-s): 0.499  
Concentration (ug/L ): 101.9

Time: 15:51  
Peak Height (A): 0.780  
Background Pk Height (A): 0.084

Mean Conc (ug/L ): 101.9 SD: 0.02 RSD(%): 0.02

SP. REC. = 94%

As ID: C677E/2 Seq. No.: 00064 A/S Pos.: 16 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.246  
Background Pk Area (A-s): 0.147  
Blank Corrected Pk Area (A-s): 0.244  
Concentration (ug/L ): 50.0

Time: 15:53  
Peak Height (A): 0.301  
Background Pk Height (A): 0.163

Replicate 2  
Peak Area (A-s): 0.245  
Background Pk Area (A-s): 0.167  
Blank Corrected Pk Area (A-s): 0.244  
Concentration (ug/L ): 49.8

Time: 15:55  
Peak Height (A): 0.281  
Background Pk Height (A): 0.178

Mean Conc (ug/L ): 49.9 SD: 0.13 RSD(%): 0.26

As ID: AC677E/2 Seq. No.: 00065 A/S Pos.: 17 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.350  
Background Pk Area (A-s): 0.172  
Blank Corrected Pk Area (A-s): 0.348  
Concentration (ug/L ): 71.2

Time: 15:57  
Peak Height (A): 0.398  
Background Pk Height (A): 0.184

Replicate 2  
Peak Area (A-s): 0.353  
Background Pk Area (A-s): 0.171  
Blank Corrected Pk Area (A-s): 0.351  
Concentration (ug/L ): 71.8

Time: 15:59  
Peak Height (A): 0.432  
Background Pk Height (A): 0.180

0061

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Mean Conc (ug/L ): 71.5 SD: 0.40 RSD(%): 0.56

SP. REC. = 108%

As ID: CCV5-7 Seq. No.: 00066 A/S Pos.: 18 Date: 10/22/96

Replicate 1 Time: 16:01  
Peak Area (A-s): 0.248 Peak Height (A): 0.304  
Background Pk Area (A-s): 0.047 Background Pk Height (A): 0.038  
Blank Corrected Pk Area (A-s): 0.246  
Concentration (ug/L ): 50.4

Replicate 2 Time: 16:02  
Peak Area (A-s): 0.247 Peak Height (A): 0.300  
Background Pk Area (A-s): 0.032 Background Pk Height (A): 0.026  
Blank Corrected Pk Area (A-s): 0.245  
Concentration (ug/L ): 50.1

Mean Conc (ug/L ): 50.2 SD: 0.21 RSD(%): 0.43

As ID: CCB7 Seq. No.: 00067 A/S Pos.: 19 Date: 10/22/96

Replicate 1 Time: 16:04  
Peak Area (A-s): 0.007 Peak Height (A): 0.010  
Background Pk Area (A-s): 0.015 Background Pk Height (A): 0.013  
Blank Corrected Pk Area (A-s): 0.005  
Concentration (ug/L ): 1.1

Replicate 2 Time: 16:06  
Peak Area (A-s): 0.006 Peak Height (A): 0.011  
Background Pk Area (A-s): 0.014 Background Pk Height (A): 0.012  
Blank Corrected Pk Area (A-s): 0.004  
Concentration (ug/L ): 0.9

Mean Conc (ug/L ): 1.0 SD: 0.11 RSD(%): 11.39

NOTE MSA SOLUTIONS +0=0PPB  
+1=100PPB(414-102-2)  
+2=250PPB(414-102-4)  
+3=400PPB(414-102-5)

As ID: C677K +0 Seq. No.: 00068 A/S Pos.: 20 Date: 10/22/96

Replicate 1 Time: 16:22  
Peak Area (A-s): 0.112 Peak Height (A): 0.134  
Background Pk Area (A-s): 0.189 Background Pk Height (A): 0.223  
Blank Corrected Pk Area (A-s): 0.110  
Concentration (ug/L ): 22.5

As ID: C677K +1 Seq. No.: 00069 A/S Pos.: 21 Date: 10/22/96

Replicate 1 Time: 16:24  
Peak Area (A-s): 0.161 Peak Height (A): 0.193  
Background Pk Area (A-s): 0.223 Background Pk Height (A): 0.245  
Blank Corrected Pk Area (A-s): 0.159  
Concentration (ug/L ): 32.6

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

As ID: C677K +2 Seq. No.: 00070 A/S Pos.: 22 Date: 10/22/96

Replicate 1 Time: 16:26  
Peak Area (A-s): 0.223 Peak Height (A): 0.293  
Background Pk Area (A-s): 0.235 Background Pk Height (A): 0.266  
Blank Corrected Pk Area (A-s): 0.221  
Concentration (ug/L ): 45.2

As ID: C677K +3 Seq. No.: 00071 A/S Pos.: 23 Date: 10/22/96

Replicate 1 Time: 16:28  
Peak Area (A-s): 0.301 Peak Height (A): 0.379  
Background Pk Area (A-s): 0.241 Background Pk Height (A): 0.257  
Blank Corrected Pk Area (A-s): 0.300  
Concentration (ug/L ): 61.2

CORRELATION COEFFICIENT=0.99880  
X-INTERCEPT=-23.42388  
Y-INTERCEPT=0.10969  
SLOPE=0.00468

As ID: C677A/20 Seq. No.: 00072 A/S Pos.: 24 Date: 10/22/96

Replicate 1 Time: 16:34  
Peak Area (A-s): 0.211 Peak Height (A): 0.311  
Background Pk Area (A-s): 0.062 Background Pk Height (A): 0.067  
Blank Corrected Pk Area (A-s): 0.209  
Concentration (ug/L ): 42.7

Replicate 2 Time: 16:36  
Peak Area (A-s): 0.206 Peak Height (A): 0.302  
Background Pk Area (A-s): 0.035 Background Pk Height (A): 0.034  
Blank Corrected Pk Area (A-s): 0.204  
Concentration (ug/L ): 41.8

Mean Conc (ug/L ): 42.3 SD: 0.66 RSD(%): 1.57

As ID: AC677A/20 Seq. No.: 00073 A/S Pos.: 25 Date: 10/22/96

Replicate 1 Time: 16:37  
Peak Area (A-s): 0.310 Peak Height (A): 0.431  
Background Pk Area (A-s): 0.040 Background Pk Height (A): 0.042  
Blank Corrected Pk Area (A-s): 0.309  
Concentration (ug/L ): 63.1

Replicate 2 Time: 16:39  
Peak Area (A-s): 0.306 Peak Height (A): 0.417  
Background Pk Area (A-s): 0.039 Background Pk Height (A): 0.043  
Blank Corrected Pk Area (A-s): 0.304  
Concentration (ug/L ): 62.2

Mean Conc (ug/L ): 62.6 SD: 0.64 RSD(%): 1.03

As ID: C68C7B Seq. No.: 00074 A/S Pos.: 20 Date: 10/22/96

C67100179 SP. REC. = 102%  
0063

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Replicate 1  
Peak Area (A-s): 0.004  
Background Pk Area (A-s): 0.011  
Blank Corrected Pk Area (A-s): 0.003  
Concentration (ug/L ): 0.5

Time: 17:03  
Peak Height (A): 0.010  
Background Pk Height (A): 0.009

Replicate 2  
Peak Area (A-s): 0.004  
Background Pk Area (A-s): 0.016  
Blank Corrected Pk Area (A-s): 0.002  
Concentration (ug/L ): 0.5

Time: 17:04  
Peak Height (A): 0.009  
Background Pk Height (A): 0.011

Mean Conc (ug/L ): 0.5 SD: 0.01 RSD(%): 2.91

As ID: AC68C7B Seq. No.: 00075 A/S Pos.: 21 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.107  
Background Pk Area (A-s): 0.019  
Blank Corrected Pk Area (A-s): 0.105  
Concentration (ug/L ): 21.5

Time: 17:06  
Peak Height (A): 0.158  
Background Pk Height (A): 0.016

Replicate 2  
Peak Area (A-s): 0.101  
Background Pk Area (A-s): 0.019  
Blank Corrected Pk Area (A-s): 0.099  
Concentration (ug/L ): 20.3

Time: 17:08  
Peak Height (A): 0.132  
Background Pk Height (A): 0.016

Mean Conc (ug/L ): 20.9 SD: 0.91 RSD(%): 4.35

As ID: C68C7C Seq. No.: 00076 A/S Pos.: 22 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.196  
Background Pk Area (A-s): 0.022  
Blank Corrected Pk Area (A-s): 0.194  
Concentration (ug/L ): 39.7

Time: 17:10  
Peak Height (A): 0.276  
Background Pk Height (A): 0.021

Replicate 2  
Peak Area (A-s): 0.195  
Background Pk Area (A-s): 0.024  
Blank Corrected Pk Area (A-s): 0.193  
Concentration (ug/L ): 39.5

Time: 17:12  
Peak Height (A): 0.260  
Background Pk Height (A): 0.023

Mean Conc (ug/L ): 39.6 SD: 0.12 RSD(%): 0.32

As ID: C66WF Seq. No.: 00077 A/S Pos.: 23 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.005  
Background Pk Area (A-s): 0.019  
Blank Corrected Pk Area (A-s): 0.003  
Concentration (ug/L ): 0.7

Time: 17:14  
Peak Height (A): 0.015  
Background Pk Height (A): 0.012

Replicate 2  
Peak Area (A-s): 0.004

Time: 17:16  
Peak Height (A): 0.013

0064

GFAA-13  
RAW DATA RUN SEQUENCE LOG

Background Pk Area (A-s): 0.023  
Blank Corrected Pk Area (A-s): 0.002  
Concentration (ug/L ): 0.5

Background Pk Height (A): 0.013

Mean Conc (ug/L ): 0.6

SD: 0.15

RSD(%): 26.53

As ID: AC66WP Seq. No.: 00078 A/S Pos.: 24 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.121  
Background Pk Area (A-s): 0.026  
Blank Corrected Pk Area (A-s): 0.120  
Concentration (ug/L ): 24.4

Time: 17:18  
Peak Height (A): 0.152  
Background Pk Height (A): 0.019

Replicate 2  
Peak Area (A-s): 0.112  
Background Pk Area (A-s): 0.027  
Blank Corrected Pk Area (A-s): 0.110  
Concentration (ug/L ): 22.6

Time: 17:20  
Peak Height (A): 0.142  
Background Pk Height (A): 0.022

Mean Conc (ug/L ): 23.5

SD: 1.33

RSD(%): 5.64

*SP. REC. = 118%*

As ID: C66WPS Seq. No.: 00079 A/S Pos.: 25 Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.188  
Background Pk Area (A-s): 0.032  
Blank Corrected Pk Area (A-s): 0.187  
Concentration (ug/L ): 38.1

Time: 17:22  
Peak Height (A): 0.237  
Background Pk Height (A): 0.024

Replicate 2  
Peak Area (A-s): 0.194  
Background Pk Area (A-s): 0.033  
Blank Corrected Pk Area (A-s): 0.192  
Concentration (ug/L ): 39.2

Time: 17:24  
Peak Height (A): 0.236  
Background Pk Height (A): 0.024

Mean Conc (ug/L ): 38.7

SD: 0.78

RSD(%): 2.01

*MAT. SP. REC. = 97%*

As ID: CCV5-18 *EUF* Seq. No.: 00080 A/S Pos.: 26 Date: 10/22/96  
*10-23-96*

Replicate 1  
Peak Area (A-s): 0.239  
Background Pk Area (A-s): 0.027  
Blank Corrected Pk Area (A-s): 0.238  
Concentration (ug/L ): 48.6

Time: 17:25  
Peak Height (A): 0.325  
Background Pk Height (A): 0.030

Replicate 2  
Peak Area (A-s): 0.232  
Background Pk Area (A-s): 0.028  
Blank Corrected Pk Area (A-s): 0.230  
Concentration (ug/L ): 47.0

Time: 17:27  
Peak Height (A): 0.276  
Background Pk Height (A): 0.022

Mean Conc (ug/L ): 47.8

SD: 1.12

RSD(%): 2.33

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

As ID: CCB78 *EIF* 10-23-96 Seq. No.: 00081 A/S Pos.: 27 Date: 10/22/96

Replicate 1 Time: 17:29  
Peak Area (A-s): 0.002 Peak Height (A): 0.009  
Background Pk Area (A-s): 0.012 Background Pk Height (A): 0.010  
Blank Corrected Pk Area (A-s): 0.000  
Concentration (ug/L ): 0.0

Replicate 2 Time: 17:31  
Peak Area (A-s): 0.002 Peak Height (A): 0.008  
Background Pk Area (A-s): 0.015 Background Pk Height (A): 0.011  
Blank Corrected Pk Area (A-s): 0.000  
Concentration (ug/L ): 0.0

Mean Conc (ug/L ): 0.0 SD: 0.00 RSD(%): 0.00

As ID: C66WFD Seq. No.: 00082 A/S Pos.: 28 Date: 10/22/96

Replicate 1 Time: 17:33  
Peak Area (A-s): 0.188 Peak Height (A): 0.249  
Background Pk Area (A-s): 0.030 Background Pk Height (A): 0.024  
Blank Corrected Pk Area (A-s): 0.187  
Concentration (ug/L ): 38.1

Replicate 2 Time: 17:35  
Peak Area (A-s): 0.192 Peak Height (A): 0.256  
Background Pk Area (A-s): 0.031 Background Pk Height (A): 0.026  
Blank Corrected Pk Area (A-s): 0.191  
Concentration (ug/L ): 39.0

Mean Conc (ug/L ): 38.6 SD: 0.60 RSD(%): 1.55

*MAT. SP. REC. = 96%*

As ID: C66WX Seq. No.: 00083 A/S Pos.: 29 Date: 10/22/96

Replicate 1 Time: 17:37  
Peak Area (A-s): 0.014 Peak Height (A): 0.017  
Background Pk Area (A-s): 0.024 Background Pk Height (A): 0.015  
Blank Corrected Pk Area (A-s): 0.013  
Concentration (ug/L ): 2.6

Replicate 2 Time: 17:39  
Peak Area (A-s): 0.008 Peak Height (A): 0.015  
Background Pk Area (A-s): 0.029 Background Pk Height (A): 0.019  
Blank Corrected Pk Area (A-s): 0.006  
Concentration (ug/L ): 1.2

Mean Conc (ug/L ): 1.9 SD: 0.93 RSD(%): 48.60

As ID: AC66WX Seq. No.: 00084 A/S Pos.: 30 Date: 10/22/96

Replicate 1 Time: 17:41  
Peak Area (A-s): 0.123 Peak Height (A): 0.159  
Background Pk Area (A-s): 0.032 Background Pk Height (A): 0.024  
Blank Corrected Pk Area (A-s): 0.121  
Concentration (ug/L ): 24.8

0066



GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

Replicate 2  
Peak Area (A-s): 0.122  
Background Pk Area (A-s): 0.032  
Blank Corrected Pk Area (A-s): 0.120  
Concentration (ug/L ): 24.5

Time: 17:43  
Peak Height (A): 0.162  
Background Pk Height (A): 0.023

Mean Conc (ug/L ): 24.7

SD: 0.19

RSD(%): 0.78

SP. REC. = 114%

As ID: C66X4

Seq. No.: 00085

A/S Pos.: 31

Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.050  
Background Pk Area (A-s): 0.034  
Blank Corrected Pk Area (A-s): 0.049  
Concentration (ug/L ): 10.0

Time: 17:45  
Peak Height (A): 0.087  
Background Pk Height (A): 0.035

Replicate 2  
Peak Area (A-s): 0.051  
Background Pk Area (A-s): 0.037  
Blank Corrected Pk Area (A-s): 0.050  
Concentration (ug/L ): 10.1

Time: 17:46  
Peak Height (A): 0.074  
Background Pk Height (A): 0.038

Mean Conc (ug/L ): 10.1

SD: 0.10

RSD(%): 0.96

As ID: AC66X4

Seq. No.: 00086

A/S Pos.: 32

Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.152  
Background Pk Area (A-s): 0.044  
Blank Corrected Pk Area (A-s): 0.150  
Concentration (ug/L ): 30.7

Time: 17:48  
Peak Height (A): 0.204  
Background Pk Height (A): 0.041

Replicate 2  
Peak Area (A-s): 0.150  
Background Pk Area (A-s): 0.045  
Blank Corrected Pk Area (A-s): 0.148  
Concentration (ug/L ): 30.3

Time: 17:50  
Peak Height (A): 0.198  
Background Pk Height (A): 0.040

Mean Conc (ug/L ): 30.5

SD: 0.32

RSD(%): 1.04

SP. REC. = 102%

As ID: C66X5

Seq. No.: 00087

A/S Pos.: 33

Date: 10/22/96

Replicate 1  
Peak Area (A-s): 0.015  
Background Pk Area (A-s): 0.024  
Blank Corrected Pk Area (A-s): 0.014  
Concentration (ug/L ): 2.8

Time: 17:52  
Peak Height (A): 0.019  
Background Pk Height (A): 0.020

Replicate 2  
Peak Area (A-s): 0.014  
Background Pk Area (A-s): 0.033  
Blank Corrected Pk Area (A-s): 0.013  
Concentration (ug/L ): 2.6

Time: 17:54  
Peak Height (A): 0.016  
Background Pk Height (A): 0.017

Mean Conc (ug/L ): 2.7

SD: 0.20

RSD(%): 7.23

GFAA-AS  
RAW DATA / RUN SEQUENCE LOG

As ID: AC66X5 Seq. No.: 00088 A/S Pos.: 34 Date: 10/22/96

Replicate 1 Time: 17:56  
Peak Area (A-s): 0.109 Peak Height (A): 0.123  
Background Pk Area (A-s): 0.032 Background Pk Height (A): 0.024  
Blank Corrected Pk Area (A-s): 0.107  
Concentration (ug/L ): 21.9

Replicate 2 Time: 17:58  
Peak Area (A-s): 0.108 Peak Height (A): 0.131  
Background Pk Area (A-s): 0.031 Background Pk Height (A): 0.025  
Blank Corrected Pk Area (A-s): 0.106  
Concentration (ug/L ): 21.7

Mean Conc (ug/L ): 21.8 SD: 0.15 RSD(%): 0.69

*SP. REC. = 96%*

As ID: CCV5-~~89~~ *ELF* Seq. No.: 00089 A/S Pos.: 35 Date: 10/22/96  
*10-23-96*

Replicate 1 Time: 18:00  
Peak Area (A-s): 0.231 Peak Height (A): 0.261  
Background Pk Area (A-s): 0.027 Background Pk Height (A): 0.022  
Blank Corrected Pk Area (A-s): 0.229  
Concentration (ug/L ): 46.9

Replicate 2 Time: 18:02  
Peak Area (A-s): 0.234 Peak Height (A): 0.295  
Background Pk Area (A-s): 0.027 Background Pk Height (A): 0.025  
Blank Corrected Pk Area (A-s): 0.233  
Concentration (ug/L ): 47.5

Mean Conc (ug/L ): 47.2 SD: 0.46 RSD(%): 0.98

As ID: CCB~~89~~ *ELF* Seq. No.: 00090 A/S Pos.: 36 Date: 10/22/96  
*10-23-96*

Replicate 1 Time: 18:04  
Peak Area (A-s): 0.006 Peak Height (A): 0.012  
Background Pk Area (A-s): 0.015 Background Pk Height (A): 0.013  
Blank Corrected Pk Area (A-s): 0.004  
Concentration (ug/L ): 0.9

Replicate 2 Time: 18:06  
Peak Area (A-s): 0.005 Peak Height (A): 0.011  
Background Pk Area (A-s): 0.011 Background Pk Height (A): 0.009  
Blank Corrected Pk Area (A-s): 0.003  
Concentration (ug/L ): 0.6

Mean Conc (ug/L ): 0.8 SD: 0.22 RSD(%): 28.71

END OF ANALYSIS

# Metals Preparation Log

Quanterra Incorporated  
450 William Pitt Way  
Pittsburgh, Pennsylvania 15238  
412/826-5477 FAX: 412/826-5571



OUA-4179	Analyst <i>William A. Hoyle</i>	Date <i>10-15-96</i>	Lot Number <i>C6J11014 C6J11015</i>	Page <i>1</i>	of <i>1</i>	Serial Number <i>025</i>	Log Book Number <i>96-MT-532</i>	Reagent Used <i>10ml 1:1 HNO<sub>3</sub> 185-026-6</i> <i>5ml conc. HNO<sub>3</sub> 36036 EM SCIENCE</i> <i>10ml 30% H<sub>2</sub>O<sub>2</sub> M157 KPBH CHEMPURE</i>
Main Matrix <i>SOIL</i>	Instr. <i>GFAA JEP</i>	Method <i>JLM03.0</i>	Start Time <i>06:40</i>	SDG, if applicable	MS <i>Q1M-752</i>	Lab Lot No. (Book, Page, Line) <i>185-026-7</i>		

Client ID	Lab Sample ID	Init Wt/Vol g/mL	Final Vol mL	Comments	Color		Clarity		Texture		Artifacts
					Pre	Post	Pre	Post	Pre	Post	
<i>1. BRL-CB1-0002</i>	<i>C6775</i>	<i>1.00g</i>	<i>200ml</i>	<i>WAH 10-15-96</i>	<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES</i>
<i>2. BRL-CB1-0002 Dyo</i>	<i>C6775X</i>				<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES</i>
<i>3. BRL-CB1-0002 MS</i>	<i>C6775S</i>				<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES</i>
<i>4. BRL-CB2-0002</i>	<i>C6776</i>				<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES, ROOTS</i>
<i>5. BRL-CB3-0002</i>	<i>C6777</i>				<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES, ROOTS, GRASS</i>
<i>6. BRL-CB4-0002</i>	<i>C6778</i>				<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES, ROOTS, GRASS</i>
<i>7. BRL-CB5-0002</i>	<i>C6779</i>				<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES, ROOTS</i>
<i>8. BRL-CB6-0002</i>	<i>C677A</i>				<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES, ROOTS</i>
<i>9. BRL-RB1-0002</i>	<i>C677E</i>				<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES</i>
<i>10. BRL-RB2-0002</i>	<i>C677F</i>				<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES</i>
<i>11. BRL-RB3-0002</i>	<i>C677G</i>				<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES, ROOTS</i>
<i>12. BRL-RB4-0002</i>	<i>C677H</i>				<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES, ROOTS</i>
<i>13. BRL-RB5-0002</i>	<i>C677J</i>				<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES</i>
<i>14. BRL-RB6-0002</i>	<i>C677K</i>				<i>BR</i>	<i>BR</i>			<i>M</i>	<i>M</i>	<i>STONES, ROOTS</i>
<i>15. PBS 10-15-1</i>	<i>PBS C68AXB</i>	<i>1.00g DI H<sub>2</sub>O</i>									
<i>16. LCSS-226 10-15-1</i>	<i>LCSS-226 C68AXC</i>	<i>1.00g</i>									
<i>17. WAH 10-15-96</i>											
<i>18. WAH 10-15-96</i>											

Digestate(s)	Digestate(s) Received				Digestate(s) Relinquished				Texture F = Fine M = Medium C = Coarse	Clarity C = Clear CL = Cloudy O = Opaque	Color R = Red BL = Blue BR = Brown BLK = Black Y = Yellow O = Orange P = Pink W = White GN = Green C = Colorless
	Date	Time	Analyst	Location	Date	Time	Analyst	Location			
<i>All Above</i>	<i>10-15-96</i>	<i>14:45</i>	<i>William A. Hoyle</i>	<i>METALS PREP</i>	<i>10-15-96</i>	<i>14:50</i>	<i>William A. Hoyle</i>	<i>MET-1 A6</i>			
<i>All Above</i>	<i>10-18-96</i>	<i>12:15</i>	<i>Erin M. Faust</i>	<i>MET1/A6</i>	<i>10-18-96</i>	<i>16:30</i>	<i>Erin M. Faust</i>	<i>MET1/A6</i>			
<i>All Above</i>	<i>10-21-96</i>	<i>08:45</i>	<i>William A. Hoyle</i>	<i>MET1/A6</i>	<i>10-21-96</i>	<i>13:40</i>	<i>William A. Hoyle</i>	<i>MET1/A6</i>			
<i>All Above</i>	<i>10-22-96</i>	<i>11:00</i>	<i>Erin M. Faust</i>	<i>MET1/A6</i>	<i>10-22-96</i>	<i>17:15</i>	<i>Erin M. Faust</i>	<i>MET1/A6</i>			

Hot Plate Temperatures	1	2	3	4	5	6	7	8	9	10
Initial Temp (°C)	<i>95°</i>							<i>95°</i>		
Final Temp (°C)	<i>95°</i>							<i>95°</i>		

Reviewed By: *William A. Hoyle* Date: *10-15-96*

# Metals Preparation Log

Quanterra Incorporated  
 450 William Pitt Way  
 Pittsburgh, Pennsylvania 15238  
 412/826-5477 FAX: 412/826-5571



QUA-4179	Analyst <i>Skilham a Hoyle</i>	Date <i>10-15-96</i>	Lot Number <i>C6T110114</i>	Page <i>1</i>	of <i>1</i>	Serial Number <i>026</i>	Log Book Number <i>96-MT-532</i>	Reagent Used <i>1ml 1:1 HNO<sub>3</sub> 185-026-6</i> <i>2ml 30% H<sub>2</sub>O<sub>2</sub> m157 KPBV CHEMPAGE</i>
Matrix <i>Water</i>	Instr. <i>GFAA</i>	Method <i>ILM03.C</i>	Start Time <i>07:30</i>	SDG, if applicable	Lab Lot No. (Book, Page, Line) <i>185-024-9</i>	MS <i>Qim-751</i>		

Client ID	Lab Sample ID	Init Wt/Vol g/mL	Final Vol mL	Comments	Color		Clarity		Texture		Artifacts
					Pre	Post	Pre	Post	Pre	Post	
<i>1. BRL-EB 1096</i>	<i>C677C</i>	<i>100ml</i>	<i>100ml</i>	<i>WAA 10-15-96</i>	<i>C</i>	<i>C</i>	<i>C</i>	<i>C</i>			
<i>2. PBW 10-15-2</i>	<i>PBW C68C2B</i>			<i>+1ml Qim-751</i>							
<i>3. LCS 10-15-2 #1</i>	<i>LCS #1 C68C2C</i>			<i>+1ml Qim-751</i>							
<i>4. LCS 10-15-2 #2</i>	<i>LCS #2 C68C2C</i>										
<i>5.</i>				<i>WHEN DIGESTING A BLANK WE</i>							
<i>6.</i>				<i>only DIGEST SAMPLE, BLANK, LCS.</i>							
<i>7.</i>				<i>BUT SAMPLE WAS ALSO LIMITED.</i>							
<i>8.</i>											
<i>9.</i>											
<i>10.</i>											
<i>11.</i>											
<i>12.</i>											
<i>13.</i>											
<i>14.</i>											
<i>15.</i>											
<i>16.</i>											
<i>17.</i>											
<i>18.</i>											

Digestate(s)	Digestate(s) Received				Digestate(s) Relinquished				Texture F = Fine M = Medium C = Coarse	Clarity C = Clear CL = Cloudy O = Opaque	Color R = Red BL = Blue BR = Brown BLK = Black Y = Yellow O = Orange V = Violet P = Pink W = White GY = Gray GN = Green C = Colorless						
	Date	Time	Analyst	Location	Date	Time	Analyst	Location									
<i>All Above</i>	<i>10-15-96</i>	<i>14:45</i>	<i>Skilham a Hoyle</i>	<i>METALS PREP</i>	<i>10-15-96</i>	<i>14:50</i>	<i>Skilham a Hoyle</i>	<i>MET-1 A6</i>									
<i>All Above</i>	<i>10-18-96</i>	<i>12:15</i>	<i>Erin M Faust</i>	<i>MET-1 A6</i>	<i>10-18-96</i>	<i>16:30</i>	<i>Erin M Faust</i>	<i>MET-1 A6</i>									
<i>All Above</i>	<i>10-21-96</i>	<i>08:45</i>	<i>Robert A Judd</i>	<i>MET-1 A6</i>	<i>10-21-96</i>	<i>13:00</i>	<i>Robert A Judd</i>	<i>MET-1 A6</i>									

Hot Plate Temperatures	1	2	3	4	5	6	7	8	9	10
Initial Temp (°C)		<i>950</i>								
Final Temp (°C)		<i>950</i>								

Reviewed By: *Robert A Judd* CF=0° Date: *10-15-96*

**GPAА CLP Spike Summary**

Project: Harding Lawson  
 Sam No.: C6J10114, C6J110115

Case No.: \_\_\_\_\_ Method: ILM03.0

Page 1 of 1  
 SDG No.: \_\_\_\_\_

Sample ID	Arsenic Spike 20 ppb				Cadmium Spike 10 ppb				Cadmium Spike ppb				Cadmium Spike 20 ppb			
	Actual Value Unspiked Sample	% Recover of An. sp	Req. Dilu- tion	Req. MSA	Actual Value Unspiked Sample	% Recover of An. sp	Req. Dilu- tion	Req. MSA	Actual Value Unspiked Sample	% Recover of An. sp	Req. Dilu- tion	Req. MSA	Actual Value Unspiked Sample	% Recover of An. sp	Req. Dilu- tion	Req. MSA
PBW 10-15-2	21.8	110	---	---												
UCSD 10-15-2	42.0	108	---	---												
UCSD D 10-15-2	42.7	110	---	---												
C6TRC	<1.8	116	VN	---												
PBS 10-15-1	<1.8	110	---	---												
UCSD 10-15-1	(x25) 46.6	120	---	---												
C6M5	(x5) 40.3	104	---	---												
C6M5D	(x5) 37.5	95	---	---												
C6M6	(x2) 44.2	103	---	---												
C6M7	(x5) 61.2	94	---	---												
C6M8	(x5) 45.0	96	---	---												
C6M9	73.5	114	---	---												
C6M1A	(x20) 42.3	102	---	---												
C6ME	(x2) 49.9	108	---	---												
C6MF	37.3	108	---	---												
C6MG	45.7	104	---	---												
C6MH	80.2	99	---	---												
C6MJ	64.7	98	---	---												
C6MK	26.9	118	---	---												
	BUF															
	BUF	10-23-16														
Matrix Spike C6MSS	Actual Value Spiked Sample (x5) 44.9	Percent Matrix Spike Recovery 58			Actual Value Spiked	Percent Matrix Spike			Actual Value	Percent Matrix Spike			Actual Value Spiked Sample	Percent Matrix Spike		

R2 10-21-96

1107  
 GAS P1/05-96/0100/GFAASmry. SMP

Reviewed by: \_\_\_\_\_

Date: \_\_\_\_\_

**QUANTERRA ENVIRONMENTAL SERVICES  
TOTAL SOLIDS/PERCENT MOISTURE LOG SHEET**

Oven Temperature: 103°C

Calculations:

1.  $A - C = D$
2.  $B - C = E$
3.  $\frac{D}{E} \times 100 = F$
4.  $100 - F = G$

Includes attachment(s) 669H

Analyst: J. W. ...

Date 10/14/96 Time in 1000

Date 10/15/96 Time out 0800

Batch No(s): 6285188

*AR 2016/10/15/96  
10/15/96  
10/15/96*

SAMPLE ID	TARE NO.	(A) DRIED SAMPLE + TARE	(B) SAMPLE + TARE	(C) TARE	(D) WEIGHT OF DRY SAMPLE IN GRAMS	(E) WEIGHT OF SAMPLE IN GRAMS	(F) PERCENT SOLIDS	(G) PERCENT MOISTURE
06J110109-001	100	6.74	7.06	1.10	5.64	5.96	94.63	536.537
↓ 001D	101	6.93	7.27	1.11	5.82	6.16	94.48	552
06J110114-001	102	5.54	6.45	1.18	4.36	5.27	82.73	17.27
↓ 002	103	6.13	7.35	1.06	5.07	6.29	80.60	19.40
↓ 003	104	4.92	6.51	1.10	3.82	5.41	70.61	29.39
↓ 004	105	7.25	8.65	1.06	6.22	7.59	81.95	18.05
↓ 005	106	5.90	7.21	1.02	4.88	6.19	78.84	21.16
↓ 006	107	5.74	6.87	1.07	4.67	5.80	80.52	19.48
06J110115-001	108	6.64	8.40	1.09	5.55	7.31	75.92	24.08
↓ 002	109	6.65	8.05	1.02	5.63	7.03	80.09	19.91
↓ 003	110	7.73	9.22	1.03	6.65	8.14	81.70	18.30
* ↓ 004	111	6.34	7.59	1.06	5.28	6.53	80.86	19.14
↓ 004D	112	5.67	6.83	1.03	4.66	5.80	80.34	19.66
↓ 005	113	5.05	6.25	1.03	4.02	5.22	77.01	22.99
↓ 006	114	5.49	6.04	1.09	4.40	4.95	88.89	11.11
<i>Handwritten signature and date: J. W. ... 10/14/96</i>								

*J. W. ... 10/14/96 069*



**APPENDIX B  
SUMMARY OF EQUATIONS AND  
INPUT DATA RISK ASSESSMENT**



This calculation brief summarizes the equations and input parameters used to conduct the risk assessment at the AlliedSignal Facility

**Default input parameters for risk assessment and hazard evaluation**

Variable Definitions:

		default	units
RML	Risk management level	1.00E-06	
THQ	Target Hazard Quotient	1	
ED <sub>TOT</sub>	Exposure duration - total	30	years
ED <sub>C</sub>	Exposure duration - child	6	years
ED <sub>AD</sub>	Exposure duration - adult	24	years
ED <sub>O</sub>	Exposure duration occupational	25	years
EF <sub>R</sub>	Exposure frequency - residential	350	days/year
EF <sub>O</sub>	Exposure frequency - occupational	250	d/yr
BW <sub>C</sub>	Body Weight - (child)	15	kg
BW <sub>AD</sub>	Body weight - adult	70	Kg
IRS <sub>C</sub>	Soil ingestion rate - child	200	mg/d
IRS <sub>AD</sub>	Soil Ingestion rate - adult	100	md/d
FC	Fraction of contaminated soil ingested	1	(100 %)
FA	Fraction of contaminant absorbed into body	1	(100 %)
AT <sub>C</sub>	Averaging time for carcinogen	25550	days
AT <sub>NC</sub>	Averaging time for noncarcinogen	ED*365	days
AT <sub>N</sub>	Averaging Time - (Noncarcinogen)	2190	days
CSF <sub>As</sub>	Cancer slope factor for Arsenic (As)	1.5	kg-d/mg
RfD <sub>O</sub>	Reference dose (oral) for arsenic	3.00E-04	mg/kg/d
IFS <sub>ADJ</sub>	Soil ingestion factor, age adjusted	114.29	mg-y/kg-d

**Evaluation of Risk-based Concentration using default assumptions**

$$RBC \text{ (mg/kg)} = (RML * AT_C) / (EF_R * (IFS_{ADJ} / 10^6) * CSF_{As})$$

$$RBC = 0.43 \text{ mg/kg}$$

**Evaluation of Hazard-based Concentration using default assumptions**

$$As \text{ HBC} = (THQ * RfD_O * BW_C * AT_N) / (EF_R * ED_C * (IRS_C / 1 \times 10^6 \text{ mg/kg}))$$

$$As \text{ HBC} = 23.5 \text{ mg/kg}$$

Prepared by: 

Checked by: ELR

**Evaluation of risk associated with background levels of arsenic, using default assumptions**

$$\text{Risk} = (C * (\text{IFS}_{\text{ADJ}} / 10^6) * \text{CSF}_{\text{As}} * \text{EF}_R) / \text{AT}_C$$

C is the concentration of Arsenic in Soil = 18 mg/kg

Risk = 4.23E-05

**Occupational assessment**

Variable Definitions (USEPA default occupational exposure)

RML	Risk Management Level	1.00E-06	
THQ	Target Hazard Quotient	1	
ED <sub>o</sub>	Exposure Duration	25 years	
EF <sub>o</sub>	Exposure Frequency	250 days/year	
BW <sub>A</sub>	Body Weight	70 kg	
IRS <sub>A</sub>	Soil ingestion rate	100 mg/day	
FC	Fraction of contaminated soil ingested	0.5	50%
FA	Fraction of contaminant absorbed into body	1	100%
AT	Averaging time	25550 days	
AT <sub>N</sub>	Averaging time (noncarcinogen)	9125 days	
RfD <sub>o</sub>	Reference dose (oral)	3.00E-04 mg/kg/d	
CSF <sub>As</sub>	Cancer slope factor for Arsenic (As)	1.5 kg-d/mg	

**Evaluation of Occupational RBC at 1x10<sup>-6</sup> risk level**

$$\text{RBC (mg/kg)} = (\text{RML} * \text{BW}_A * \text{AT}) / (\text{EF}_o * \text{ED}_o * (\text{IRS}_A / 10^6 \text{ mg/kg}) * \text{FC} * \text{CFS})$$

RBC = 3.8 mg/kg

**Evaluation of Occupational RBC using same risk as presented to residential receptor by background concentration of arsenic of 18 mg/kg (4.23x10<sup>-5</sup>)**

Risk level 4.23E-05

$$\text{RBC (mg/kg)} = (4.23 \times 10^{-5} * \text{BW}_A * \text{AT}) / (\text{EF}_o * \text{ED}_o * (\text{IRS}_A / 10^6 \text{ mg/kg}) * \text{FC} * \text{CFS})$$

RBC = 161.3 mg/kg

**Evaluation of site Occupational Hazard using default assumptions**

$$\text{RBC (mg/kg)} = (\text{THQ} * \text{RfD} * \text{BW}_A * \text{AT}_N) / (\text{EF}_o * \text{ED}_o * (\text{IRS}_A / 10^6 \text{ mg/kg}) * \text{FC})$$

RBC = 613 mg/kg

Prepared by: Am C

Checked by: ER



**APPENDIX C  
REMEDIAL ALTERNATIVES  
COST ESTIMATE**

**CALCULATION OF IMPACTED SOIL VOLUME  
EVALUATION OF REMEDIAL ALTERNATIVES  
BUFFALO RESEARCH LABORATORY**

**ASSUMPTIONS**


IMPACTED AREAS ARE DEFINED AS THOSE AREAS WITH CONCENTRATIONS OF ARSENIC IN SURFACE SOILS GREATER THAN 18 mg/kg AS ILLUSTRATED IN FIGURE 5.

FOR EXCAVATION AND DISPOSAL PURPOSES, IT IS ASSUMED THE TOP 2 FEET OF SOIL WILL NEED TO BE REMOVED.

AREA IDENTIFICATION	DIMENSIONS (feet)	EXCAVATION DEPTH (feet)	AREA (square feet)	VOLUME (cubic feet)	VOLUME (cubic yards)	WEIGHT (tons)
MW-10	155 x 185	2	28,675	57,350	2,124	3,186
SWMU	110 x 60	2	6,600	13,200	489	733
	60 x 40	2	2,400	4,800	178	267
MW-8	20 x 20	2	400	800	30	44
MW-9	60 x 20	2	1,200	2,400	89	133
MW-7	60 x 20	2	1,200	2,400	89	133

TOTAL IMPACTED AREA IN LANDSCAPED AREAS	38,075 SQUARE FEET
TOTAL IMPACTED AREA BENEATH ASPHALT	2,400 SQUARE FEET
TOTAL VOLUME OF SOIL TO BE EXCAVATED	2,998 CUBIC YARDS
TOTAL WEIGHT OF SOIL TO BE EXCAVATED	4,498 TONS

Prepared by: ELR

Checked by: 

**CALCULATION OF BACKFILL SOIL VOLUME REQUIRED FOR SITE RESTORATION  
EVALUATION OF REMEDIAL ALTERNATIVES  
BUFFALO RESEARCH LABORATORY**

**VOLUME OF CLEAN BACKFILL REQUIRED IF EXCAVATION /DISPOSAL ALTERNATIVE IS SELECTED**

AREA IDENTIFICATION	DIMENSIONS (feet)	FILL DEPTH (feet)	AREA (square feet)	VOLUME (cubic feet)	VOLUME (cubic yards)	WEIGHT (tons)
MW-10	155 x 185	1.5	28,675	43,013	1,593	2,390
SWMU	110 x 60	1.5	6,600	9,900	367	550
	60 x 40	1.5	2,400	3,600	133	200
MW-8	20 x 20	1.5	400	600	22	33
MW-9	60 x 20	1	1,200	1,200	44	67
MW-7	60 x 20	1	1,200	1,200	44	67

**VOLUME OF TOP SOIL REQUIRED IF EXCAVATION/DISPOSAL OR ALTERNATIVE SELECTED  
TOP SOIL COVER ALTERNATIVE IS SELECTED**

AREA IDENTIFICATION	DIMENSIONS (feet)	FILL DEPTH (feet)	AREA (square feet)	VOLUME (cubic feet)	VOLUME (cubic yards)	WEIGHT (tons)
MW-10	155 x 185	0.5	28,675	14,338	531	797
SWMU	110 x 60	0.5	6,600	3,300	122	183
	60 x 40	0.5	2,400	1,200	44	67
MW-8	20 x 20	0.5	400	200	7	11
MW-9	60 x 20	0	1,200	0	0	0
MW-7	60 x 20	0	1,200	0	0	0

**EXCAVATION AND DISPOSAL ALTERNATIVE**  
TOTAL VOLUME OF BACKFILL MATERIAL REQUIRED  
TOTAL VOLUME OF BACKFILL TOP SOIL REQUIRED

3,307 TONS  
705 CUBIC YARDS

**TOP SOIL COVER ALTERNATIVE**  
TOTAL VOLUME OF TOP SOIL REQUIRED

705 CUBIC YARDS

Prepared by ELR  
Checked by: *[Signature]*

**COST ESTIMATE  
EXCAVATION, DISPOSAL AND SITE RESTORATION ALTERNATIVE  
BUFFALO RESEARCH LABORATORY**

ASSUMPTIONS:

- 1.) WORK WILL BE COMPLETED IN 2 WEEKS
- 2.) WORK WILL BE DONE WITH A 3 MAN CREW
- 3.) EXCAVATED MATERIAL WILL NOT BE STOCKPILED ON SITE, IT WILL BE TRUCKED TO DISPOSAL SITE UPON EXCAVATION
- 4.) MATERIAL **WILL** BE CONSIDERED HAZARDOUS FOR DISPOSAL PURPOSES
- 5.) THE TOP 2 FEET OF SOIL WILL BE REMOVED

LABOR			
HLA	RATE	HOURS	TOTAL
SENIOR GEOLOGIST	\$90	40	\$3,600
STAFF GEOLOGIST	\$65	140	\$9,100
CLERICAL	\$40	10	\$400
SUBCONTRACTOR			
FIELD SUPERINTENDENT	\$40	100	\$4,000
FIELD TECHNICIAN	\$30	200	\$6,000


EQUIPMENT/ EXPENSES			
HLA			
TRUCK	\$80	10	\$800
LEVEL D PPE	\$20	10	\$200
PER DIEM	\$75	10	\$750
SUBCONTRACTOR			
EXCAVATOR	\$1,500	2	\$3,000
ASPHALT CUTTER	\$200	1	\$200
TRUCK	\$60	10	\$600
UTILITY TRAILER	\$100	10	\$1,000
PER DIEM	\$75	30	\$2,250

Prepared by ELR  
Checked by: *[Signature]*

**COST ESTIMATE  
EXCAVATION, DISPOSAL AND SITE RESTORATION ALTERNATIVE  
BUFFALO RESEARCH LABORATORY**

	RATE		UNITS	TOTAL
TRANSPORTATION AND DISPOSAL OF SOIL	\$210	TON	4498	\$944,580
WASTE CHARACTERIZATION SAMPLE	\$1,300	EACH	1	\$1,300
BACKFILL	\$20	TON	3307	\$66,140
TOP SOIL	\$30	YD <sup>3</sup>	705	\$21,150
ASPHALT	\$7	YD <sup>2</sup>	267	\$1,869
LANDSCAPING	\$5,000	EACH	1	\$5,000
LABOR TOTAL				\$23,100
EQUIPMENT/EXPENSES TOTAL				\$8,800
ALTERNATIVE TOTAL				\$1,071,939

Prepared by ELR

Checked by: 



**COST ESTIMATE  
COVER IMPACTED AREAS WITH 2-INCHES OF ASPHALT ALTERNATIVE  
BUFFALO RESEARCH LABORATORY**

ASSUMPTIONS:


- 1.) ONLY THE LANDSCAPED AREAS OF THE SITE WILL BE COVERED WITH ASPHALT
- 2.) WORK WILL BE COMPLETED IN ONE WEEK
- 3.) IMPACTED AREAS WILL BE REPAVED EVERY 3 YEARS WITH A 1-IN LAYER OF ASPHALT

TOTAL IMPACTED AREA IN LANDSCAPED AREAS OF PLANT 38,075 FT<sup>2</sup>

REQUIRED VOLUME OF ASPHALT 4,230 YD<sup>2</sup>

LABOR	RATE	UNITS	TOTAL
SENIOR GEOLOGIST	\$90	10	\$900
STAFF GEOLOGIST	\$65	50	\$3,250
CLERICAL	\$40	8	\$320
EQUIPMENT/EXPENSES			
TRUCK	\$80	5	\$400
LEVEL D PPE	\$20	5	\$100
PER DIEM	\$75	5	\$375

	RATE	UNITS	TOTAL
INITIAL PLACEMENT OF ASPHALT	\$7	4230	\$29,610
TOTAL LABOR / EXPENSES			\$5,345
INITIAL ALTERNATIVE TOTAL			\$34,955
RESURFACING EVERY 3 YEARS	\$5	4230	\$21,150
100 YEAR ALTERNATIVE TOTAL			\$732,905

Prepared by: ELR  
Checked by: 

**COST ESTIMATE****COVER IMPACTED AREAS WITH 6 INCHES OF TOP SOIL AND VEGETATION ALTERNATIVE  
BUFFALO RESEARCH LABORATORY**

## ASSUMPTIONS:

- 1.) ONLY LANDSCAPED AREAS OF THE PLANT WILL BE COVERED
- 2.) WORK WILL BE PERFORMED IN 1 WEEK

TOTAL IMPACTED AREA IN LANDSCAPED AREAS OF PLANT

38,075 FT<sup>2</sup>

TOTAL VOLUME OF TOP SOIL REQUIRED

705 FT<sup>3</sup>

LABOR	RATE	UNITS	TOTAL
SENIOR GEOLOGIST	\$90	10	\$900
STAFF GEOLOGIST	\$65	50	\$3,250
CLERICAL	\$40	8	\$320
EQUIPMENT/EXPENSES			
TRUCK	\$80	5	\$400
LEVEL D PPE	\$20	5	\$100
PER DIEM	\$75	5	\$375

	RATE	UNITS	TOTAL
PLACEMENT OF TOP SOIL	\$30	705	\$21,150
LANDSCAPING	\$5,000	1	\$5,000
TOTAL LABOR / EXPENSES			\$5,345
ALTERNATIVE TOTAL			\$31,495

Prepared by: ELR

Checked by: 