THIRD FIVE-YEAR REVIEW REPORT

MIDVALE SLAG SUPERFUND SITE
Salt Lake County, Utah

CERCLIS ID: UTD081834277

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Prepared by

U.S. Environmental Protection Agency
Region 8
Denver, Colorado

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LIST OF ABBREVIATIONS

ACL	Alternate Concentration Limit
ARARs	Applicable or Relevant and Appropriate Requirements
As	Arsenic
bgs	below ground surface
BRA	Baseline Risk Assessment
CDM	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
COC	Contaminants or Chemical of Concern
EE/CA	Engineering Evaluation/Cost Analysis
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
ft	feet
ft/day	feet per day
gpm	gallons per minute
GW	Groundwater
IC	Institutional Control
ICPP	Institutional Control Process Plan
IDW	Investigation Derived Waste
JVWCD	Jordan Valley Water Conservation District
LF	West-central portion of OU1 (site of a small landfill)
LG	East-central portion of OU1 (abandoned WWTP lagoons)
LR	Southern one-third of OU1 (right of way for proposed Jordan River Blvd)
MCL	Maximum Contaminant Level
mg/Kg	Milligram per kilogram
mg/L	Milligram per liter
MSW	Mixed Smelter Waste
NCP	National Contingency Plan
NPL	National Priorities List
NTCRA	Non-time critical removal action
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
OU1	Operable Unit 1 (Northern 266 acres)
OU2	Operable Unit 2 (Southern 180 acres)
PCE	Tetrachloroethylene

Pb	Lead
POA	Private Owners Associations
Ppb	part per billion
PRG	Preliminary Remediation Goals
RA	Remedial Action
RAO	Remedial Action Objective
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Regional Project Manager
Site	Midvale Slag Superfund Site
SMP	Site Management Plan
SPLP	Synthetic Precipitation Leaching Procedure
SW	Surface Water
TAG	Technical Assistance Grant
TBD	To Be Determined
TCLP	Toxicity Characteristic Leaching Procedures
TCRA	Time Critical Removal Action
UDEQ	Utah Department of Environmental Quality
UDWR	Utah Division of Water Rights
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Service
US&G	Upper Sand and Gravel
UTA	Utah Transit Authority
µg/L	microgram per Liter
USBR	U.S. Bureau of Reclamation
WE	Winchester Estates (northern one-third of OU1)
WENW	Winchester Estates northwestern portion
WESE	Winchester Estates southeastern portion
WWTP	Waste Water Treatment Plant

EXECUTIVE SUMMARY

The U. S. Environmental Protection Agency (EPA) Region 8 with support from the Omaha District U.S. Army Corps of Engineers (USACE) has finalized the five-year review of the remedial actions (RAs) implemented at the Midvale Slag Superfund Site (Site), Operable Unit 1 (OU1) and Operable Unit 2 (OU2). This is the third five-year review for the Site. Since hazardous substances were contained in place at the Midvale Slag Superfund Site as part of the remedy, EPA requires five-year reviews to ensure that the Site remedy remains protective of human health and the environment.

The Site is located 12 miles south of Salt Lake City, Utah. The majority of the Site is contained within Midvale City; although, approximately 80 acres in the northern portion extends into Murray City. The Site was the location of five lead and copper smelters between 1871 and 1971. Smelter facilities were demolished in the 1970's. OU2 was the location of most smelter waste disposal although some smelter wastes and contaminated soils are also present on OU1. Groundwater contamination exists at both OUs. Contaminants of concern (COCs) for both soil and groundwater include heavy metals, primarily arsenic and lead. Tetrachloroethylene (PCE), a chlorinated organic solvent, is also present in Site groundwater but is not considered to be a COC due to its off-site origin.

The remedy for the Site was chosen and documented by the Record of Decision (ROD) for OU1 in 1995 and a separate ROD for OU2 in 2002. Two Explanation of Significant Difference (ESD) documents were issued for OU1, one in 1998 and the other in 2006. A third ESD covering both OUs was issued in 2013, to update and modify the remedy to address changing conditions.

The selected Site remedy under the RODs and ESDs includes activities specific to each OU:

- OU1: The remedy includes excavation of contaminated soils, implementation of institutional controls and stabilization of the Jordan River banks.
- OU2: The remedy includes disposal of highly contaminated smelter waste, construction of barriers over smelter waste and contaminated soils, implementation of institutional controls, groundwater monitoring and stabilization of the Jordan River banks.

The following paragraphs describe protectiveness determinations for each OU at this Site.

OU1 protective. The remedy at OU1 protects human health and the environment because contaminated soils were excavated, institutional controls were implemented and the banks of the Jordan River were stabilized.

OU2 protective. The remedy at OU2 protects human health and the environment because soils were excavated, wastes left in place were capped, institutional controls were implemented, groundwater continues to be monitored, and the banks of the Jordan River were stabilized.

Sitewide protective. Because the remedies at OU1 and OU2 are protective, the Midvale Slag Superfund Site remedial action is protective of human health and the environment.

FIVE-YEAR REVIEW SUMMARY FORM

Site Identification			
Site Name: Midvale Slag			
EPA ID: UTD081834277			
Region: 8	**State:** UT		**City/County:** Midvale/Salt Lake County

Site Status	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

Review Status
Lead agency: EPA
Author name (Federal or State Project Manager): Erna Waterman
Author affiliation: US EPA, Region 8
Review period: 04/01/2013 – 12/30/2013
Date of site inspection: 06/12/2013
Type of review: Statutory
Review number: 3
Triggering action date: 12/30/2008
Due date *(five years after triggering action date)*: 12/30/2013

Issues/Recommendations				
Issues and Recommendations Identified in the Five-Year Review:				
OU(s): OU1, OU2	**Issue Category:** No Issue			
	Issue: None			
	Recommendation: N/A			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
N/A	N/A	N/A	N/A	N/A

Protectiveness Statements		
OU: OU1	**Protectiveness Determination:** Protective	**Addendum Due Date:** N/A
The remedy at OU1 protects human health and the environment because contaminated soils were excavated, institutional controls were implemented and the banks of the Jordan River were stabilized.		
OU: OU2	**Protectiveness Determination:** Protective	**Addendum Due Date:** N/A
The remedy at OU2 protects human health and the environment because soils were excavated, wastes left in place were capped, institutional controls were implemented, groundwater continues to be monitored, and the banks of the Jordan River were stabilized.		
OU: Sitewide	**Protectiveness Determination:** Protective	**Addendum Due Date:** N/A
Because the remedies at OU1 and OU2 are protective, the Midvale Slag Superfund Site remedial action is protective of human health and the environment.		

1.0 INTRODUCTION

The purpose of the five-year review is to determine whether the remedial actions at a Site are protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and make recommendations to address them.

1.1 Authority for Conducting the Five-Year Review

The U.S. Environmental Protection Agency (EPA), Region 8 is preparing this third five-year review report pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP). CERCLA §121 states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the Site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such Site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

EPA interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

1.2 Who Conducted the Five-Year Review

EPA Region 8, with support from the Omaha District of the U.S. Army Corps of Engineers (USACE), has conducted the third five-year review of remedial actions implemented at Midvale Slag near Midvale, Utah. (CERCLIS ID: UT081834277) This review was conducted for the entire Site from April through December 2013.

1.3 Other Review Characteristics

The triggering action for this review is the signature date of the previous five-year review report, December 30, 2008. This review is being conducted to meet the statutory mandate under CERCLA § 121 (c) where contaminants have been left in place on the Site above levels that allow for unlimited use and unrestricted exposure.

2.0 SITE CHRONOLOGY

Table 1 summarizes the important events and relevant dates in the Site's chronology

Table 1: Chronology of Site Events

Date	Event
1871-1971	Five lead and copper smelters operate at the Site
1982 - 86	Various inspections and characterizations performed at the Site
June 1986	EPA proposed listing the Site on the National Priorities List (NPL)
1988	Site Investigation for EPA Region 8 was conducted
Dec 1990	Removal action to dispose of lab chemicals and explosives remaining onsite from an abandoned lab facility completed
Feb 1991	EPA lists the Site on the NPL
Jan 1993	Phase 1 preliminary investigation report published by EPA
1994	The Final Feasibility Study Report on OU1 complete
April 1995	EPA issued a Record of Decision (ROD) for OU1
July 1995	Non-time critical removal action (NTCRA) at OU2 to address mixed smelter waste and associated contaminated soils on OU2 completed
May 1996	Remedial construction began on the WENW Parcel of OU1
June 1996	Action Memorandum for a removal action at OU2 to properly decommissioned water supply wells in the Deep Principal Aquifer signed
Aug 1996	Notice to Proceed Letter issued for Winchester Estates
Aug 1996	"Midvale Pioneer Cemetery" established by an archaeological evaluation
Sep 1996	Action Memorandum for time-critical removal action (TCRA) on the Butterfield Lumber Company parcel signed
Sep 1996	TCRA approved on Butterfield Lumber Company parcel
Oct 1996	Action Memorandum authorizing a TCRA on the Pioneer Cemetery signed
April 1997	TCRA completed at the Pioneer Cemetery at OU2
1998	Remedial construction performed on the WESE Parcel of OU1
May 1998	EPA issued Explanation of Significant Differences (ESD) for OU1
Nov 1998	Construction on the WESE Parcel of OU1 completed
Jan 1999	Final inspection of RA completed on OU1
March 1999	Final RA report for OU1 remedy completed
July 1999	EPA selects Midvale City as a Superfund redevelopment pilot project community
Aug 2000	*Bingham Junction Reuse Assessment and Master Plan* adopted by Midvale City Council
Oct 2001	Investigation-derived waste from approximately 84 deteriorated drums was bulked and disposed
Nov 2001	Midvale City rezones the Site, renamed to Bingham Junction, establishing a mixed-use zone
Oct 2002	EPA issues ROD for OU2
Oct 2003	EPA completes first Five-Year Review
Nov 2004	Consent decree for OU2 cleanup signed
March 2005	Technical Memorandum for Preliminary Remediation Goals (PRG) and decision-making process at OU1 signed
Feb 2006	EPA issues second Explanation of Significant Differences for OU1

Table 1: Chronology of Site Events

Date	Event
June 2006	Final Inspection of OU2 Remedial Action
Aug 2006	Redevelopment ribbon-cutting ceremony
Sep 2006	Draft Final Remedial Action Report completed
June 2007	Midvale City adopts ordinance (06/26/2007 O-8) "Institutional Controls Ordinance for Bingham Junction, Jordan Bluffs, and designated rights-of-way" implementing institutional controls
Aug 2007	Construction of OU2 Remedy completed
Spring 2008	EPA issues Ready for Reuse Determination
Aug 1, 2008	Application for Federal Assistance submitted to EPA for Ecosystem Restoration along the East bank of the Jordan River
Oct 2008	Begin construction of riparian zone remedy – OU2
Nov 2008	Begin construction of groundwater monitoring network – OU2
Dec 2008	EPA completes second Five-Year Review
2008-2011	Riparian zone remedy and ground water monitoring network installed and operational.
May 2011	EPA published a case study "Cleanup and Mixed-Use Revitalization on the Wasatch Front, the Midvale Slag Superfund Site and Midvale City, Utah"
Aug 2011	Opening of Bingham Junction station on UTA Mid-Jordan light rail line
Sep 2011	EPA issues Preliminary Close-Out Report
Nov 2013	EPA issues ESD for OU1/OU2
Nov-Dec 2013	EPA contracts for drop structure repairs on Jordan River

3.0 BACKGROUND

3.1 Location and Setting

The Midvale Slag Site is located 12 miles south of Salt Lake City, Utah (Figure 1, Appendix 5). The Site encompasses approximately 446 acres and is divided into two operable units, OU1 and OU2 comprising the northern and southern portion of the Site, respectively. The Site is mostly located in the City of Midvale with a portion extending into the City of Murray, Utah (Figure 2, Appendix 5). Site boundaries include W 7800 South Street on the south, the Jordan River on the west, W 6400 South Street (Winchester Avenue) on the north, S700 West Street on the northeast and east, and Holden Street on the southeast.

OU1 encompasses approximately 266 acres in the northern portion of the Site, and primarily consisted of buffer land where minimal smelter operations occurred (Figure 2, Appendix 5). OU1 was historically divided into smaller parcels LR, LF, LG, WENW, and WESE (Figure 3, Appendix 5). The northernmost portion of OU1, approximately 80 acres, falls within the Murray City limits. This area has been remediated and achieved unlimited use and unrestricted exposure criteria, therefore no institutional controls are required.

OU2 encompasses approximately 180 acres in the southern portion of the Site and was the location of the smelter building and operations. OU2 was subdivided into areas based on the distribution of unique smelter and mill wastes. The location of these features is illustrated in Figure 4 of Appendix 5.

Ore processing and smelting operations were conducted at the Site and the adjacent Sharon Steel Superfund site, located immediately south of OU2. During the operational time of the facility, five different lead and copper smelters occupied the Site. Operations at the Site ceased in 1971.

Contamination is associated with smelter and mill waste deposits on OU2 as well as small amounts of surface and subsurface slag and contaminated soils on OU1. Contaminants of concern include arsenic, barium, cadmium, chromium, copper, lead, mercury, selenium, silver, and zinc. EPA ultimately selected lead, cadmium and arsenic as the primary chemicals to be addressed by remedial action for surface soils at OU1. Arsenic, cadmium, selenium, and antimony were identified as contaminants of concern for groundwater, with the predominant concern being arsenic.

EPA listed the Midvale Slag Superfund Site on the National Priorities List in 1991. EPA proposed the Site to the NPL based on studies conducted between 1982 and 1985 that found groundwater, soil and sediments contaminated with heavy metals. Potential human health threats include drinking contaminated groundwater and ingesting, inhaling or handling contaminated soils, wastes or sediments.

The cleanup for this Site included the following areas:

1) The former smelter property including buffer land currently known as Bingham Junction, which is owned by individual property owners.
2) Portions of the Jordan River riparian corridor which are adjacent to the former smelter property.
3) Portions of residential properties in the northern portion of the Site including the Winchester Estates, all part of OU1.
4) Groundwater beneath the Site for both OU1 and OU2.

3.2 Hydrogeology and Hydrology

The Site is located in the Salt Lake Valley, bounded to the west by the Oquirrh Mountains and on the east by the Wasatch Range. Thrusting, faulting, folding, and igneous intrusions are responsible for the presence and form of these mountain ranges. These ranges are the source of Quaternary alluvial sediments that make up much of the Salt Lake Valley Floor.

The Midvale Site lies on the Jordan River floodplain and slopes gently to the west, toward the river. Floodplain soils consist of silty clay loams, silty clays, sands, and gravels. The floodplain deposits overlie valley fill material comprising gravelly sands and sandy gravels. The flood plain deposits grade laterally to the east into interlayered sand silt and clay lacustarine terrace deposits.

The Quaternary age valley fill contains a shallow unconfined aquifer, Upper Sand & Gravel (US&G) Aquifer, and a deep confined aquifer, Deep Principal Aquifer. A confining layer between 5 and 100 feet thick separates the two aquifers.

Near surface geology on OU2 is described relative to the Jordan River floodplain and the adjacent upland terrace. The terrace is underlain by lacutrine deposits consisting of interlayered sand, silt and clay. These deposits contain localized saturated conditions with groundwater perched on underlying silt and clay at a depth of 30-40 ft. Groundwater flow direction is variable in the terrace, but generally includes a downward and westerly component.

The Jordan River floodplain on OU2 generally has a layer of smelter and mill wastes underlain by a thin layer of Holocene alluvium. The Quaternary age valley fill and associated US&G and Deep Principal Aquifers underlies the recent alluvial materials.

Site hydrology includes the Jordan River, wetlands and an abandoned irrigation canal. In the vicinity of the Site, river flow ranges from 30 cfs to 2500 cfs, in the northerly direction. Jordan River is a gaining river and surface water quality is influenced by groundwater inflows and irrigation return flow. Groundwater flows on the Site are in a northwesterly direction toward the Jordan River.

3.3 Land and Resource Use

The Site is currently zoned for residential, recreational, and industrial uses. Midvale promoted redevelopment through the publication of the *Bingham Junction Reuse Assessment and Master Plan* in 2000, and Midvale City was the first EPA Region 8 community selected as a Superfund redevelopment pilot project. The Bingham Junction plan envisioned commercial, industrial, and retail, as well as single and multi-family homes.

Today a large-scale, mixed-use development is being constructed on both OU1 and OU2. In addition, the Utah Transit Authority constructed a light rail line through the Site on the former Union Pacific property. Since the publication of the Site's Ready for Reuse Determination document in the spring of 2008, approximately 98 % of the Site's total 446 acres has been proposed for redevelopment. Currently, the completed Site construction is estimated at 40% residential, 40% commercial, and 2 % recreational/riparian, with a smaller percentage allocated to roads and UTA train rail coverage. Full Site redevelopment is estimated to be complete in 2018."

3.4 History of Contamination

Little historical information is available describing activities on OU1 prior to the 1940's. Before that time, it is generally believed that the land was used as pasture with no industrial activities. Disposal of domestic trash and household goods occurred on the southwest corner of the LF Parcel between the 1940's and the 1960's. The WWTP on OU1 operated from 1959 until 1986. The secondary treatment lagoons were closed according to an approved closure plan. Material excavated as part of the Interstate Highway 215 construction project was subsequently deposited on the former lagoon location. The historical smelting activities on OU2 are presumed to be the source of contaminants detected in OU1.

The history of ore processing at the Site covers the period from 1871 to 1971. Five lead and copper smelters operated in the vicinity of OU2 during that period. OU2 was also the location of most waste disposal. Smelter wastes included arsenic trioxide, calcine, slag and other miscellaneous smelter wastes. OU2 was also used for the disposal of mill tailings from the Sharon Steel Site to the south.

3.5 Initial Responses

EPA proposed the Site to the National Priorities List based upon studies conducted between 1982 and 1985 that found groundwater, soil and sediments were contaminated with heavy metals. Potential human health threats included drinking contaminated groundwater or ingesting, inhaling or handling contaminated soils, wastes or sediments. EPA listed the Midvale Slag Superfund Site in 1991.

Removal Actions: EPA and UDEQ conducted investigative work and a series of removal actions. The removal actions conducted at the Site include:

- March 1990: Removal Action for installation of a fence around both operable units.
- December 1990: Emergency Removal Action to dispose of lab chemicals and explosives remaining onsite from abandoned laboratories.
- April 1995: Time Critical Removal Action to install a fence between OU1 and OU2.
- June 1996: Time Critical Removal Action to properly abandon onsite water supply wells remaining from the smelter operations.
- September 1996: Time Critical Removal Action to address contamination at the Butterfield Lumber Company property by excavating contaminated soils and backfilling with clean soils.
- October 1996: Time Critical Removal Action at the Pioneer Cemetery to excavate contaminated soils, backfill with clean soils and install fencing around this historic area.
- October 2001: Time Critical Removal Action to remove approximately 90 deteriorated drums and associated debris located in OU1.

3.6 Basis for Taking Action

Contamination at the Site is associated with smelter and mill waste deposits on OU2, as well as small amounts of surface and subsurface slag and contaminated soils on OU1. It is presumed that smelter wastes were transported to OU1 via wind, storm water, smelter stack fallout, as well as, deliberate placement as fill.

Lead and arsenic were selected as the primary chemicals to be addressed by remedial action with the expectation that other contaminants of concern would be addressed by the remedial remedy. The remaining contaminants of concern for smelter/mill wastes and soil, sediment, surface water, and groundwater include barium, cadmium, chromium, copper, mercury, selenium, silver and zinc.

Maximum arsenic and lead concentrations in Site media are summarized in Table 2.

Table 2: Maximum Contaminant Concentrations by Media

Environmental Medium	Arsenic	Lead
Smelter/Mill Wastes and Soil	20,400 mg/kg	26, 300 mg/kg
Sediment	96 mg/kg	721 mg/kg
Surface Water (dissolved)	0.0172 mg/L	0.025 mg/L
Groundwater (US&G Aquifer)	2.99 mg/L	0.037 mg/L

4.0 REMEDIAL ACTIONS

4.1 Decision Documents

The decision documents describing remediation for the Site include the ROD for each OU, and three subsequent ESD documents.

4.1.1 Record of Decision

RODs were issued in 1995 (OU1) and 2002 (OU2). These documents call out specific response actions for OU1and OU2 that include excavation/capping of contaminated soil and smelter wastes; institutional controls related to contaminated soils, smelter wastes, and ground water; and monitoring of groundwater.

4.1.2 Explanation of Significant Differences

An ESD was issued in 1998, requiring the excavation of contaminated soils, rather than capping, on the WESE parcel of OU1, which also eliminated the need for institutional controls governing the use of that parcel.

A second ESD was issued in 2006, to clarify certain modifications of the OU1 remedy decision that included land use restrictions, the riparian zone, and the groundwater remedy. Details are found in the 2006 ESD and the administrative record.

A third ESD was issued in 2013 which further clarified remedies chosen for the US&G aquifer. Two significant changes were documented:

- ACLs established in the 2002 OU2 ROD became the sitewide groundwater standards applicable to the contaminants of concern (arsenic, cadmium, selenium and antimony).
- Removed RAO to restore the AS&G aquifer to beneficial use as a drinking water source (if possible).

4.2 Remedial Action Objectives

4.2.1 OU1 Soil

The RAO specific to soil, as established in the 1995 ROD are as follows:

- Prevent unacceptable exposure risks to current and future human populations presented by contact, ingestion, or inhalation of smelter materials, associated contaminated materials, or COCs derived from the smelter wastes.

4.2.2 OU2 Mixed Smelter Waste

The RAOs specific to mixed smelter waste, as established in the 2002 ROD are as follows:

- Prevent unacceptable exposure risks to current and future human populations presented by contact, ingestion, or inhalation of smelter materials, associated contaminated materials, or COCs derived from the smelter areas.
- Prevent unacceptable exposure risks to current and future ecological receptors presented by contact, ingestion, inhalation, or uptake from smelter materials, associated contaminated materials, or COCs derived from the smelter areas.

- Provide that the future migration of contaminants from the smelter materials is within limits considered protective of ground water
- Prevent smelter materials from entering the Jordan River via surface water flow

4.2.3 OU2 Slag

The RAOs specific to slag, as established in the 2002 ROD are as follows:

- Prevent unacceptable exposure risks to current and future human populations presented by contact, ingestion, or inhalation of slag or associated contaminated materials.
- Prevent unacceptable exposure risks to current and future ecological receptors presented by uptake from slag, associated contaminated materials within slag, or COCs derived from the slag areas.
- Provide that the future migration of contaminants from the slag or contaminated materials within slag is within limits considered protective of ground water.
- Prevent slag or contaminated materials within slag from entering the Jordan River via surface water flow.

4.2.4 OU1 and OU2 Groundwater

The RAOs specific to the US&G aquifer, as established in the 2002 ROD and in the OU1 ROD, pursuant to the 2006 ESD and modified in the 2013 ESD are as follows:

- Provide that future migration of COCs into previously uncontaminated portions of the US&G aquifer and into the Deep Principal Aquifer is protective of these aquifers as sources of drinking water.
- Provide that future discharge of contaminated groundwater from the Site to the Jordan River is protective of the aquatic environment and designated use.

4.3 Remedy Components

The major components of the selected remedy under the RODs and ESDs are summarized below.

4.3.1 OU1

- Excavate soils on portions of OU1 zoned for residential use, storing soils on OU2 and backfilling excavations with clean soil.
- Implement institutional controls to prohibit unrestricted residential land use on the remainder of OU1 without additional assessment and/or clean-up.
- Stabilize the Jordan River banks and/or possible revegetation to minimize Site contamination from sloughing off into the Jordan River.

Land use restrictions were changed in the 2006 ESD, to accommodate multiple land uses. Soil cleanup levels for each land use type are shown in Table 4.

Table 3: OU1 Soil Cleanup Levels

Contaminant	Cleanup Levels	Contaminant	Cleanup Levels	Contaminant	Cleanup Levels
Residential		*Recreational*		*Commercial*	
Arsenic	73 mg/kg	Arsenic	73 mg/kg	Arsenic	960 mg/kg
Lead	650 mg/kg	Lead	650 mg/kg	Lead	2,000 mg/kg
Cadmium	49 mg/kg	Cadmium	not evaluated	Cadmium	2980 mg/kg

4.3.2 OU2

An integral aspect of the selected remedy for OU2 was the ability to redevelop the Site. By concurrently planning the remedy and Site redevelopment, the remedy accommodates reuse of the Site. To the extent possible, the redevelopment infrastructure is to be installed concurrently with the remediation.

The major components of the selected remedy include:

- Excavate highly contaminated smelter wastes and dispose off-site.
- Construct and maintain various barriers over smelter waste and contaminated soils. Provide periodic inspection and long-term maintenance of covers.
- Implement institutional controls that place restrictions on future excavations, require review of proposals for Site land use changes, restrict surface water management and irrigation practices, require mitigation of organic vapors in future structures from contaminated groundwater and restricting water wells.
- Stabilize the Jordan River banks and/or possible revegetation to minimize Site contamination from sloughing off into the Jordan River.

4.3.3 OU1 and OU2 Groundwater

The Deep Principal aquifer, a primary source of drinking water in the Salt Lake Valley, is not impacted by the Site, but the shallower US&G aquifer is impacted. The major components of the selected remedy include:

- Design and install a groundwater monitoring system to assess groundwater conditions comprising shallow and intermediate depth wells in the US&G aquifer.
- Develop institutional controls on groundwater prohibiting use within the limits of contamination.
- Develop alternative concentration limits for contaminants of concern in groundwater.
- Implement a semi-annual groundwater monitoring program.

ACLs were developed based on maintaining protectiveness to the Jordan River from contaminated groundwater discharge. Table 3 provides the established cleanup levels, as reported in the 2002 OU2 ROD, and definitively affirmed in the 2013 ESD as the final site-wide standards for the US&G aquifer.

Table 4: OU2 Alternate Concentration Limits (ACLs) for the US&G Aquifer

Contaminant	ACL
Arsenic	7,000 µg/l
Cadmium	1,560 µg/l
Selenium	900 µg/l
Antimony	380 µg/l

The Deep Principal Aquifer is not known to be contaminated. Although chlorinated organic compounds are present in on-site groundwater at concentrations over health-based standards, these chemicals are not considered to be COCs for the Site as the source area location is off-site, to the east.

4.4 Remedy Implementation

4.4.1 OU1 Soils

A two-phase approach occurred with the Winchester Estates portion beginning in September 1995 and ending in April 1996. The WESE parcel remedy began in July 1998. The Remedial Action for OU1 was considered complete upon inspection in January 1999, with the final RA report signed in March 1999.

4.4.2 OU2 Soils

A consent decree signed by EPA and the main property owner, Littleson, Inc, governed work conducted to perform the remedial design/remedial action (RD/RA) for the smelter wastes, slags and impacted soils at OU2. The city of Midvale was also a party to the consent decree and agreed to enact and enforce institutional controls in the form of an ordinance. This consent decree was entered on November 16, 2004.

Littleson, Inc. completed all remedial activities as planned and no additional areas of contamination were identified. Physical construction was considered complete upon final inspection by EPA, UDEQ and Midvale City on June 26, 2006. A one year warranty period began on July 6, 2006 to ensure the remedy continued to operate as designed. A second final inspection was conducted by EPA, UDEQ and Midvale City on May 15, 2007 to verify the remedy remained effective. On August 13, 2007, the remedy was declared operational and functional upon EPAs approval of the Remedial Action Report. That same day, EPA certified the completion of the construction work required under the consent decree.

4.4.3 OU1 and OU2 Groundwater and Surface Water

A network of 30 monitoring wells was installed at the Site in December, 2008. Construction of the system was completed under a cooperative agreement established between EPA and UDEQ whereby UDEQ implemented the groundwater monitoring system design that was developed by EPA. The first year involved quarterly monitoring events followed by semi-annual events in the spring and fall thereafter. In 2009, EPA determined that construction of the monitoring system was complete in accordance with the ROD and design specifications.

4.4.4 OU1 and OU2 Riparian Zone, including Jordan River

The riparian zone remedy, including stabilization of the Jordan River banks, was conducted in four phases starting in October 2008 and was completed in 2011. The riparian and river actions are on both OU1 and OU2:

- *Phase I Riparian Area Construction, 2008*: EPA hired the USGS to survey the river channel and to develop a two-dimensional hydraulic model to evaluate the hydraulic characteristics of the river at different stream flows.
- *Phase II Riparian Area Construction, 2009*: EPA hired construction contractor to improve the river bank stability through grade changes and strategic placement of boulders and rock placement north of the 7800 bridge. Additional stream bank stabilization was completed through augmentation of the outflow area adjacent to the grouted boulder structure. This work was conducted in two field seasons due to high spring flows in the Jordan River. The first field season was from May 8 to May 27, 2009 and the second started on July 21 and ended on August 28, 2009.
- *Phase III Riparian Area Construction, 2010-2011*: In the Phase III Riparian Remedial Action, a grant was provided to Salt Lake County Division of Flood Control by EPA. In addition, EPA contracted to have an invasive plant study and soils study completed. Construction included construction debris removal, slope development, placement of riprap, and installation of irrigation piping. Because of late snow pack and heavy precipitation in the spring the remedial action was completed in late June 2011.
- *Phase IV Riparian Area Construction, 2011*: EPA awarded a construction contract for the final Phase IV RD/RA which included reinforcement of the western river bank through the use of grade changes and bank stabilization. Additionally, two pedestrian bridges and bridge abutments were designed and built as part of this final phase of work.

Additional work along the Jordan River occurred since the last five-year review. In 2008, EPA hired JE Hurley to replace a sheet pile dam with a sheet pile grouted boulder drop structure, in conjunction with Phase IV of the Riparian construction. Work was completed on July 12, 2011.

Because the city of Midvale and the local developers prepared plans and obtained permits for two pedestrian bridges, bridge abutments were designed and built as part of this final phase of work. In the future, the City plans to build the two bridges.

4.5 Operations and Maintenance

Operations and maintenance (O&M) activities involve enforcement of the institutional controls, proper maintenance of soil covers and drainage as well as routine groundwater and surface water sampling. Currently a Project Plan (URS, 2009) for groundwater and surface water sampling is in place.

Enforcement of institutional controls is largely the responsibility of Midvale City. The city employs a full time site coordinator who is responsible for oversight, providing routine inspections of development activities and adherence to required institutional controls. Enforcement of groundwater use restrictions is the responsibility of the Utah Division of Water Rights. Currently institutional control monitoring includes the following major activities:

- Regular inspection/observation during redevelopment construction by Midvale City site coordinator.

- Review of development construction plans and specification for conformance with cover requirements, storm water management and irrigation restrictions, contaminated Site material storage, and other requirements under the remedy decision and design documents.
- Monitoring to ensure that contractors performing on-Site activities related to development are preparing the required documentation (e.g. soils management plan), that the documentation is prepared by a qualified individual, and that a qualified individual is engaged to oversee implementation of the plans.
- Within residential developments, property owners' associations will have the responsibility of reviewing, approving and overseeing the implementation of irrigation plans.
- Within areas depicted in the vapor mitigation area (Figure 5, Appendix 5), residential buildings must implement appropriate vapor mitigation measures.

4.6 Demonstration of Construction Quality Assurance and Quality Control

All work was conducted in accordance with EPA and UDEQ approved plans. EPA and State regulators frequently visited the Site during implementation of the remedial and removal actions to review progress and evaluate and review the results of QA/QC activities. EPA and UDEQ oversaw the construction activities at the Site for both its own contractors as well as activities conducted by the property owner. All work was determined to be consistent with the RODs, ESD, Action Memoranda, and plans and specifications.

4.7 Site Close Out

The Preliminary Close Out Report (September 2011) documents that EPA has completed remedial construction activities at the Site in accordance with Close Out Procedures for National Priorities List Sites (OSWER Directive 9320.2-22, May 2011). The pre-final inspection was conducted by EPA and UDEQ on August 10, 2011 and determined that the constructed remedy is in accordance with EPA-approved design plans and specifications, and no further remedy construction responses are anticipated.

5.0 PROGRESS SINCE LAST FIVE-YEAR REVIEW

5.1 Protectiveness Statements from the Second Five Year Review

<u>OU1</u>: The remedy at OU1 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risk are being controlled.

<u>OU2</u>: The remedy at OU2 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risk are being controlled.

5.2 Status of recommendations and follow-up actions from last review

Status of recommendations and follow-up actions from the second five-year review are discussed in Table 5.

Table 5: Follow-up Actions since the Last Five-Year Review

Issues from Previous Review	Recommendations/ Follow-up Actions	Responsible Party	Milestone Date	Date of Action
The map of the Sharon Steel Restricted Area (to restrict water wells) maintained by the State Engineer on its Water Rights website does not include all of the Midvale Slag Site.	Provide correct boundaries to the State Engineer and update the website.	EPA	9/30/2009	9/30/2009
Actions Taken and Outcome: The correct boundaries were provided to the State Engineer and the website was updated accordingly (Figure 6, Appendix 5).				

6.0 FIVE-YEAR REVIEW PROCESS

6.1 Administrative Components

This is the third five-year review for the Site. The review effort was led by Erna Waterman, EPA Remedial Project Manager. The following team members participated in the review:

- Tony Howes, UDEQ Project Manager
- Dave Allison, UDEQ Community Involvement Coordinator
- Karen Kellen, EPA Attorney
- James Stearns, EPA Site Attorney
- Jennifer Chergo, EPA Community Involvement Coordinator
- US Army Corps of Engineers, Omaha District
  Mary Darling, Project Manager
  Chris Svendsen, Hydraulic Engineer
  John Hartley, Geologist
  Molly Maxwell, Chemist
  James Tiehen, Chemist
  Melissa Kemling, Regulatory Specialist

This five-year review process consisted of a review of relevant documents, data review, Site inspection, local interviews, as well as development and review of the five-year review report.

6.2 Community Involvement

During the five-year review process, EPA invited the public to share any information about the Site that might be useful in evaluating the protectiveness of the remedy. In addition, in June 2013, EPA Remedial Project Manager Erna Waterman conducted five-year review interviews with eight individuals. During the interviews, respondents had the opportunity to provide their views regarding the Midvale Slag remedy and its continued protectiveness.

A concerned group, Citizens for a Safe Future for Midvale, received Technical Assistance Grants from EPA to hire a technical advisor to study and inform the community about issues related to Site cleanup. The bimonthly TAG group meetings were open to the public. During the five year review Site visit, all team members attended the final TAG meeting on June 12, 2013. The participants were very positive in describing the Midvale Slag experience and indicated several times that they felt their opinions made a difference in the project outcome.

6.3 Document Review

This five-year review consisted of a review of relevant documents including ARARs, RODs, ESDs, and monitoring data. A list of Site documents used in the preparation of this five-year review is included as Appendix 3.

6.4 Data Review

6.4.1 Groundwater Monitoring

Groundwater monitoring of shallow groundwater was initiated in 1995 during the EE/CA phase of work. This limited sampling was supplemented during the RI/FS. Three principle water bearing units were identified: an uppermost perched unit which is confined to the terrace area, an upper sand and gravel aquifer (US&G) which is separated from the perched unit on the terrace by a clay layer, and a deeper principal aquifer which is separated from the US&G aquifer by a discontinuous clay layer. There is a slight upward gradient in the two deeper aquifers which inhibits downward transport of contaminants.

Contaminant fate and transport modeling determined that active groundwater remediation would be ineffective in the short term and, while it would reduce the time frame for the aquifer to re-attain beneficial use status, the remediation time frame would still exceed 100 yrs. For that reason the selected remedy for the groundwater component of the Site was monitoring and implementation of institutional controls preventing the installation of water wells within the plume. (Table 4) According to the 2013 ESD the specific monitoring objectives are as follows:

- Conduct groundwater and surface water monitoring to assess if applicable groundwater and surface water quality criteria are being met for COCs (antimony, arsenic, cadmium and selenium).
- Assess monitoring data and determine if contamination is moving laterally or vertically within the boundaries of the Site.

Wells used for the Site Remedial Investigation sampling were ultimately abandoned for Site remediation (capping) and development activities and then later replaced. Semi-annual ground water monitoring utilizing the new wells, has been conducted at the Site since late the second quarter of 2009 (Figures 2, 8, and 9 in Appendix 5). Contaminant trends for the new wells were also mixed. A significant number of the wells had no statistically supportable trend for any of the contaminants. Concentrations tended to be higher in the shallow sand and gravel aquifer wells compared to the intermediate wells. Selenium tended to show increasing trends in more wells than was seen for other contaminants. The plume core wells had increasing arsenic trends though for the most part though the trends involved low concentrations of contaminants. Quantitative Trend Analyses and historic data are presented in Appendix 4.

Wells 505 and 706 had significantly elevated concentration outliers during April 2012 sampling for antimony, arsenic, cadmium and selenium. These spikes returned to normal ranges during the subsequent sampling event. A maximum arsenic detection of 209,000 ppb was seen in Well 505. Well 706 had arsenic concentration of 103,000 ppb and selenium concentrations of 355,000 ppb. Both of these spikes significantly exceeded the ACL selected for protection of the Jordan River.

The concentration spikes could be the result of sampling error, lab analytical or reporting error, or a reflection of actual geochemical conditions. Review of the geochemistry of selenium and arsenic reveals both elements can be mobile in near neutral to alkaline pH conditions which are seen in the Site ground water.

Significant spikes were seen for all metals of concern analyzed for in those two wells, except for antimony in Well 706 which did not spike. Spikes tend to reflect some type of significant geochemical change while arsenic and selenium show inverse correlations as Site redox conditions stray towards more oxidizing or reducing conditions. Review of the basic groundwater parameters shows that nothing was significantly different in the two wells with spikes compared to other wells or comparing results from the April 2012 and Sept 2012 events.

Table 6: Groundwater Parameters for Selected Wells

	Temp	Conductance	pH	Turbidity
WELL 505				
April 2012	17.8	2.64	6.44	25
September 2012	22	3.4	6.8	7
WELL 706				
April 2012	17.1	2.53	6.8	25
September 2012	21	3.3	7.2	2

The higher specific conductance seen in September indicates higher dissolved solids in the groundwater during that sampling event. Given all the above considerations it is likely that the concentration spikes are the result of error at some point in the sampling and analytical process rather than a reflection of actual geochemical conditions.

To date, sufficient ground water data has been collected and a trend analysis of contaminant levels in the various wells was performed in September 2012 and presented in the Semi-Annual Groundwater and Surface Water Monitoring report. General conclusions are:

- Groundwater flow direction is towards the northwest and is consistent with past trends.
- COC concentrations, in the ACL monitoring wells, did not exceed their respective ACL value.
- COC concentrations, in surface water, did not exceed established surface water quality criteria values for the Jordan River.
- Statistical evaluation of COC concentration trends indicates cadmium and selenium are increasing in some ACL monitoring wells at levels below the established ACL values.
- In general PCE concentrations continue to be higher in intermediate monitoring wells than in shallow monitoring wells.
- COC concentrations in groundwater continue to be confined within the boundaries of the Site

6.4.2 Surface Water and Sediment Monitoring

Surface water trend analysis showed a probable increasing trend for Antimony at one sample location but the concentrations measured were less than 1ppb. No other significant contaminant trends were noted in surface water samples. No contaminants exceeded water quality criteria for the Jordan River.

6.5 Site Inspection

The Site Inspection was performed on June 12, 2013 and was attended by the following personnel:

- Erna Waterman, Environmental Engineer, US EPA Region 8
- Tony Howes, Environmental Scientist, Utah DEQ
- John Jacobson, Development Site Coordinator, Midvale City, UT
- Mariam L. Hubbard, Watershed Planner/Scientist, Salt Lake County, UT
- Christopher J. Svendsen, USACE Omaha District Hydraulic Engineer
- Mary N. Darling, USACE Omaha District Project Manager

The purpose of the Site Inspection was to assess the protectiveness of the remedy, observe current Site conditions and removal action elements. The formal inspection checklist is provided in Appendix 1. All photos referenced in the following subsections can be found in Appendix 2, the Site Photo Log.

The border between OU1 and OU2 over the years was an existing fence, at a location south of 7200 South Street. However, the fence was removed as development occurred so now the generally recognized border is the curving road 7200 South at the east edge on the Site that curves up to 7000 South on the west edge of the Site. (Figure 2, Appendix 5)

6.5.1 Vegetative Cover, Pavement and Buildings

Where new developments were in place, the grass, vegetation, asphalt, and concrete appeared to be well maintained. The undeveloped areas had little ground cover and appeared prone to erosion by wind and water. Considerable new construction has occurred on OU1 including, but not limited to, the FL Smidth Building near the river, (Photo 1) and several housing developments (Photo 2). There are also areas that exhibit specialized habitat and recreation: a large wetlands area adjacent the Jordan River north of Riverwalk Apartments (Photo 3) and a maintained park east of the wetlands.

OU2 already had high density residential dwellings completed during the 2008 Five Year Review. The new UTA Train Station Bingham Junction (Photo 4) and Intermountain Ken C. Gardner Supply Center (Photos 5 and 6) were constructed in the last 5 years on OU2. Grading for a new subdivision "Rooftops" was observed during the Site visit (Photo 7, panorama) in an area that is fill dirt, not slag (near Well 707). OU2 has completed apartments that included hard cover as part of the plan (Photo 8) and drainage between garages.

During the Site visit for OU2 the team visited a current excavation that penetrates through the slag, located beyond the UTA station area and near Well 503 (Photo 9 and Photo 10). Photo 11 shows a piece of slag from the excavation. The area was sparsely vegetated and highly subject to wind, blowing dust, and erosion from overland runoff. This is an on-going construction activity that the site coordinator is actively monitoring. It is expected to have construction completed in the very short term.

6.5.2 Institutional Controls

Institutional Controls are required since site conditions have not met unlimited use or unrestricted exposure. An Institutional Control Process Plan was written by EPA, immediately followed by the city of Midvale approving an ordinance which outlined measures for identifying and maintaining institutional controls at the Site in accordance with the Institutional Control Process Plan (ICPP).

Institutional controls and their implementation were discussed extensively with John Jacobsen, the Site Coordinator. He is notified of new development primarily by potential developers, realtors or individuals calling him to talk about the institutional controls and ordinance requirements. He is also notified when a developer files for a permit in Midvale. His office is located within Midvale City Hall, approximately two minutes from the Site at 7505 Holden Street.

The Site Coordinator provides a quality assurance check on the documents provided to him and of the contractor's work on the Midvale Slag Site to ensure proper implementation of institutional controls and the City Ordinance. He has, at times, followed trucks with soil leaving the Site to ensure proper testing and disposal in accordance with the Ordinance. During the Site visit, John mentioned several large projects currently in progress: Savage Industries, a new five-story office building, Nelson Industries, and Salt Lake Mental Health. There are also several other projects in the planning phase: a Maverick gas station and a Jimmy John's restaurant. There are also two new pedestrian bridges planned to span the Jordan River.

Quarterly Site and daily inspections are completed and documented for each development by the Site Coordinator. Files are kept electronically, as well as in hard copy filed at the Site Coordinator's office. Another copy is distributed to the property owner. There have been no significant issues implementing any of the Soil Management plans for any project. According to the Midvale City Ordnance, documented proof of adherence to institutional controls during construction comes with the issuance of the Certificate of Occupancy at the end of each project.

6.5.3 Groundwater

Developers are required to install landscaping that meets appropriate infiltration rates (average based on area) but most of the land is developed and the infiltration blocked by buildings, parking lots, roads, and sidewalks. The storm water is diverted as required under storm water permits.

The team located and took photographs of several nested wells: (Photo 18 a-h). The caps and concrete around all wells appeared in good condition whether flush mount or raised. When raised wells were observed, all viewed wells were protected with bollards.

6.5.4 Riparian Zone including Jordan River

The riparian areas along the Jordan River were installed in four phases. This work included laying back the steep river banks, installing benches, and vegetating the benches and banks and above the bank area. EPA, in conjunction with Salt Lake County, developed the riparian area along the Jordan River along OU1 and OU2 (Photo 12). The team started at the north of the Site adjacent to OU1 by the Riverwalk Apartments and walked south to the drop structure. The banks of the river, benches and the upper edges of the river where the Salt Lake County performed the work appeared to be vegetated. Miriam Hubbard, Watershed Planer with Salt Lake County, indicated getting the vegetation on the benches was a challenge due to the intermittent controlled releases of the river which can submerge the benches for long periods. The team saw various irrigation systems installed on the upper edges to encourage plant growth (Photo 19) but it was not clear if they are being operated regularly, although the ones by the Riverwalk Apartments were observed to be running the afternoon of the Site visit. The taller planted areas were fenced to stop animals from destroying the vegetation. Miriam said Salt Lake County is actively managing the weeds by periodic manual weeding in combination with applying pre-emergent herbicides.

John Jacobsen observed that the river is cleaner and has fewer solids since the installation of the Riparian project.

The following is a list of relevant photos taken during the Site visit, included in Appendix 2:

- Photo 13: on West Jordan side or River looking north east downstream. EPA armored the West Jordan Side with Intermountain Healthcare behind on OU2.
- Photo 14: on West Jordan side; boy fishing.
- Photo 15: new UTA light rail bridge over Jordan River paths on both sides. Looking north at OU2 side.
- Photo 16: Drop Structure in Jordan River from West Jordan toward OU2

Two scour holes had formed at the drop structure on the Jordan River. The east bank of the river is maintained by the cities of Midvale and Murray while the west bank is maintained by the city of West Jordan. The high river flows have eroded the river bed below the drop structure and Salt Lake County asked EPA to address this area to reduce the scour (Photo 17). EPA addressed this issue in 2013.

Directly downstream of the drop structure, three bendway weirs were installed on the right bank of the Jordan River. Their purpose is to redirect flows away from the toe of the bank and, although submerged, they appear to be functioning as designed.

Construction was completed on bank stabilization in September 2010. The work provided riprap protection to most areas of possible erosion along the right bank of the river, incorporated native plantings along the entirety of the Site, and provided for drip irrigation systems for planting establishment. At the time of inspection, bank riprap installations appeared to be in good condition and functioning as designed. It wasn't apparent if irrigation efforts were ongoing and many of the plantings could be said to be in poor to satisfactory condition. Successful establishment and maintenance of vegetation along the banks of the Jordan River is an important component of stabilization efforts.

6.6 Interviews

Interviews were conducted by Erna Waterman, Environmental Engineer, US EPA Region 8. Those who were interviewed included:

- Three community members, very knowledgeable about the Site, who have been involved for many years with the Midvale Slag Superfund Site Technical Advisory Group (TAG).
- State and local agency representatives who worked closely with EPA on the implementation and oversight of the Site remedy.
- A Utah Transit Authority representative.
- An EPA–funded Site coordinator.

The content of the interviews is summarized in the following paragraphs.

Overall, all interviewees were very pleased with the remedy. They felt the outcome has been positive and there was widespread agreement that the work resulted in an economic benefit to Midvale City and provided for an opportunity to put the land back to beneficial use. It was also noted that the community is pleased with the river restoration because they really use the improved river trail and enjoy the access to nature it provides. All respondents seemed to feel that the remedy is protective of human health and the environment.

It was noted that the trail and riparian work had been a huge investment of effort and should be maintained. One respondent offered creative ideas to keep up the maintenance. For instance, the city could utilize the community to pull weeds and pick up trash as part of a festival or event. Additionally, at least one respondent would like to see improvements made to the drop structure.

When asked for any other suggestions or recommendations, some of the interviewees said they were anxious for EPA to delete the Site from the NPL. Some noted that keeping it on the NPL is like "holding it hostage" and that completing the deletion will help with new opportunities for development. One interviewee said that people in the community occasionally have questions or concerns about the Site and that deleting the Site would help to alleviate their concerns.

It was noted by a couple of the respondents that there have been some instances of vandalism or trespassing. Rubble and trash have been thrown into the river and along the Jordan River Parkway trail. It was also noted that fences to keep people out of work areas have been cut.

All interviewees felt that the communication was good from EPA and they all indicated that the project manager had done a good job keeping them informed about Site activities. They all indicated they knew how to contact EPA should there be concerns or questions about the Site in the future. The TAG group representatives noted that they would be wrapping up the TAG as the work was largely completed. They said that they were pleased about their involvement at the Site through the years and felt they had made a difference during difficult times.

7.0 TECHNICAL ASSESSMENT

This section presents a technical assessment and is formulated based on the answers to Questions A, B, and C, presented below. For consistency with Five-Year Review guidance, each question is summarily answered yes or no. Supporting information is provided in the previous sections. Documents reviewed for this assessment are included in Appendix 3.

7.1 Question A: *Is the remedy functioning as intended by the decision documents?*

Yes, the remedy is functioning as intended by the RODs (OU1, 1995; OU2, 2002), as modified by the ESDs (OU1, 1998 and 2006; OU1 and OU2, 2013). The status and performance of each remedy element is summarized in Table 7.

Table 7: Evaluation of Midvale Slag Site Remedial Action

Remedy Element and Protectiveness Action	Remedy Status
OU1 SOILS	
Excavate soils on portions of OU1 zoned for residential use, store soils on OU2 and backfill excavations with clean soil. Protectiveness action: Remediation of 14 residential yards located on the WENW Parcel. Excavation of contaminated soil from the WESE Parcel and deposition on OU2	Remedial actions complete. No contaminated soil above residential action levels remaining on OU1 parcels WENW and WESE. Functioning as intended: Yes
Implement ICs to prohibit unrestricted residential land use on the remainder of OU1 without additional assessment and/or clean-up. Protectiveness action: Institutional Controls implemented on LR east/west, LF and LG Parcels via Ordinance No. 06/26/2007 O-8.	ICs are in place and prevent unrestricted land use on parcels of OU1. Current O&M is working well. Functioning as intended: Yes

Table 7: Evaluation of Midvale Slag Site Remedial Action

Remedy Element and Protectiveness Action	Remedy Status
OU2 MIXED SMELTER WASTE AND SLAG	
Remediate highly contaminated smelter wastes. Protectiveness action: Category I materials were encountered and left in place at depth. E	Response action complete. Functioning as intended: Yes
Construct and maintain various barriers over smelter waste and contaminated soils. Protectiveness action: Category II and III materials were covered with a geotextile and vegetative cover. Category IV materials were covered with a vegetative cover.	Category II, III and IV materials remain covered. Meets or exceeds baseline protectiveness. Functioning as intended: Yes
Provide periodic inspection and long-term maintenance of covers. Protectiveness action: Institutional Controls implemented via Ordinance No. 06/26/2007 O-8	Inspection and maintenance is ongoing. Functioning as intended: Yes
OU2 MIXED SMELTER WASTE AND SLAG	
Implement ICs placing restrictions on future excavations, reviewing proposals for changes to land use, restricting surface water management and irrigation practices, requiring mitigation of organic vapors from contaminated groundwater in future structures and restricting water wells. Protectiveness action: Institutional Controls implemented via Ordinance No. 06/26/2007 O-8. Restrictions on water wells to include the Site within the Sharon Steel Restricted Area administered by the Utah Division of Water Rights.	ICs are in place and prevent unrestricted land use on OU2. Redevelopment ICs are effectively enforced by Midvale Site Coordinator. Functioning as intended: Yes
OU1 AND OU2 GROUNDWATER	
Develop and implement a surface and groundwater monitoring program (applicable to both OU1 and OU2) Protectiveness Action: Semi-annual groundwater and surface water monitoring is ongoing	Groundwater and surface water data indicates that the remedy is protective of human and environmental receptors. Functioning as intended: Yes
Stabilize the banks of the Jordan River and/or possible revegetation to minimize Site contamination from sloughing off into the Jordan River. Protectiveness Action: Stabilization of the Jordan River banks through construction of riparian areas from 2008-11	Jordan River banks are stabilized through vegetation and construction of riparian areas. OU1 revegetation still in establishment phase. Ongoing maintenance is expected to occur by city and county representatives. Functioning as intended: Yes

7.1.1 Institutional Controls

The ROD identified institutional controls that were further developed during the remedial design into the Institutional Control Process Plans. The ICPPs were incorporated into the consent decree and used as the basis for the Midvale ordinance governing institutional controls. The ICPPs established legal requirements to maintain protectiveness during and after completion of redevelopment. The Midvale ordinance, as currently written, accurately reflects the requirements of the ICPPs. EPA and UDEQ reviewed the ordinance and determined that it complied with the requirements of the ROD and ICPPs in the consent decree. The ordinance covers both the Sharon Steel site and the portion of the Midvale Slag Site that lies in Midvale, Utah. All required institutional controls are in place and being implemented successfully.

Winchester Estates, the northern portion of OU1 that lies within the Murray City limits has no institutional control requirements for soils as they have achieved unlimited use and unrestricted exposure.

The Utah State Engineer produced the Salt Lake Groundwater Management Plan that has two restricted areas for well drilling. One of these areas is the Sharon Steel Restriction Area (Figure 6, Appendix 5) that includes both the former Sharon Steel and the Midvale Slag Superfund sites.

UDEQ performs semi-annual groundwater and surface water monitoring at this Site. The ESD (2013) discusses the purpose for establishing Alternate Concentration Limits (ACLs) in the OU2 ROD and affirms the applicability of ACLs as final site-wide cleanup standards for the US&G groundwater aquifer. Monitoring will continue to be conducted by UDEQ on a semi-annual basis.

The requirements of Midvale Ordinance No. 06/26/2007 O-8 (2007) are explained in the following paragraphs.

City of Midvale Responsibilities

1. Periodic inspection of covers and final barriers on the Site.
2. Prohibition of new groundwater wells without prior consent of EPA, UDEQ, and the State Engineer.
3. Repair of covers and final barriers, if the Private Owners Associations (POA) or landowner is unresponsive. The city will enforce repair and collection of costs.
4. Review of Site plan applications and issuance of final Site plan approval.
5. Review of road-cut permit applications and issuance of permits.
6. Review of intrusive activity plans and issuance of final approval.
7. Periodic inspections during initial Site development and post-development construction to ensure compliance with construction permits including air quality monitoring plans.
8. Oversight of landscaping activities of POA (or similar entity).
9. Verification that private covenants and deed restrictions for developments include the requirements of the ordinance relating to landscaping and excavation.
10. Review irrigation plans for non-residential development with Source Areas and issue approval for such plans.
11. Review request for Certificate of Occupancy to determine whether the final depth of surface cover meets or exceeds the approved depth.

U.S. EPA and UDEQ Responsibilities

1. Review of procedures and protocols for testing excavated materials and issuance of final approvals.
2. EPA has general oversight responsibilities for operations and maintenance of the remedy such as Five Year Reviews, etc.

Landowner/POA Responsibilities

1. Maintenance and repair of covers on their property.
2. Review, approve and oversee the implementation of irrigation plans in residential areas.
3. Establish conditions, covenants and restrictions which include the creation of POAs to oversee compliance with applicable excavation and grading restrictions.

4. Prepare and submit all plans and request for approvals as required by the Midvale Ordinance. Hire a Special Inspector to oversee residential development projects.

The Midvale City Department of Community and Economic Development will be the primary enforcement and oversight agency for the ordinances at the Site. Currently all requirements of the institutional controls have been met and there is active monitoring of construction activities and compliance by the Site Coordinator. With redevelopment anticipated to be complete by 2018, Site institutional controls maintenance and enforcement should be outlined specifically in a Site Management Plan to ensure continued protectiveness.

7.1.2 Riparian Zone and Jordan River

All required elements of the Riparian Zone were completed in compliance with all approved remedial plans. Maintenance of the vegetation along the Riparian Corridor is expected to continue by City and County representatives.

7.2 Question B: *Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the Remedy Selection still valid?*

Yes, the toxicity data, cleanup levels, remedial action objectives and assumptions of ingestion and dermal contact exposure used at the time of the remedy selection are still valid. However some assumptions regarding inhalation exposure have changed but do not impact protectiveness of the remedy.

Cleanup levels set for the site were presented in the 1995 and 2002 RODs. Because the document was developed prior to EPA's Risk Assessment Guidance for Superfund (RAGS) Part F (2009), quantification of inhalation exposure were conducted differently. The exposure metric that was used in the Baseline Human Health Risk Assessment (BHHRA) (1995 and 2002) used inhalation concentrations that were based on ingestion rate and body weight (mg/kg-day). Inhalation intake on a mg/kg – day basis is no longer estimated during the exposure assessment step of baseline risk assessments. The updated methodology found in EPA's RAGS Part F uses the concentration of a chemical in the air, with the exposure metric of ug/m^3. However, this change does not impact overarching considerations of whether the inhalation exposure pathway is complete or incomplete. The assumptions of exposure duration and exposure frequency are unchanged; inhalation rate and body weight are no longer relevant. These changes do not impact the protectiveness of the remedy.

New Site risk-based remedial values for OU1 were presented in the 2005 Tech Memo. EPA revisited the derivation of cleanup levels for OU1 for residential, recreational and commercial land uses. The 2006 ESD for OU1 incorporated its conclusions into the remedy for OU1. Cleanup levels published in the OU1 and OU2 ROD and the evaluation of those levels in the Tech Memo are summarized by OU in Table 9.

Table 8: Final OU1 Cleanup Levels

	LAND USE		
Chemical	**Residential**	**Recreational**	**Commercial**
Arsenic	73 mg/Kg	73 mg/Kg	960 mg/Kg
Lead	650 mg/Kg	650 mg/Kg	2000 mg/Kg

EPA developed a decision flowchart for determining if a parcel of land in OU1 is suitable for development for residential or recreational use. This flowchart is provided in the Tech Memo and was used by the developer engaged in development of OU1 to identify areas of OU1 where hypothetical future risks to residents were above a level of concern.

Midvale City requested that EPA consider setting identical cleanup levels for both OU1 and OU2. With the exception of setting a lead cleanup standard of 2,000 mg/Kg for commercial land use and omitting cadmium as a COC, EPA decided to leave the OU1 cleanup levels unchanged from the 1998 ROD. Like OU1, the risk assessment process ultimately led to the development of cleanup levels for COCs in various environmental media and potentially exposed human populations in OU2. Given the identification of arsenic and lead as the primary COCs in the ROD, Table 10 only summarizes cleanup levels for these chemicals.

Table 9: OU2 Soil Cleanup Levels in 2002 ROD

Chemical	Residential Land Use	Non-Contact Intensive	Contact Intensive	Construction Worker	Recreational
Arsenic	61 mg/Kg	560 mg/Kg	50 mg/Kg	80 mg/Kg	68 mg/Kg
Lead	438 mg/Kg	2063 mg/Kg	430 mg/Kg	365 mg/Kg	1066 mg/Kg

To protect the Jordan River against excessive contaminated groundwater inflow, EPA established ACLs for US&G Aquifer established in the EDS (2013) at specific points of assessment (POA). The chemical-specific ACLs are provided in Table 11.

Table 10: Alternative Concentration Limits (ACLs) for the US&G Aquifer

Chemical	Arsenic	Cadmium	Selenium	Antimony
ACL	7,000 µg/L	1,560 µg/L	900 µg/L	380 µg/L

7.2.1 Changes in Standards and TBCs

New groundwater and surface water standards were published in April 2013 (UAC R317). However, since the 2013 ESD was signed, the RAO for restoring groundwater to beneficial use (if possible) was stricken from the OU1 and OU2 remedies. The 2013 ESD established ACLs as the final site-wide cleanup standard for the US&G aquifer. Surface water quality standards (*Standards of Quality for Waters of the State* UAC R317-2) still apply to the Site and the Jordan River. There are no changes that affect the current protectiveness.

7.2.2 Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

There have been no unknown or unexpected land use changes on or near the Site since the last five-year review. The OU2 ROD and the 2006 OU1 ESD were written to anticipate changes in land use due to redevelopment. All changes due to redevelopment in OU1 and OU2 followed requirements as outlined in the Midvale City Ordinance No. 06/26/2007 O-8 ensuring the continued protectiveness of the remedy for human health and the environment. There are no newly identified contaminants or contaminant sources. There are no unanticipated toxic byproducts of the remedy.

Institutional controls for groundwater in the OU2 ROD only pertain to the US&G Aquifer. Midvale local land use controls will restrict surface water management and irrigation practices to limit infiltration. The validity of the groundwater model results and the ACL calculations depends on maintaining infiltration rates comparable to those in 2002.

7.2.3 Changes in Risk Assessment Methods

OU1: There has been no change to the standardized risk assessment methodology since the Tech Memo (CDM 2005) for OU1 that should affect the protectiveness of the remedy. In terms of exposure, no new human populations have been identified beyond residential, worker, and recreational user. Assumptions and default values for arsenic have not been modified since 2005 and are assumed to still be protective. There has been an updated version of the Integrated Exposure Uptake Biokenetic Model (June 2009). The newer version uses updated model input variables for dietary lead exposure, updated baseline maternal blood lead concentrations, and uses a continuous function relating age and bone weight. In the 2005 Tech Memo, a range of values using both Site specific data and default IEUBK values were provided (min = 310, max = 3100). It is not anticipated that the new values will significantly alter this range; therefore, it is anticipated that the existing PRGs for OU1 are still protective and appropriate.

Based upon anticipated activities and redevelopment, the 2002 ROD identified human populations for potential exposure as residential, industrial worker, commercial worker, and non-remediation construction worker and recreational visitor. No new human populations have been identified based upon current Site activities.

OU2: There have been several updates to the standardized risk assessment methodology since the BLRA was conducted in 1994; however, few modifications have been employed since the Usability Assessment was conducted in 2000. As discussed previously, a newer version of the IEUBK Model has been released, but the assumptions used in the initial baseline risk assessment were conservative and it is not anticipated that these changes will impact action levels and are still assumed to be protective and appropriate.

The baseline risk assessment initially evaluated three populations of chief concern: potential on-site workers, trespassers, and potential residents, including both children and adults. The 2002 OU2 ROD included a reevaluation of populations and included youth trespassers, industrial workers (contact intensive), commercial workers (non-contact intensive), non-remediation construction worker, resident and recreational visitor. Risks were not evaluated for the revised list of Site populations of concern; however PRGs were calculated for these populations and are considered appropriate and protective.

7.2.4 Expected Progress Toward Meeting Objectives of the Selected Remedial Actions

As part of the third five-year review, an evaluation of the RAOs stated in the RODs and modified by the ESDs was conducted to determine whether the remedy is meeting or will meet RAOs. All RAOs are being met.

7.3 Question C: *Has any other information come to light that could call into question the protectiveness of the response actions?*

During this five-year review, no information was revealed that could call into question the current protectiveness of the remedy.

7.4 Technical Assessment Summary

According to the data reviewed, the Site inspection, and the interviews, the remedy is functioning as intended by the RODs, as modified by the ESDs. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. There has been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy since the last five-year review. There is no other information that calls into question the protectiveness of the remedy.

8.0 ISSUES

No issues were identified.

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

No recommendations and follow up actions.

10.0 PROTECTIVENESS STATEMENTS

10.1 OU1 – protective

Protectiveness has been achieved at OU1 through the excavation of contaminated soils, the implementation of institutional controls and stabilization of the banks of the Jordan River. Contaminated soils from OU1 were excavated and placed on OU2 and then backfilled with clean soil to prevent future exposure. The institutional controls implemented restrict use of land on OU1 to prevent exposure. The Banks of the Jordan River have also been stabilized through the construction of riparian zones, addition of riprap and vegetation to prevent contamination from sloughing off into the surface water.

10.2 OU2 – protective

Protectiveness has been achieved at OU2 through the excavation of contaminated soils, capping of wastes left in place, the implementation of institutional controls, continued groundwater monitoring, and stabilization of the banks of the Jordan River. Any wastes left in place have been adequately capped to prevent exposure. The institutional controls implemented restrict use of land on OU2 to prevent activities that could cause exposure. The banks of the Jordan River have also been stabilized through the construction of riparian zones, addition of riprap, a drop structure and vegetation to prevent contamination from sloughing off into the surface water. A groundwater and surface water monitoring network has been established and is sampled semi-annually.

10.3 Sitewide – protective

Because the remedies at OU1 and OU2 are protective, the Midvale Slag Superfund Site remedial action is protective of human health and the environment.

11.0 NEXT REVIEW

The Site requires ongoing five-year reviews in accordance with CERCLA § 121 (c). The next five year review for the Site will be performed by April 2019, five years from the signature date of this review.

Appendix 1
Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site name: Midvale Slag Superfund Site	**Date of inspection:**
Location and Region: Salt Lake County, UT, EPA Region 8	**EPA ID:** UTD08134277
Agency, office, or company leading the five-year review: EPA, Region 8	**Weather/temperature:** sunny, windy, moderate temperatures

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: none

II. INTERVIEWS

1. **O&M site manager:** EPA Remedial Project Manager Erna Waterman conducted five-year review interviews with eight individuals. No individual reports; all are summarized in Community Notification and Input
2. **O&M staff:** John Jacobson, Midvale City Development Site Coordinator
3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.)

   Town Howes, PM Utah DEQ
4. **Other interviews** None

III. ON-SITE DOCUMENTS & RECORDS VERIFIED

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☒ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☒ N/A

Remarks: None

2. **Site-Specific Health and Safety Plan** ☐ Readily available ☐ Up to date ☒ N/A

   ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A

   Remarks: None

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A

   Remarks: None

4. Permits and Service Agreements			
☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits	☐ Readily available	☐ Up to date	☒ N/A
Remarks: Permits are exempted under CERCLA			
5. Gas Generation Records	☐ Readily available	☐ Up to date	☒ N/A
Remarks: None			
6. Settlement Monument Records	☐ Readily available	☐ Up to date	☒ N/A
Remarks: None			
7. Groundwater Monitoring Records	☐ Readily available	☒ Up to date	☐ N/A
Remarks: Records were provided by Tony Howes, RPM, Utah DEQ			
8. Leachate Extraction Records	☐ Readily available	☐ Up to date	☒ N/A
Remarks: None			
9. Discharge Compliance Records			
☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
Remarks: None			
10. Daily Access/Security Logs	☐ Readily available	☐ Up to date	☒ N/A
Remarks: Site is being redeveloped			

IV. O&M COSTS

1. O&M Organization

☐ State in-house	☐ Contractor for State
☐ PRP in-house	☐ Contractor for PRP
☐ Federal Facility in-house	☐ Contractor for Federal Facility
☒ Other	

Remarks: Midvale City oversees development and O&M under "Institutional Controls Ordinance for Bingham Junction, Jordan Bluffs and Designated Rights of Way" passed May 7, 2013
Utah DEQ conducts groundwater monitoring

2. O&M Cost Records

☐ Readily available	☐ Up to date
☐ Funding mechanism/agreement in place	☒ Unavailable

Remarks: Not available

3. Unanticipated or Unusually High O&M Costs During Review Period

Remarks: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS
A. Fencing
1. Fencing ☐ Location shown on site map ☐ Gates secured ☒ N/A Remarks: Fencing between OU1 and OU2 removed for redevelopment of site. Newly developed owners had installed their own property fencing for their own purposes.
B. Other Access Restrictions
1. Signs and other security measures ☐ Location shown on site map ☒ N/A Remarks: None
C. Institutional Controls (ICs) – see remarks
1. Implementation and enforcement Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A Type of monitoring (e.g., self-reporting, drive by): Frequency: Responsible party/agency: Midvale City Contact Name: John Jacobsen Title: Development Site Coordinator Date: 6/12/2013 Reporting is up-to-date ☒ Yes ☐ No ☐ N/A Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A Violations have been reported ☐ Yes ☒ No ☐ N/A Other problems or suggestions: The Institutional Controls Ordinance for Bingham Junction, Jordan Bluffs and Designated Rights of Way, available through www.midvalecity.org does not contain the figures, which are necessary Remarks: Recommend making figures referenced by the ICs available to agencies and the public
2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A Remarks: Midvale City Ordinance and the enforcement via the Development Site Coordinator meet the requirements of the remedy
D. General
1. Vandalism/trespassing ☐ Location shown on site map ☒ No vandalism evident Remarks: None
2. Land use changes on site ☐ N/A Remarks: OU1 and OU2 are being redeveloped for residential, commercial, transportation corridor, and recreational use, and much has already been completed.
3. Land use changes off site ☐ N/A Remarks: None observed

V. ACCESS AND INSTITUTIONAL CONTROLS

A. Fencing

1. Fencing ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks: Fencing between OU1 and OU2 removed for redevelopment of site. Newly developed owners had installed their own property fencing for their own purposes.

B. Other Access Restrictions

1. Signs and other security measures ☐ Location shown on site map ☒ N/A

Remarks: None

C. Institutional Controls (ICs) – see remarks

1. Implementation and enforcement

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive by):

Frequency:

Responsible party/agency: Midvale City

Contact Name: John Jacobsen Title: Development Site Coordinator Date: 6/12/2013

Reporting is up-to-date	☒ Yes	☐ No	☐ N/A
Reports are verified by the lead agency	☐ Yes	☐ No	☒ N/A
Specific requirements in deed or decision documents have been met	☒ Yes	☐ No	☐ N/A
Violations have been reported	☐ Yes	☒ No	☐ N/A

Other problems or suggestions: The Institutional Controls Ordinance for Bingham Junction, Jordan Bluffs and Designated Rights of Way, available through www.midvalecity.org does not contain the figures, which are necessary

Remarks: Recommend making figures referenced by the ICs available to agencies and the public

2. Adequacy ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks: Midvale City Ordinance and the enforcement via the Development Site Coordinator meet the requirements of the remedy

D. General

1. Vandalism/trespassing ☐ Location shown on site map ☒ No vandalism evident

Remarks: None

2. Land use changes on site ☐ N/A

Remarks: OU1 and OU2 are being redeveloped for residential, commercial, transportation corridor, and recreational use, and much has already been completed.

3. Land use changes off site ☐ N/A

Remarks: None observed

VI. GENERAL SITE CONDITIONS			
A. Roads ☒ Applicable ☐ N/A			
1. Roads damaged	☐ Location shown on site map	☐ Roads adequate	☒ N/A
Remarks: New roads and UTA TRAX Bingham Junction rail station have been constructed as part of the site redevelopment			
B. Other Site Conditions			
Remarks: None			

VII. LANDFILL COVERS		
A. Landfill Surface – OU2 remedy consists of a barrier between site wastes and human contact, it is not a true landfill. There are no covers on OU1		
1. Settlement (Low spots)	☐ Location shown on site map	☐ Settlement not evident
Remarks: N/A – monitoring not required		
2. Cracks	☐ Location shown on site map	☐ Cracking not evident
Remarks: N/A – monitoring not required		
3. Erosion	☐ Location shown on site map	☒ Erosion not evident
Remarks: During site visit the team observed that much of the site is already developed and redevelopment included various hard surfaces of asphalt and concrete and planned drainages to reduce erosion. The team viewed one open excavation below MW-503 on OU2		
4. Holes	☐ Location shown on site map	☐ Holes not evident
Remarks: Team viewed one open excavation below MW-503 on OU2, visible slag at excavation.		
5. Vegetative Cover	☐ Grass	☐ Cover properly established
☐ No signs of stress	☐ Trees/Shrubs (indicate size and locations on a diagram)	
Remarks: The new construction on OU1 and OU2 includes landscaping of grass, ground cover, shrubs and trees. These appear well maintained. A heavily vegetated wetlands area was observed between the older Winchester Estate residential area and the recently constructed River Walk Apartments. The riparian area along the Jordan River had vegetation with volunteer plants that are being managed by Salt Lake County through application of pre-emergent and pulling unwanted volunteer plants. At the open excavation below MW-503 on OU2, the vegetation is sparse to none, allowing blowing dust from cover and excavation.		
6. Alternative Cover (armored rock, concrete, etc.)		
Remarks: Along the edge of the Jordan River and Midvale Slag site the bank was laid back, occasional benches formed, and some of the bank had been armored with rock. Armored rock was also placed in a few areas on the West Jordan side of the river. During site visit the team observed that redevelopment included various hard surfaces of asphalt and concrete and planned drainages to reduce erosion.		
7. Bulges	☐ Location shown on site map	☒ Bulges not evident
Remarks: None		

8. Wet Areas/Water Damage	☒ Wet areas/water damage not evident		
☐ Wet areas	☐ Location shown on site map	Arial extent	
☐ Ponding	☐ Location shown on site map	Arial extent	
☐ Seeps	☐ Location shown on site map	Arial extent	
☐ Soft subgrade	☐ Location shown on site map	Arial extent	
Remarks: None			
9. Slope Instability	☐ Slides	☐ Location shown on site map	
☒ No evidence of slope instability			
Remarks: None			
B. Landfill Benches ☐ Applicable ☒ N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1. Flows Bypass Bench	☐ Location shown on site map	☐ N/A or okay	
Remarks: None			
2. Bench Breached	☐ Location shown on site map	☐ N/A or okay	
Remarks: None			
3. Bench Overtopped	☐ Location shown on site map	☐ N/A or okay	
Remarks: None			
C. Landfill Letdown Channels ☐ Applicable ☒ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1. Settlement (Low spots)	☐ Location shown on site map	☐ No evidence of settlement	
Arial extent: ______		Depth: ______	
Remarks: None			
2. Material Degradation	☐ Location shown on site map	☐ No evidence of degradation	
Material type: ______		Arial extent: ______	
Remarks: None			
3. Erosion	☐ Location shown on site map	☐ No evidence of erosion	
Arial extent: ______		Depth: ______	
Remarks: None			
4. Undercutting	☐ Location shown on site map	☐ No evidence of undercutting	
Arial extent: ______		Depth: ______	
Remarks: None			

5. Obstructions Type: ___ ☐ No obstructions ☐ Location shown on site map Arial extent: ___ Size ___ Remarks: <u>None</u>	
6. Excessive Vegetative Growth Type: ___ ☐ No evidence of excessive growth ☐ Vegetation in channels does not obstruct flow ☐ Location shown on site map Arial extent: ___ Remarks: <u>None</u>	
D. Cover Penetrations ☐ Applicable ☒ N/A ICs allow redevelopment of site, including cover penetrations during construction	
1. Gas Vents ☐ Active ☐ Passive ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks: <u>None</u>	
2. Gas Monitoring Probes ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A Remarks: <u>None</u>	
3. Monitoring Wells (within surface area of landfill) ☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks: <u>None</u>	
4. Leachate Extraction Wells ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks: <u>None</u>	
5. Settlement Monuments ☐ Located ☐ Routinely surveyed ☒ N/A Remarks: <u>None</u>	
E. Gas Collection and Treatment ☐ Applicable ☒ N/A	
1. Gas Treatment Facilities ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse ☐ Good condition ☐ Needs Maintenance Remarks: <u>None</u>	

2. Gas Collection Wells, Manifolds and Piping			
	☐ Good condition	☐ Needs Maintenance	
	Remarks: None		
3. Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)			
	☐ Good condition	☐ Needs Maintenance	☐ N/A
	Remarks: None		
F. Cover Drainage Layer	☐ Applicable	☒ N/A	
1. Outlet Pipes Inspected	☐ Functioning		☐ N/A
	Remarks: None		
2. Outlet Rock Inspected	☐ Functioning		☐ N/A
	Remarks: None		
G. Detention/Sedimentation Ponds	☐ Applicable	☒ N/A Constructed and being constructed as part of site redevelopment	
1. Siltation	Area extent: _____	Depth: _____	☐ N/A
	☐ Siltation not evident		
	Remarks: None		
2. Erosion	Area extent: _____	Depth: _____	
	☐ Erosion not evident		
	Remarks: None		
3. Outlet Works	☐ Functioning		☐ N/A
	Remarks: None		
4. Dam	☐ Functioning		☐ N/A
	Remarks: None		
H. Retaining Walls	☐ Applicable	☒ N/A	
1. Deformations	☐ Location shown on site map	☐ Deformation not evident	
	Horizontal displacement: _____	Vertical displacement: _____	
	Rotational displacement: _____		
	Remarks: None		
2. Degradation	☐ Location shown on site map	☐ Degradation not evident	
	Remarks: None		
I. Perimeter Ditches/Off-Site Discharge	☐ Applicable	☒ N/A	
1. Siltation	☐ Location shown on site map	☒ Siltation not evident	
	Area extent: _____	Depth: _____	
	Remarks: None		

2. Vegetative Growth ☐ Location shown on site map ☐ N/A

☐ Vegetation does not impede flow

Area extent: _____ Type: _____

Remarks: None

3. Erosion ☐ Location shown on site map ☐ Erosion not evident

Area extent: _____ Depth: _____

Remarks: None

4. Discharge Structure ☐ Functioning ☐ N/A

Remarks: None

VIII. VERTICAL BARRIER WALLS ☒ N/A

1. Settlement ☐ Location shown on site map ☐ Settlement not evident

Area extent: _____ Depth: _____

Remarks: None

2. Performance Monitoring Type of monitoring: _____

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: None

IX. GROUNDWATER/SURFACE WATER REMEDIES

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. Pumps, Wellhead Plumbing, and Electrical

☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A

Remarks: None

2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances

☐ Good condition ☐ Needs Maintenance

Remarks: None

3. Spare Parts and Equipment

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: None

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. Collection Structures, Pumps, and Electrical

☐ Good condition ☐ Needs Maintenance

Remarks: None

2. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances

☐ Good condition ☐ Needs Maintenance

Remarks: None

3. Spare Parts and Equipment

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: None

C. Treatment System ☐ Applicable ☒ N/A

1. Treatment Train (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

☐ Additive (e.g., chelation agent, flocculent): _____

☐ Others: _____

☐ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: _____

2. Electrical Enclosures and Panels (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks: None

3. Tanks, Vaults, Storage Vessels

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks: None

4. Discharge Structure and Appurtenances

☐ N/A ☐ Good condition ☐ Needs Maintenance

Remarks: None

5. Treatment Building(s)

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks: None

6. Monitoring Wells (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks: None

D. Monitoring Data			
1. Monitoring Data			
☒ Is routinely submitted on time	☒ Is of acceptable quality		
Remarks: Utah DEQ conducts groundwater monitoring			
2. Monitoring data suggests:			
☐ Groundwater plume is effectively contained	☒ Contaminant concentrations are declining		
E. Monitored Natural Attenuation			
1. Monitoring Wells (natural attenuation remedy)			
☒ Properly secured/locked	☒ Functioning	☒ Routinely sampled	☒ Good condition
☐ All required wells located	☐ Needs Maintenance		☐ N/A
Remarks: None			

X. OTHER REMEDIES ☒ N/A

If there are remedies applied at the site, not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy is intended to monitor natural attenuation of a groundwater contaminated plume and to control human exposure to contaminated solid media as well as groundwater. Human exposure pathways to contaminated solid media are being effectively controlled through the constructed cover system and implementation of ICs before, during, and after redevelopment. Human exposure to contaminated groundwater is also controlled through ICs.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O&M consists of implementation of ICs. Midvale City has hired a dedicated individual to oversee IC implementation. The ICs require site development entities hire qualified individuals to ensure compliance with the ICs. The apparent effective implementation of ICs results in current and long-term protectiveness.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

None noted

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None noted

Appendix 2
Site Photo Log

Photo 1 - FL Smidth Building from across Jordan River.

Photo 2 - Housing Developments

Photo 3 - Wetlands adjacent to the Jordan River North of the Riverwalk Apartments.

Photo 4 - UTA TRAX Station.


Photo 5 - Intermountain Ken C. Gardner Supply Center walk at top of retaining wall to MW #601 looking west.

Photo 6 - Intermountain Supply Center - looking north with FL Smidth in background.

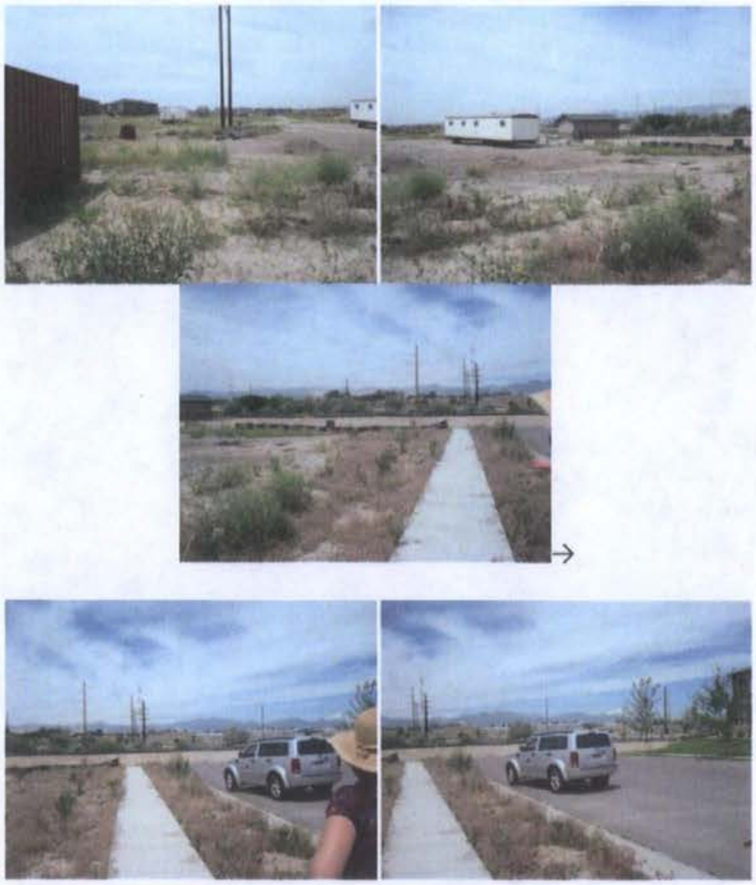


Photo 7 - Panorama left to right - Current subdivision being constructed called "Rooftops" Area, area is fill dirt not slag.

Photo 8 - Near MW 706, Completed apartments planned with hard cover and drainage.

Photo 9 - Looking NE beyond the UTA TRAX station at the grading and excavation (on left).

Photo 10 – A current excavation that penetrates through the slag.

Photo 11:- A piece of slag from excavation area.

Photo 12 - Riparian Area adjacent to the Riverside Apartments

Photo 13 - Armored West bank of the Jordan River, Intermountain Healthcare at background.

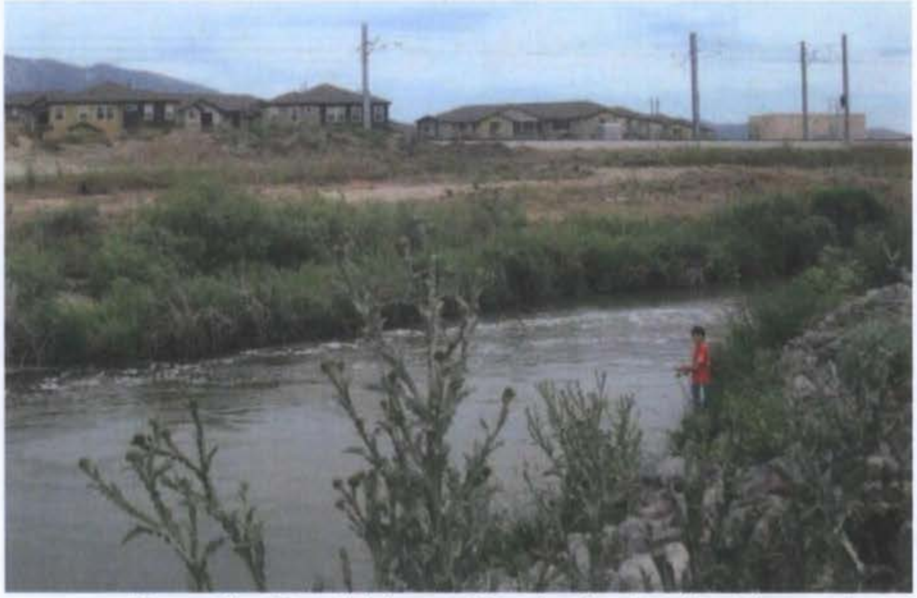


Photo 14 - Boy fishing on West bank of Jordan River.

Photo 15 - UTA light rail bridge over the Jordan River.

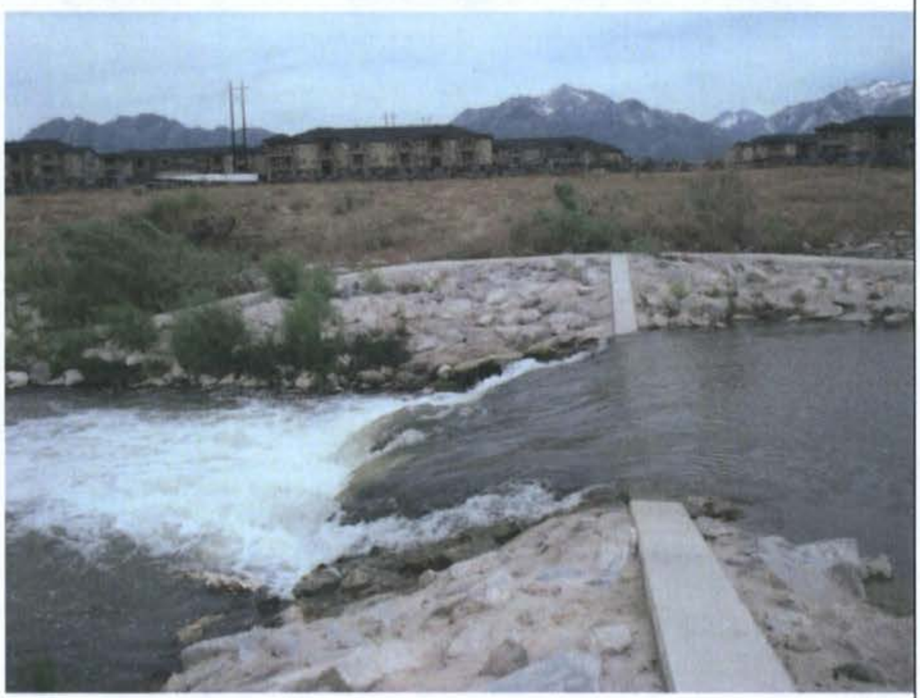


Photo 16 - Drop Structure in Jordan River from West Jordan toward OU2.

Photo 17 - Grouted Riprap at left bank by Drop Structure.

Appendix 3
List of Documents Reviewed

CDM, 1999. Technical Memorandum Simulation of Non-Equilibrium Desorption and Projected Aquifer Cleanup Times Midvale Slag Site - Midvale, Utah. September.

CDM, 2000. Usability of 1994 Baseline Risk Assessment for Midvale Superfund Site Operable Unit (OU) 2 and Other Human Health Risk-Related Issues. December.

CDM, 2004. Final Groundwater and Surface Water Monitoring Plan, Midvale Slag Superfund Site, Operable Units 1 and 2, Midvale, Utah. September.

CDM, 2005. Midvale Slag Superfund Site Operable Unites 1 and 2, Midvale, Utah. Final Summary of Groundwater Sampling Activities Before Remedial Action. July.

CDM, 2007. Jordan River Sheet Pile Dam Improvements Basis of Design Report. November.

ENTACT, 2005. Implementation of OU1 Riparian Area contingency response action. August.

EPA, 1995. Record of Decision, Midvale Slag OU1. April.

EPA, 1998. Explanation of Significant Differences, Midvale Slag Superfund Site, Midvale, Utah, Operable Unit #1.

EPA, 2002. Record of Decision, Midvale Slag OU2.October.

EPA, 2003. First Five-year Review Report for Midvale Slag Superfund Site, Midvale, Utah. October.

EPA, 2004. RD/RA Consent Decree , Civil No. 2:04 CV-843 for Midvale Slag Superfund Site. September.

EPA, 2004. Institutional Control Process Plan, Operable Unit No.1, Midvale Slag Site. Attachment to the RD/RA Consent Decree, Civil No. 2:04 CV-843. September.

EPA, 2004. Technical Report. Groundwater and Surface Water Monitoring Plan, Midvale Slag Superfund Site, Midvale, Utah.

EPA, 2005. Technical Memorandum, Preliminary Remediation Goals and Decision-Making Process at Midvale OU2.

EPA, 2005. Final Summary of Groundwater Sampling Activities Before Remedial Action, Midvale Slag Superfund Site, Operable Units 1 and 2, Midvale, Utah. July.

EPA, 2006. Explanation of Significant Differences, Midvale Slag Superfund Site Midvale, Utah, Operable Unit #1. February.

EPA, 2007. Memorandum from Karen Kellen (EPA Enforcement Counsel) and Frances Costanzi (RPM) to the Post ROD Site File. Technical Clarification of the OU2 ROD, Midvale Slag Superfund Site.

EPA, 2007. Letter from EPA to Littleson Inc. Certificate of Construction Work Completion for the Midvale Slag NPL Site. August.

EPA, 2008. Ready for Reuse Determination, Midvale Slag Superfund Site. May.

EPA, 2008. Midvale Slag Superfund Site Jordan River Riparian Project Fact Sheet. October.

EPA, 2008. Remedial Action Completion Report-Riparian Restoration Phase I, December.

EPA, 2008. Second Five-Year Review Report for Midvale Slag Superfund Site, December.

EPA. Remedial Action Report, Record of Preparation, Review and Approval. Midvale Slag Superfund Site. Groundwater. September.

EPA, 2009. Remedial Action Completion Report, Record of Preparation, Review and Approval Midvale Slag Superfund Site, Riparian Restoration – Phase II. December.

EPA, 2010. Acceptance Letter for Quarterly Groundwater Monitoring Reports for 2010. September. EPA, 2010. Jordan River Riparian Corridor Noxious Weed Assessment for the Restoration along the Midvale Slag Superfund Site. October.

EPA, 2011. Cleanup and Mixed-Use Revitalization on the Wasatch Front, The Midvale Slag Superfund Site and Midvale City, Utah. Superfund Redevelopment Initiative Fact Sheet. May.

EPA, 2011. Remedial Action Completion Report-Riparian Restoration Phase III. June.

EPA, 2011. Remedial Action Completion Report-Riparian Restoration Phase IV. June.

EPA, 2011. Preliminary Close Out Report, Midvale Slag Site, Salt Lake County, Utah. September.

EPA, 2012. Return to Use Initiative Fact Sheet. April.

EPA, 2012. 2012 Update to the Five-Year Review, Midvale Slag Superfund Site, Midvale, Salt Lake County, Utah. June.

EPA, 2013. Draft Notice of Deletion, Midvale Slag Superfund Site, Midvale, Salt Lake County, Utah. January.

ERM, 2006. Mercer Bingham Junction Development – Soil Management Final Report. August.

JUB Engineers, 2009. Jordan River Bank Stabilization Project.

JUB Engineering, 2010. Jordan River Bank Stabilization – Project Manual. August.

Life Systems 1994. Site Characterization Report for the Engineering Evaluation/Cost Analysis at the Midvale Slag Superfund Site, OU2, Midvale, Utah. Volume 2. Baseline Risk Assessment Report. January.

Midvale City, 2007. Ordinance No. 06/26/2007 O-8. An Ordinance Creating Section 8.10 in Chapter 8 of the Midvale City Municipal Code Titles "Institutional Controls Ordinance for Bingham Junction, Jordan Bluffs and Designated Rights-Of-Way". June.

Midvale City, 2013. Ordinance No. 06/26/07 O-8.10- Chapter 8 of the Midvale Municipal Code "Institutional Controls Ordinance for Bingham Junction, Jordan Bluffs and Designated Rights-Of-Way. April.

Salt Lake County, 2010. Jordan River Bank Stabilization – Project Drawings for Phase 3. May. South Valley Water Reclamation Facility, 2010. Discharge Permit #GWR03M1A8. February.

Stantac, 2008. Material Management Plan Backbone Infrastructure Bingham Junction Midvale, Utah, Arbor Gardner Bingham Junction Holdings, LLC. January.

Sverdrup, 1999. Groundwater Feasibility Study Briefing Paper. November.

UDEQ, 2009. Remedial Action Report Record of Preparation, Review and Approval, Midvale Slag Superfund Site, Groundwater. September.

UDEQ, 2010. Semi-Annual Groundwater and Surface Water Monitoring Report, Midvale Slag Superfund Site. October 2010

UDEQ, 2011. Semi-Annual Groundwater and Surface Water Monitoring Report, Midvale Slag Superfund Site. May.

UDEQ, 2011. Semi-Annual Groundwater and Surface Water Monitoring Report, Midvale Slag Superfund Site. September.

UDEQ, 2012. Semi-Annual Groundwater and Surface Water Monitoring Report for October 2010, Midvale Slag Superfund Site. January.

UDEQ, 2012. Semi-Annual Groundwater and Surface Water Monitoring Report, Midvale Slag Superfund Site. April .

UDEQ, 2012. Semi-Annual Groundwater and Surface Water Monitoring Report for September 2011, Midvale Slag Superfund Site. January.

UDEQ, 2012. Semi-Annual Groundwater and Surface Water Monitoring Report for May 2011, Midvale Slag Superfund Site. September.

UDEQ, 2013. Semi-Annual Groundwater and Surface Water Monitoring Report for April 2012. April.

UDEQ, 2013. Semi-Annual Groundwater and Surface Water Monitoring Report for September 2012. May.

URS, 2008. Work Assignment Work Plan- Scope of Work and Cost Estimate for Work Assignment No. 03, CERCLA Level of Effort Contract #086217, Midvale Slag Superfund Site, Review and Installation of Groundwater Monitoring Design and Quarterly Monitoring. September.

URS, 2009. Final Project Plans for Quarterly Groundwater and Surface Water Monitoring at the Midvale Slag Superfund Site, Midvale, Utah, Work Assignment No. 03. March.

URS, 2009. Final Monitoring Well Installation Report for the Groundwater Monitoring System at the Midvale Slag Superfund Site, Midvale Utah, Work Assignment No. 03. May.

URS, 2009. Final Quarterly Groundwater and Surface Water Monitoring Report First Quarter: January/February 2009 for the Midvale Slag Superfund Site, Midvale Utah, Work Assignment No. 03. May.

URS, 2009. Draft Quarterly Groundwater and Surface Water Monitoring Report Second Quarter: April/May 2009 for the Midvale Slag Superfund Site, Midvale Utah, Work Assignment No. 03. June.

URS, 2009. Final Quarterly Groundwater and Surface Water Monitoring Report Third Quarter: July 2009 for the Midvale Slag Superfund Site, Midvale Utah Work Assignment No. 03. November.

URS, 2010. Final Quarterly Groundwater and Surface Water Monitoring Report Fourth Quarter: October 2009 for the Midvale Slag Superfund Site, Midvale Utah, Work Assignment No. 03. May.

URS, 2010. Final Spring 2010 Semi-Annual Groundwater and Surface Water Monitoring Report for the Midvale Slag Superfund Site, Midvale Utah Work Assignment No. 03. September.

URS, 2010. Data Validation Report for Midvale Slag, Midvale Utah, December.

USGS, 2011. Midvale Utah Quadrangle, 7.5-Minute Series topographic map

USGS, 2011. Two-Dimensional Streamflow Simulations of the Jordan River, Midvale and West Jordan, Utah. Scientific Investigations Report 2011-5043.

UTA, 2011. Mid-Jordan Light Rail Project – Soils Management Procedure Post Construction Report. August.

Utah DNR, 2002. Salt Lake Valley Groundwater Management Plan. June.

Utah Ground Water Quality Standards, 2013. Rule 317-Environmental Quality, Water Quality; Rule R317-6 Ground Water Quality Protection. April.

Utah Surface Water Quality Standards, 2013. Rule 317-Environmental Quality, Water Quality; R317- 2 Standards of Quality for Waters of the State. April.

Appendix 4
Trend Analysis Data

Table 7: Summary of Antimony Trends in Groundwater and Surface Water

Well ID	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Trend
MW-501s	1	-7	70.0%	No Trend
MW-501i	1.15	-9	75.8%	No Trend
MW-503s	1.23	0	45.6%	No Trend
MW-503i	1.70	8	72.9%	No Trend
MW-504s	1.26	-18	93.4%	Prob. Decreasing
MW-504i	1.54	-15	89.2%	No Trend
MW-505s	1.52	21	96.4%	Increasing
MW-505i	0.81	-5	63.6%	Stable
MW-506s	1.11	6	66.8%	No Trend
MW-506i	1.08	-5	63.6%	No Trend
MW-507s	0.93	7	70.0%	No Trend
MW-507i	1.36	2	53.5%	No Trend
MW-601s	0.40	-4	60.3%	Stable
MW-601i	0.94	-32	99.9%	Decreasing
MW-602s	0.41	19	94.6%	Prob. Increasing
MW-602i	0.95	-8	72.9%	Stable
MW-701s	0.83	-10	78.4%	Stable
MW-701i	1.22	-12	83.2%	No Trend
MW-702s	1.31	-12	83.2%	No Trend
MW-702i	1.25	-14	87.3%	No Trend
MW-704s	1.26	-9	75.8%	No Trend
MW-704i	1.11	-10	78.4%	No Trend
MW-705s	0.74	-14	87.3%	Stable
MW-705i	1.44	-5	63.6%	No Trend
MW-706s	0.52	-3	56.9%	Stable
MW-706i	0	0	45.6%	Stable
MW-707s	1.19	-3	56.9%	No Trend
MW-707i	0	0	45.6%	Stable
SW-201*	1.30	8	72.9%	No Trend
SW-202*	1.17	16	90.7%	Prob. Increasing

*Surface Water Locations

Table 8: Summary of Arsenic Trends in Groundwater and Surface Water

Well ID	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Trend
MW-501s	1.41	25	98.6%	Increasing
MW-501i	0.80	24	98.2%	Increasing
MW-503s	1.36	19	94.6%	Prob. Increasing
MW-503i	1.83	9	75.8%	No Trend
MW-504s	1.52	6	66.8%	No Trend
MW-504i	1.79	7	70.0%	No Trend
MW-505s	3.16	29	99.5%	Increasing
MW-505i	0.81	13	85.4%	No Trend
MW-506s	0.79	15	89.2%	No Trend
MW-506i	1.81	9	75.8%	No Trend
MW-507s	0.43	3	56.9%	No Trend
MW-507i	1.90	15	89.2%	No Trend
MW-601s	0.09	23	97.7%	Increasing
MW-601i	0.61	25	98.6%	Increasing
MW-602s	0.18	21	96.4%	Increasing
MW-602i	0.81	13	85.4%	No Trend
MW-701s	0.7	14	87.3%	No Trend
MW-701i	1.81	7	70.0%	No Trend
MW-702s	1.42	5	63.6%	No Trend
MW-702i	1.70	12	83.2%	No Trend
MW-704s	0.11	-13	85.4%	Stable
MW-704i	1.66	7	70.0%	No Trend
MW-705s	0.34	-21	96.4%	Decreasing
MW-705i	0.14	-16	90.7%	Prob. Decreasing
MW-706s	3.01	11	81.0%	No Trend
MW-706i	0.45	-21	96.4%	Decreasing
MW-707s	0.19	15	89.2%	No Trend
MW-707i	0.68	8	72.9%	No Trend
SW-201*	0.19	7	70.0%	No Trend
SW-202*	0.17	13	85.4%	No Trend

*Surface Water Locations

Table 9: Summary of Cadmium Trends in Groundwater and Surface Water

Well ID	Coefficient of Variation	Mann-Kendall Statistic.(S)	Confidence Factor	Trend
MW-501s	0.44	2	53.5%	No Trend
MW-501i	0.76	1	50.0%	No Trend
MW-503s	0.39	13	85.4%	No Trend
MW-503i	1.49	13	85.4%	No Trend
MW-504s	0.85	-7	70.0%	Stable
MW-504i	0.39	1	50.0%	No Trend
MW-505s	2.98	24	98.2%	Increasing
MW-505i	1.35	12	83.2%	No Trend
MW-506s	0.39	13	85.4%	No Trend
MW-506i	0.00	0	45.6%	Stable
MW-507s	0.58	13	85.4%	No Trend
MW-507i	0.97	13	85.4%	No Trend
MW-601s	0.11	19	94.6%	Prob. Increasing
MW-601i	0.83	-6	66.8%	Stable
MW-602s	0.55	6	66.8%	No Trend
MW-602i	0.41	0	45.6%	Stable
MW-701s	0.86	6	66.8%	No Trend
MW-701i	0.99	9	75.8%	No Trend
MW-702s	0.39	-7	70.0%	Stable
MW-702i	0.91	1	50.0%	No Trend
MW-704s	3.09	11	81.0%	No Trend
MW-704i	0.00	0	45.6%	Stable
MW-705s	0.39	13	85.4%	No Trend
MW-705i	0.00 .	0	45.6%	Stable
MW-706s	3.06	27	99.2%	Increasing
MW-706i	0.00	0	45.6%	Stable
MW-707s	0.76	13	85.4%	No Trend
MW-707i	1.75	13	85.4%	No Trend
SW-201*	2.14	2	53.5%	No Trend
SW-202*	1.93	4	60.3%	No Trend

*Surface Water Locations

Table 10: Summary of Selenium Trends in Groundwater and Surface Water

Well ID	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Trend
MW-501s	0.38	18	93.4%	Prob. Increasing
MW-501i	0.70	9	75.8%	No Trend
MW-503s	1.51	19	94.6%	Prob. Increasing
MW-503i	1.44	18	93.4%	Prob. Increasing
MW-504s	1.08	13	85.4%	No Trend
MW-504i	1.48	29	99.5%	Increasing
MW-505s	3.16	19	94.6%	Prob. Increasing
MW-505i	2.66	28	99.4%	Increasing
MW-506s	1.62	21	96.4%	Increasing
MW-506i	1.59	24	98.2%	Increasing
MW-507s	1.67	23	97.7%	Increasing
MW-507i	1.66	15	89.2%	No Trend
MW-601s	0.55	13	85.4%	No Trend
MW-601i	0.83	36	>99.9%	Increasing
MW-602s	0.53	10	78.4%	No Trend
MW-602i	0.67	24	98.2%	Increasing
MW-701s	1.08	28	99.4%	Increasing
MW-701i	1.26	12	83.2%	No Trend
MW-702s	0.66	22	97.1%	Increasing
MW-702i	0.93	21	96.4%	Increasing
MW-704s	0.90	9	75.8%	No Trend
MW-704i	1.18	4	60.3%	No Trend
MW-705s	1.94	19	94.6%	Prob. Increasing
MW-705i	1.18	23	97.7%	Increasing
MW-706s	3.16	11	81.0%	No Trend
MW-706i	1.20	28	99.4%	Increasing
MW-707s	1.50	6	66.8%	No Trend
MW-707i	1.20	22	97.1%	Increasing
SW-201*	0.52	15	89.2%	No Trend
SW-202*	0.54	15	89.2%	No Trend

*Surface Water Locations

Table.11: Summary of PCE Trends in Groundwater

Well ID	Coefficient of Variation	Mann-Kendall Statistic (S)	Confidence Factor	Trend
MW-501s	0.82	-22	97.1%	Decreasing
MW-501i	0.45	-30	99.7%	Decreasing
MW-503s	1.82	-11	81.0%	No Trend
MW-503i	0.23	-25	98.6%	Decreasing
MW-504s	0.43	-12	83.2%	Stable
MW-504i	0.24	-11	81.0%	Stable
MW-505s	2.19	3	56.9%	No Trend
MW-505i	2.19	3	56.9%	No Trend
MW-506s	1.91	-4	60.3%	No Trend
MW-506i	0.47	29	99.5%	Increasing
MW-507s	2.19	3	56.9%	No Trend
MW-507i	2.19	3	56.9%	No Trend
MW-601s	0.44	-35	100.0%	Decreasing
MW-601i	0.39	-33	99.9%	Decreasing
MW-602s	0.80	-11	81.0%	Stable
MW-602i	0.54	-24	98.2%	Decreasing
MW-701s	0.21	-26	98.9%	Decreasing
MW-701i	0.16	-13	85.4%	Stable
MW-702s	0.39	-11	81.0%	Stable
MW-702i	0.53	-28	99.4%	Decreasing
MW-704s	0.24	-28	99.4%	Decreasing
MW-704i	0.34	-39	>99.9%	Decreasing
MW-705s	1.49	-18	93.4%	Prob. Decreasing
MW-705i	0.71	-32	99.9%	Decreasing
MW-706s	1.48	-8	72.9%	No Trend
MW-706i	1.19	-16	90.7%	Prob. Decreasing
MW-707s	1.68	-20	95.5%	Decreasing
MW-707i	1.89	-8	72.9%	No Trend

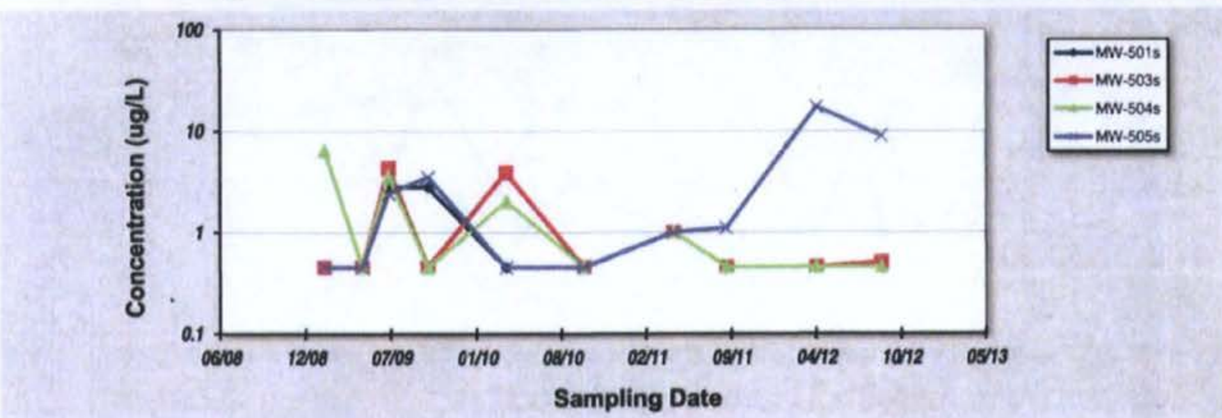
Trend Analysis Results

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes

Job ID: Upgradient Monitoring Wells
Constituent: Antimony
Concentration Units: ug/L

Sampling Event	Sampling Date	MW-501s	MW-503s	MW-504s	MW-505s			
		ANTIMONY CONCENTRATION (ug/L)						
1	Feb-09	0.45	0.45	6.4	0.45			
2	May-09	0.45	0.45	0.45	0.45			
3	Jul-09	2.8	4.3	3.6	2.4			
4	Oct-09	2.8	0.45	0.45	3.5			
5	Apr-10	0.45	3.9	2	0.45			
6	Oct-10	0.45	0.45	0.45	0.45			
7	May-11	1	1	1	1			
8	Sep-11	0.45	0.45	0.45	1.1			
9	Apr-12	0.45	0.45	0.45	17.2			
10	Sep-12	0.45	0.5	0.45	8.9			
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.00	1.23	1.26	1.52			
Mann-Kendall Statistic (S):		-7	0	-18	21			
Confidence Factor:		70.0%	45.6%	93.4%	96.4%			
Concentration Trend:		No Trend	No Trend	Prob. Decreasing	Increasing			



Notes:

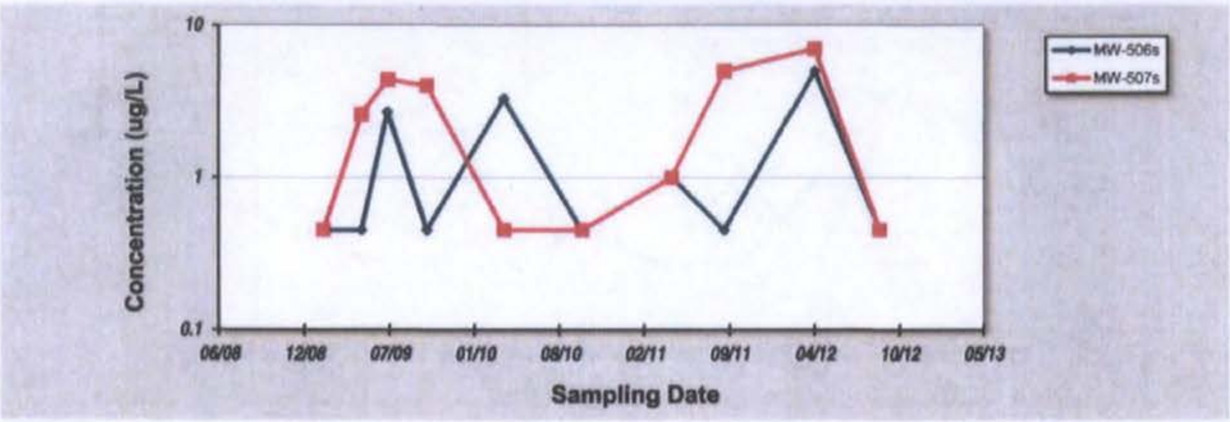
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes

Job ID: Downgradient Monitoring Wells
Constituent: Antimony
Concentration Units: ug/L

Sampling Event	Sampling Date	MW-506s	MW-507s					
		ANTIMONY CONCENTRATION (ug/L)						
1	Feb-09	0.45	0.45					
2	May-09	0.45	2.6					
3	Jul-09	2.7	4.4					
4	Oct-09	0.45	4					
5	Apr-10	3.3	0.45					
6	Oct-10	0.45	0.45					
7	May-11	1	1					
8	Sep-11	0.45	5					
9	Apr-12	5	7					
10	Sep-12	0.45	0.45					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.11	0.93					
Mann-Kendall Statistic (S):		6	7					
Confidence Factor:		66.8%	70.0%					
Concentration Trend:		No Trend	No Trend					



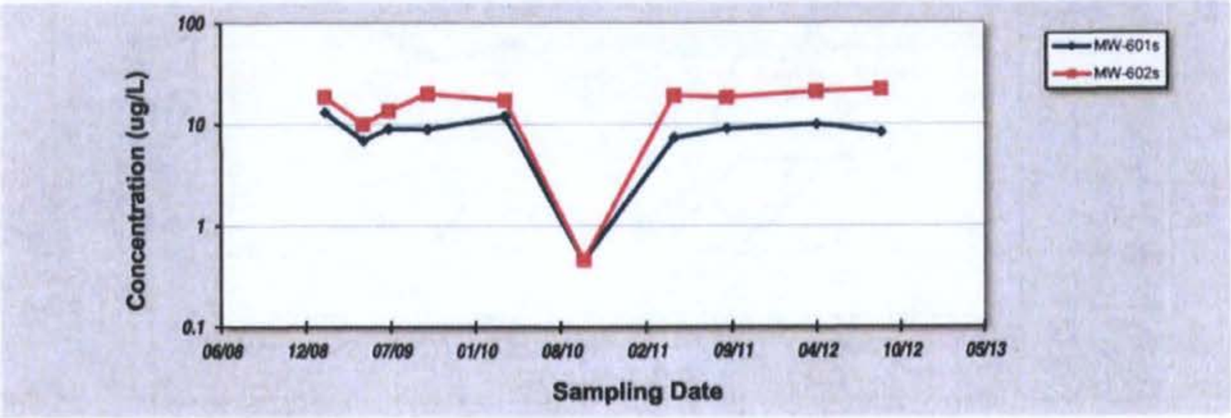
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	**Job ID:**	Plume Core Monitoring Wells
Facility Name:	Midvale Slag	**Constituent:**	Antimony
Conducted By:	T. Howes	**Concentration Units:**	ug/L

Sampling Event	Sampling Date	MW-601s	MW-602s					
	Sampling Point ID:	**MW-601s**	**MW-602s**					
		ANTIMONY CONCENTRATION (ug/L)						
1	Feb-09	13.1	18.6					
2	May-09	6.9	10					
3	Jul-09	9	13.6					
4	Oct-09	8.9	19.8					
5	Apr-10	12	17.2					
6	Oct-10	0.45	0.45					
7	May-11	7.34	19.1					
8	Sep-11	9	18.4					
9	Apr-12	10	21					
10	Sep-12	8.3	22.1					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
	Coefficient of Variation:	0.40	0.41					
	Mann-Kendall Statistic (S):	-4	19					
	Confidence Factor:	60.3%	94.6%					
	Concentration Trend:	Stable	Prob. Increasing					



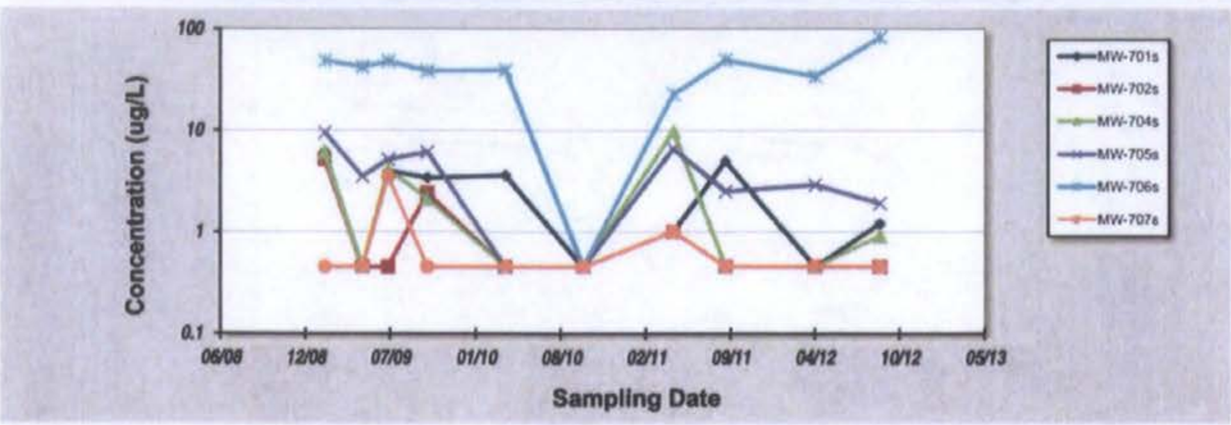
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13 | **Job ID:** ACL Monitoring Wells
Facility Name: Midvale Slag | **Constituent:** Antimony
Conducted By: T. Howes | **Concentration Units:** ug/L

Sampling Event	Sampling Date	MW-701s	MW-702s	MW-704s	MW-705s	MW-706s	MW-707s	
		ANTIMONY CONCENTRATION (ug/L)						
1	Feb-09	6.2	5.2	6.1	9.5	48.1	0.45	
2	May-09	0.45	0.45	0.45	3.5	41.9	0.45	
3	Jul-09	4	0.45	4.1	5.2	47.6	3.5	
4	Oct-09	3.4	2.4	2.1	6.1	38.1	0.45	
5	Apr-10	3.6	0.45	0.45	0.45	38.9	0.45	
6	Oct-10	0.45	0.45	0.45	0.45	0.45	0.45	
7	May-11	1	1	9.67	6.59	22.6	1	
8	Sep-11	5	0.45	0.45	2.5	49.1	0.45	
9	Apr-12	0.45	0.45	0.45	2.9	33.9	0.45	
10	Sep-12	1.2	0.45	0.9	1.9	82	0.45	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.83	1.31	1.26	0.74	0.52	1.19	
Mann-Kendall Statistic (S):		-10	-12	-9	-14	-3	-3	
Confidence Factor:		78.4%	83.2%	75.8%	87.3%	56.9%	56.9%	
Concentration Trend:		Stable	No Trend	No Trend	Stable	Stable	No Trend	



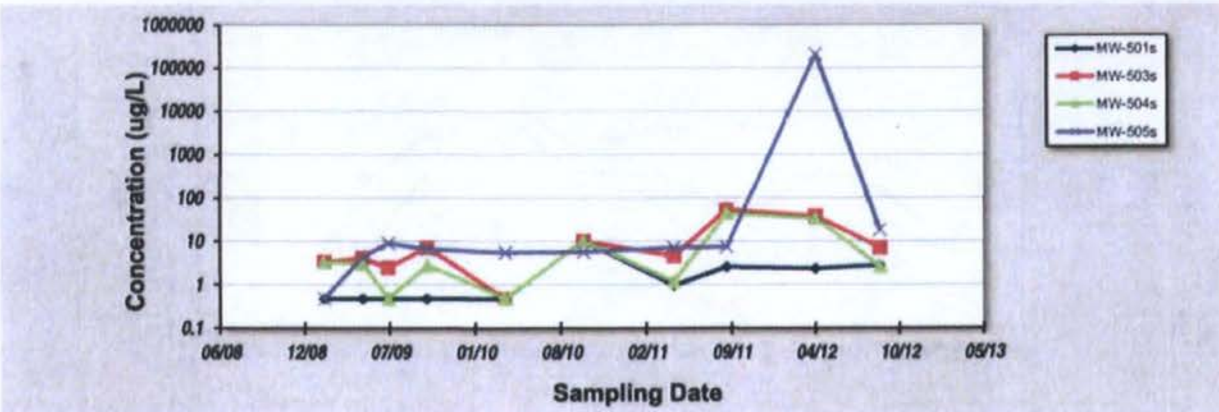
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	Job ID:	Upgradient Monitoring Wells
Facility Name:	Midvale Slag	Constituent:	Arsenic
Conducted By:	T. Howes	Concentration Units:	ug/L

Sampling Event	Sampling Date	MW-501s	MW-503s	MW-504s	MW-505s			
		ARSENIC CONCENTRATION (ug/L)						
1	Feb-09	0.47	3.3	3.2	0.47			
2	May-09	0.47	4.1	3	4.3			
3	Jul-09	0.47	2.4	0.47	8.9			
4	Oct-09	0.47	7.1	2.7	6.5			
5	Apr-10	0.47	0.47	0.47	5.4			
6	Oct-10	10	10	10	5.6			
7	May-11	0.94	4.45	1.16	6.9			
8	Sep-11	2.5	52	42	7.2			
9	Apr-12	2.3	37	32	209000			
10	Sep-12	2.7	6.8	2.5	18			
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.41	1.36	1.52	3.16			
Mann-Kendall Statistic (S):		25	19	6	29			
Confidence Factor:		98.6%	94.6%	66.8%	99.5%			
Concentration Trend:		Increasing	Prob. Increasing	No Trend	Increasing			



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

DISCLAIMER: *The GSI Mann-Kendall Toolkit is available "as is". Considerable care has been exercised in preparing this software product; however, no party, including without limitation GSI Environmental Inc., makes any representation or warranty regarding the accuracy, correctness, or completeness of the information contained herein, and no such party shall be liable for any direct, indirect, consequential, incidental or other damages resulting from the use of this product or the information contained herein. Information in this publication is subject to change without notice. GSI Environmental Inc., disclaims any responsibility or obligation to update the information contained herein.*

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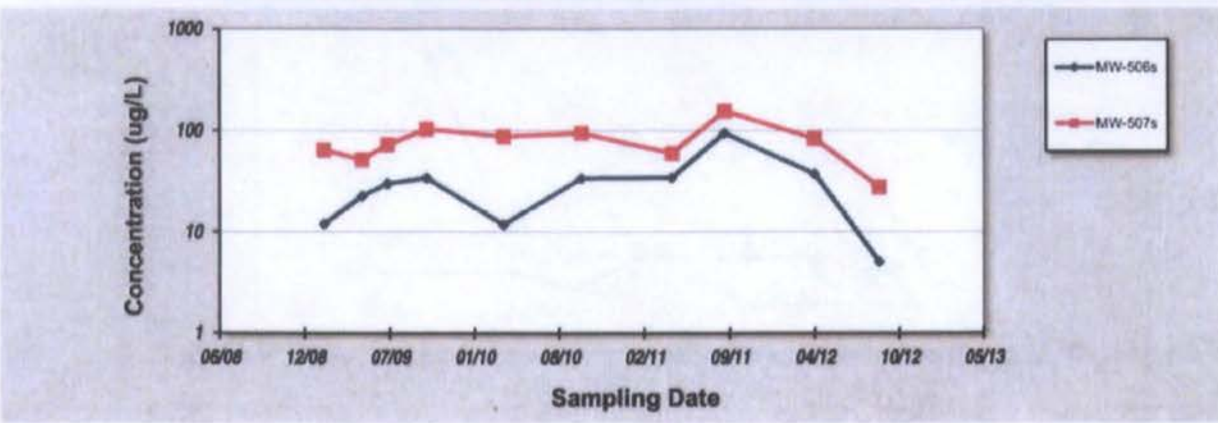
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	**Job ID:**	Downgradient Monitoring Wells
Facility Name:	Midvale Slag	**Constituent:**	Arsenic
Conducted By:	T. Howes	**Concentration Units:**	ug/L

Sampling Event	Sampling Date	MW-506s	MW-507s					
		ARSENIC CONCENTRATION (ug/L)						
1	Feb-09	11.9	64.2					
2	May-09	22.6	51.5					
3	Jul-09	29.9	72.5					
4	Oct-09	34	103					
5	Apr-10	11.7	87.1					
6	Oct-10	33.7	94.4					
7	May-11	34.1	59.4					
8	Sep-11	94	155					
9	Apr-12	37	83					
10	Sep-12	5	27.3					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.79	0.43					
Mann-Kendall Statistic (S):		15	3					
Confidence Factor:		89.2%	56.9%					
Concentration Trend:		No Trend	No Trend					



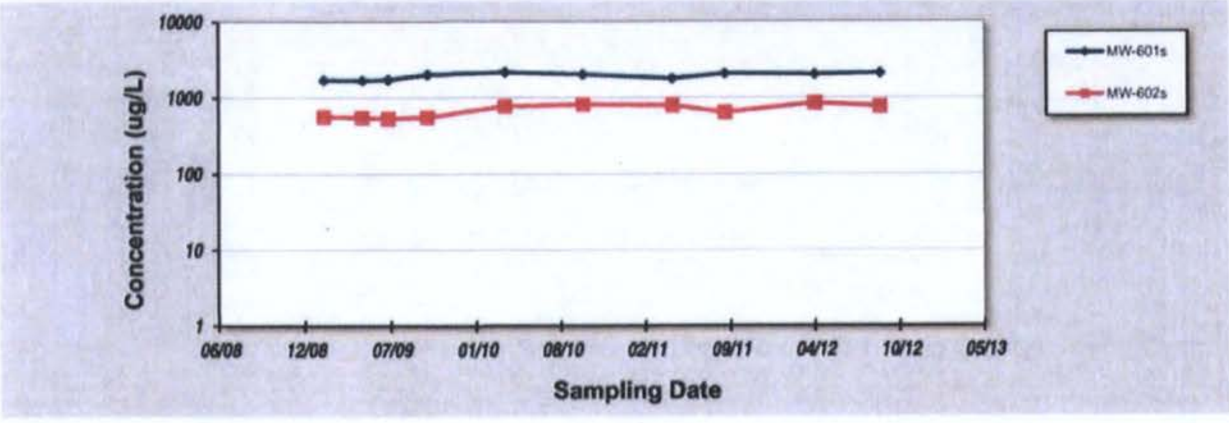
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	Job ID:	Plume Core Monitoring Wells
Facility Name:	Midvale Slag	Constituent:	Arsenic
Conducted By:	T. Howes	Concentration Units:	ug/L

Sampling Point ID:		MW-601s	MW-602s					
Sampling Event	Sampling Date	ARSENIC CONCENTRATION (ug/L)						
1	Feb-09	1710	563					
2	May-09	1690	549					
3	Jul-09	1730	533					
4	Oct-09	2020	553					
5	Apr-10	2160	770					
6	Oct-10	2030	807					
7	May-11	1790	783					
8	Sep-11	2070	631					
9	Apr-12	2010	842					
10	Sep-12	2090	759					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.09	0.18					
Mann-Kendall Statistic (S):		23	21					
Confidence Factor:		97.7%	96.4%					
Concentration Trend:		Increasing	Increasing					



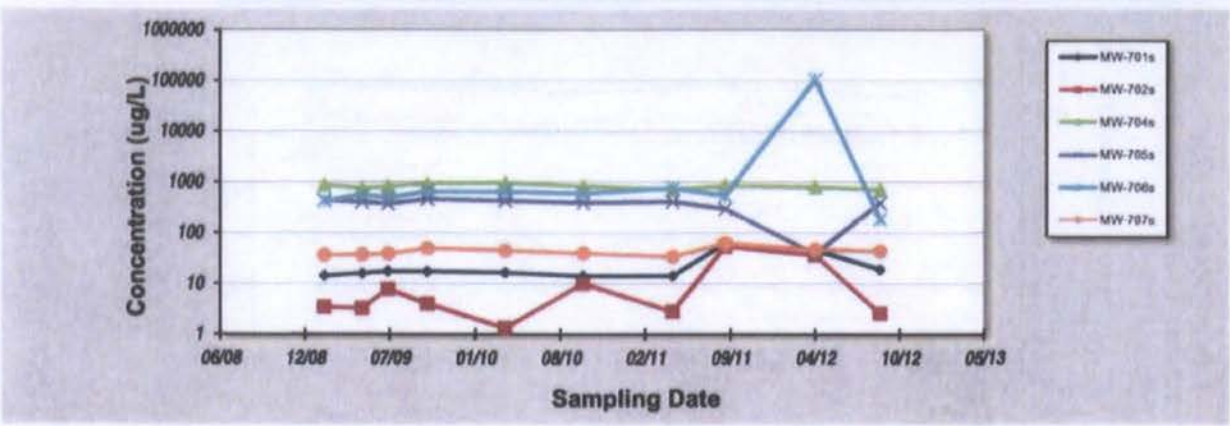
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: ACL Monitoring Wells
Constituent: Arsenic
Concentration Units: ug/L

Sampling Point ID:		MW-701s	MW-702s	MW-704s	MW-705s	MW-706s	MW-707s	
Sampling Event	Sampling Date	ARSENIC CONCENTRATION (ug/L)						
1	Feb-09	14.2	3.4	864	431	416	35.5	
2	May-09	15.7	3.2	734	399	545	36.3	
3	Jul-09	17.3	7.6	802	370	479	38	
4	Oct-09	17.2	3.9	911	457	636	48.1	
5	Apr-10	16.3	1.3	947	423	641	44	
6	Oct-10	14.2	10	812	391	588	38.8	
7	May-11	14.2	2.76	698	408	734	33.4	
8	Sep-11	62	53	832	292	526	61.2	
9	Apr-12	45	36	778	38	103000	45.5	
10	Sep-12	18.7	2.5	685	382	180	42.3	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.70	1.42	0.11	0.34	3.01	0.19	
Mann-Kendall Statistic (S):		14	5	-13	-21	11	15	
Confidence Factor:		87.3%	63.6%	85.4%	96.4%	81.0%	89.2%	
Concentration Trend:		No Trend	No Trend	Stable	Decreasing	No Trend	No Trend	



Notes:

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2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

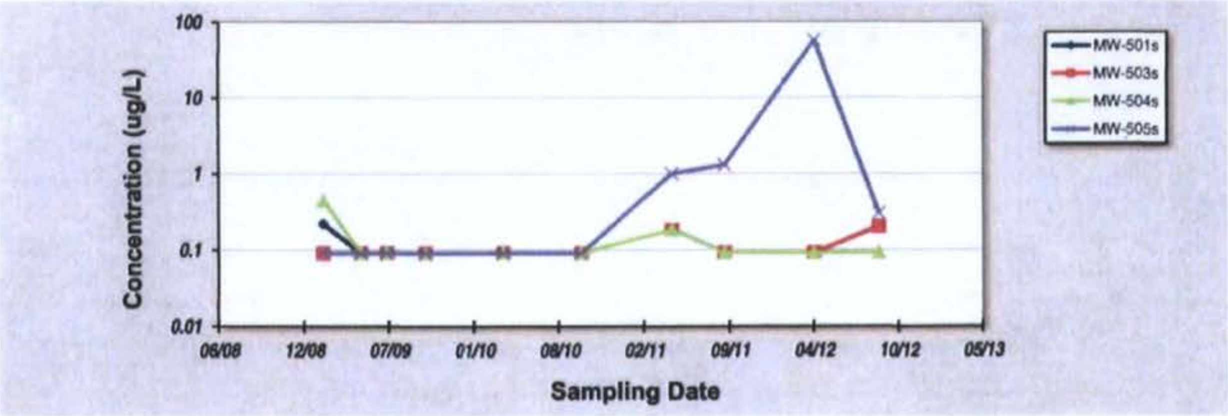
GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes

Job ID: Upgradient Monitoring Wells
Constituent: Cadmium
Concentration Units: ug/L

Sampling Event	Sampling Date	MW-501s	MW-503s	MW-504s	MW-505s			
		CADMIUM CONCENTRATION (ug/L)						
1	Feb-09	0.22	0.09	0.45	0.09			
2	May-09	0.09	0.09	0.09	0.09			
3	Jul-09	0.09	0.09	0.09	0.09			
4	Oct-09	0.09	0.09	0.09	0.09			
5	Apr-10	0.09	0.09	0.09	0.09			
6	Oct-10	0.09	0.09	0.09	0.09			
7	May-11	0.18	0.18	0.18	1			
8	Sep-11	0.09	0.09	0.09	1.3			
9	Apr-12	0.09	0.09	0.09	57.1			
10	Sep-12	0.2	0.2	0.09	0.3			
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.44	0.39	0.85	2.98			
Mann-Kendall Statistic (S):		2	13	-7	24			
Confidence Factor:		53.5%	85.4%	70.0%	98.2%			
Concentration Trend:		No Trend	No Trend	Stable	Increasing			



Notes:

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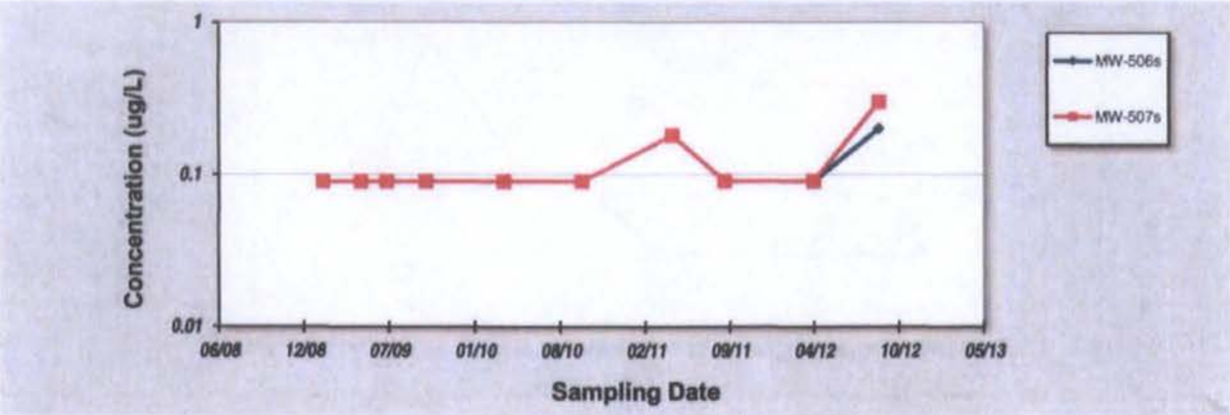
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	Job ID:	Downgradient Monitoring Wells
Facility Name:	Midvale Slag	Constituent:	Cadmium
Conducted By:	T. Howes	Concentration Units:	ug/L

Sampling Point ID:		MW-506s	MW-507s					
Sampling Event	Sampling Date	CADMIUM CONCENTRATION (ug/L)						
1	Feb-09	0.09	0.09					
2	May-09	0.09	0.09					
3	Jul-09	0.09	0.09					
4	Oct-09	0.09	0.09					
5	Apr-10	0.09	0.09					
6	Oct-10	0.09	0.09					
7	May-11	0.18	0.18					
8	Sep-11	0.09	0.09					
9	Apr-12	0.09	0.09					
10	Sep-12	0.2	0.3					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.39	0.58					
Mann-Kendall Statistic (S):		13	13					
Confidence Factor:		85.4%	85.4%					
Concentration Trend:		No Trend	No Trend					



Notes:

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GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Plume Core Monitoring Wells
Constituent: Cadmium
Concentration Units: ug/L

Sampling Event	Sampling Date	MW-601s	MW-602s					
		CADMIUM CONCENTRATION (ug/L)						
1	Feb-09	416	0.19					
2	May-09	431	0.09					
3	Jul-09	403	0.09					
4	Oct-09	433	0.09					
5	Apr-10	493	0.09					
6	Oct-10	471	0.09					
7	May-11	546	0.09					
8	Sep-11	404	0.18					
9	Apr-12	440	0.09					
10	Sep-12	513	0.3					
11								
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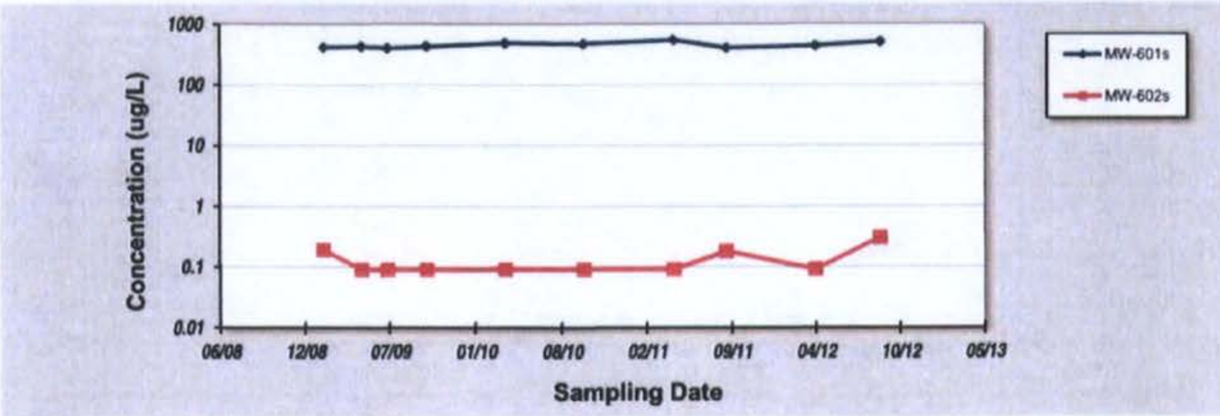
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.11	0.55					
Mann-Kendall Statistic (S):		19	6					
Confidence Factor:		94.6%	66.8%					
Concentration Trend:		Prob. Increasing	No Trend					



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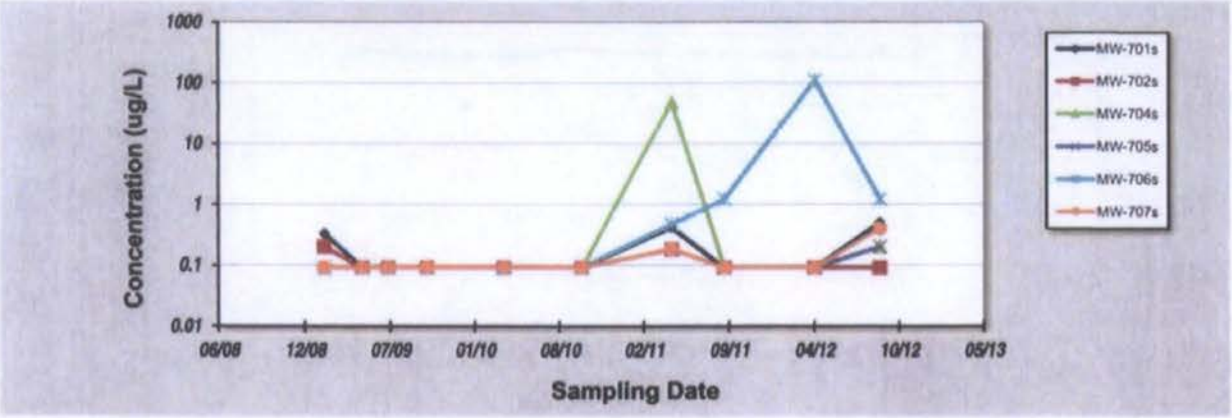
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	**Job ID:**	ACL Monitoring Wells
Facility Name:	Midvale Slag	**Constituent:**	Cadmium
Conducted By:	T. Howes	**Concentration Units:**	ug/L

Sampling Event	Sampling Date	MW-701s	MW-702s	MW-704s	MW-705s	MW-706s	MW-707s	
		CADMIUM CONCENTRATION (ug/L)						
1	Feb-09	0.33	0.2	0.09	0.09	0.09	0.09	
2	May-09	0.09	0.09	0.09	0.09	0.09	0.09	
3	Jul-09	0.09	0.09	0.09	0.09	0.09	0.09	
4	Oct-09	0.09	0.09	0.09	0.09	0.09	0.09	
5	Apr-10	0.09	0.09	0.09	0.09	0.09	0.09	
6	Oct-10	0.09	0.09	0.09	0.09	0.09	0.09	
7	May-11	0.414	0.18	46	0.18	0.466	0.182	
8	Sep-11	0.09	0.09	0.09	0.09	1.2	0.09	
9	Apr-12	0.09	0.09	0.09	0.09	109	0.09	
10	Sep-12	0.5	0.09	0.2	0.2	1.2	0.4	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.86	0.39	3.09	0.39	3.06	0.76	
Mann-Kendall Statistic (S):		6	-7	11	13	27	13	
Confidence Factor:		66.8%	70.0%	81.0%	85.4%	99.2%	85.4%	
Concentration Trend:		No Trend	Stable	No Trend	No Trend	Increasing	No Trend	



Notes:

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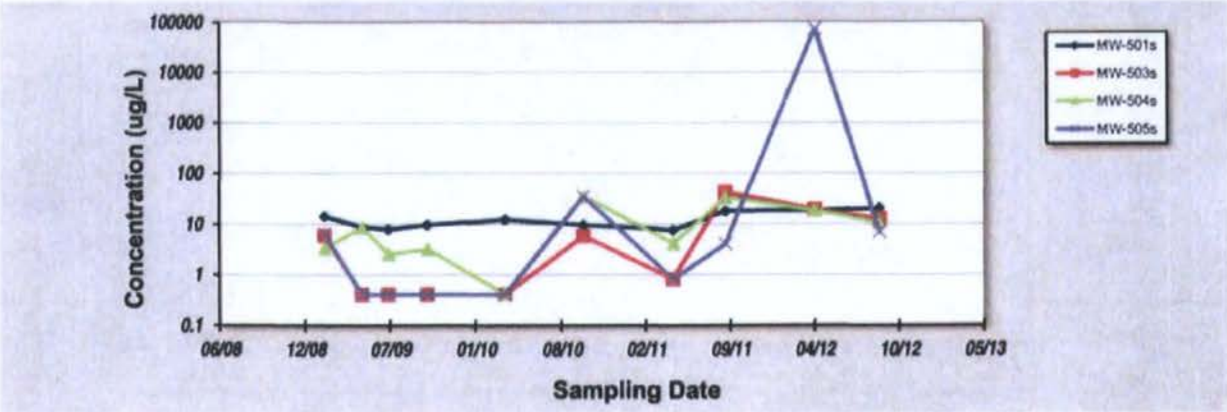
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Upgradient Monitoring Wells
Constituent: Selenium
Concentration Units: ug/L

Sampling Event	Sampling Date	MW-501s	MW-503s	MW-504s	MW-505s			
		SELENIUM CONCENTRATION (ug/L)						
1	Feb-09	14.3	5.9	3.3	6.2			
2	May-09	8.7	0.4	8.4	0.4			
3	Jul-09	7.8	0.4	2.5	0.4			
4	Oct-09	9.6	0.4	3.1	0.4			
5	Apr-10	12.3	0.4	0.4	0.4			
6	Oct-10	9.6	5.8	35	35			
7	May-11	7.54	0.8	4.05	0.8			
8	Sep-11	17.9	42	33	4			
9	Apr-12	18.2	19	18	72700			
10	Sep-12	20.2	12.5	10.4	6.9			
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.38	1.51	1.08	3.16			
Mann-Kendall Statistic (S):		18	19	13	19			
Confidence Factor:		93.4%	94.6%	85.4%	94.6%			
Concentration Trend:		Prob. Increasing	Prob. Increasing	No Trend	Prob. Increasing			



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
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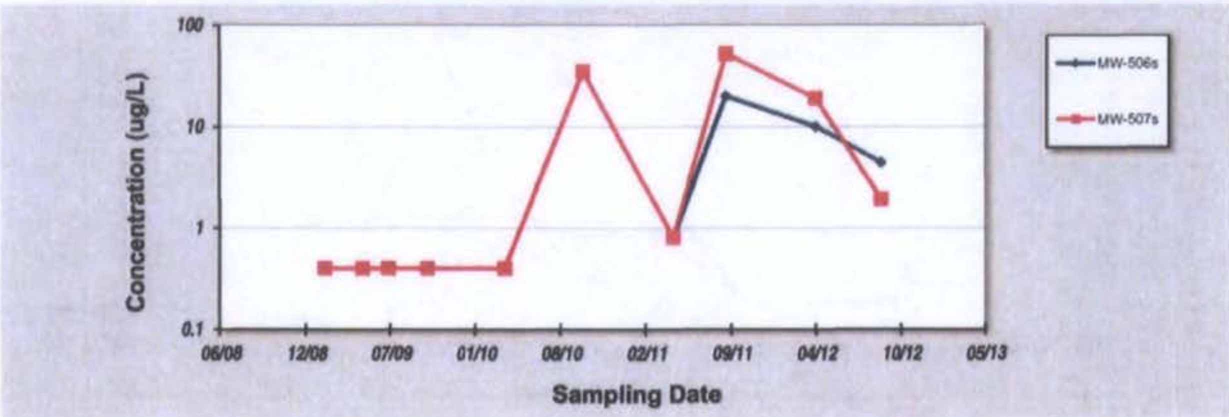
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	Job ID:	Downgradient Monitoring Wells
Facility Name:	Midvale Slag	Constituent:	Selenium
Conducted By:	T. Howes	Concentration Units:	ug/L

Sampling Event	Sampling Date	MW-506s	MW-507s					
		SELENIUM CONCENTRATION (ug/L)						
1	Feb-09	0.4	0.4					
2	May-09	0.4	0.4					
3	Jul-09	0.4	0.4					
4	Oct-09	0.4	0.4					
5	Apr-10	0.4	0.4					
6	Oct-10	35	35					
7	May-11	0.8	0.8					
8	Sep-11	20	52					
9	Apr-12	10	19					
10	Sep-12	4.4	1.9					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.62	1.67					
Mann-Kendall Statistic (S):		21	23					
Confidence Factor:		96.4%	97.7%					
Concentration Trend:		Increasing	Increasing					



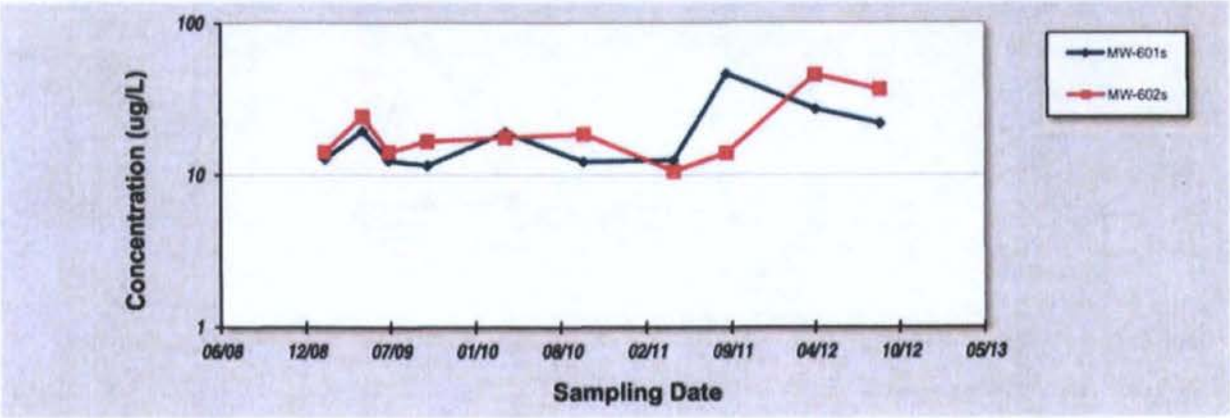
Notes:
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes

Job ID: Plume Core Monitoring Wells
Constituent: Selenium
Concentration Units: ug/L

Sampling Event	Sampling Date	MW-601s	MW-602s					
		SELENIUM CONCENTRATION (ug/L)						
1	Feb-09	12.7	14.1					
2	May-09	19.5	24.2					
3	Jul-09	12.4	14.1					
4	Oct-09	11.5	16.6					
5	Apr-10	19	17.5					
6	Oct-10	12.2	18.5					
7	May-11	12.5	10.5					
8	Sep-11	46	13.9					
9	Apr-12	27	45.4					
10	Sep-12	21.7	36.3					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.55	0.53					
Mann-Kendall Statistic (S):		13	10					
Confidence Factor:		85.4%	78.4%					
Concentration Trend:		No Trend	No Trend					



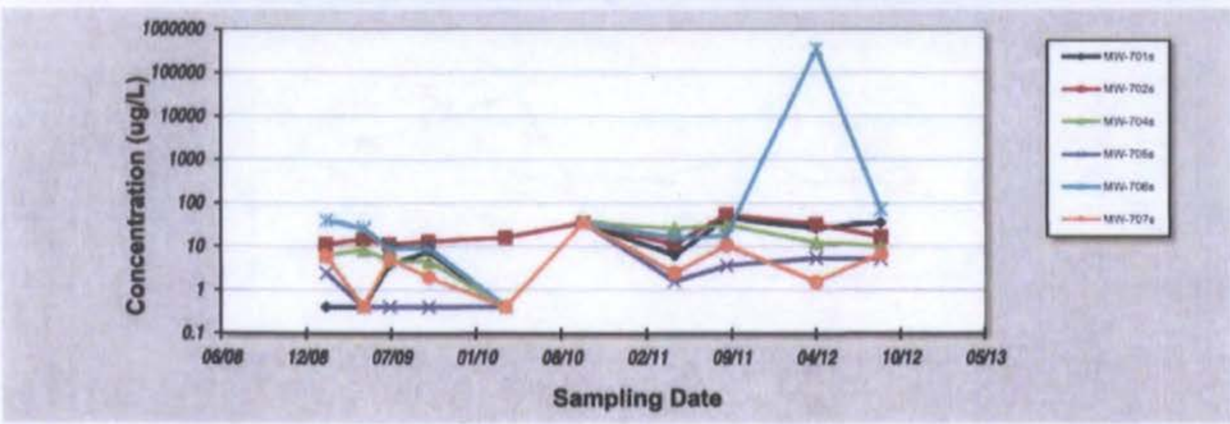
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: ACL Monitoring Wells
Constituent: Selenium
Concentration Units: ug/L

Sampling Point ID:		MW-701s	MW-702s	MW-704s	MW-705s	MW-706s	MW-707s	
Sampling Event	Sampling Date	SELENIUM CONCENTRATION (ug/L)						
1	Feb-09	0.4	11	6.1	2.4	39	5.8	
2	May-09	0.4	14.5	8	0.4	25.3	0.4	
3	Jul-09	3.7	11.1	4.5	0.4	8.8	4.9	
4	Oct-09	7.5	12.9	4.4	0.4	8.9	1.9	
5	Apr-10	0.4	15.8	0.4	0.4	0.4	0.4	
6	Oct-10	35	35	35	35	35	35	
7	May-11	6.18	11.1	25.2	1.56	15.3	2.42	
8	Sep-11	44	53	31	3.6	17.2	10.3	
9	Apr-12	26	32	12	5.3	355000	1.5	
10	Sep-12	35.3	16.3	9.8	5	69.4	6.4	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.08	0.66	0.90	1.94	3.16	1.50	
Mann-Kendall Statistic (S):		28	22	9	19	11	6	
Confidence Factor:		99.4%	97.1%	75.8%	94.6%	81.0%	66.8%	
Concentration Trend:		Increasing	Increasing	No Trend	Prob. Increasing	No Trend	No Trend	



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

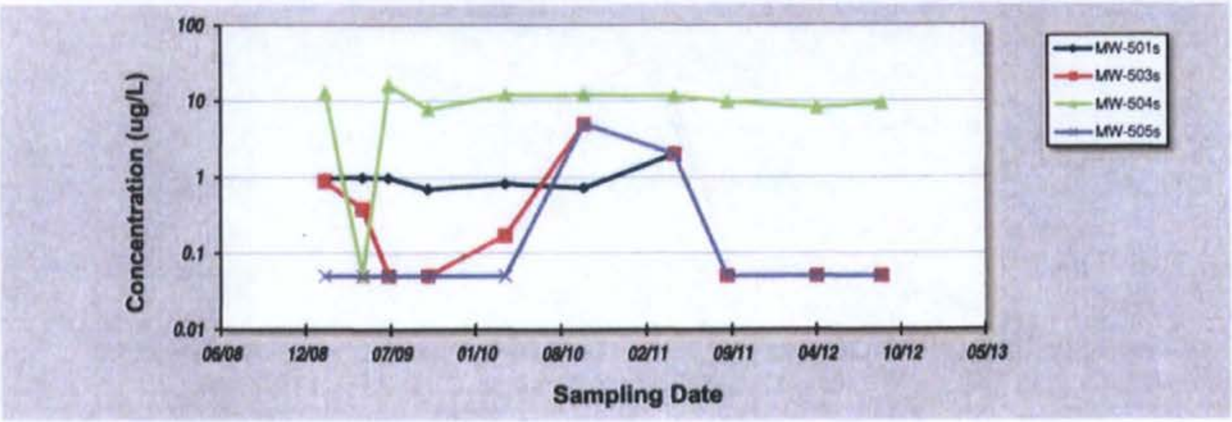
GSI MANN-KENDALL TOOLKIT

for Constituent Trend Analysis

Evaluation Date: 18-Mar-13
Facility Name: Midvale Slag
Conducted By: T. Howes

Job ID: Upgradient Monitoring Wells
Constituent: PCE
Concentration Units: ug/L

Sampling Event	Sampling Date	MW-501s	MW-503s	MW-504s	MW-505s			
		PCE CONCENTRATION (ug/L)						
1	Feb-09	0.96	0.88	13	0.05			
2	May-09	0.99	0.38	0.05	0.05			
3	Jul-09	0.97	0.05	16	0.05			
4	Oct-09	0.69	0.05	7.7	0.05			
5	Apr-10	0.82	0.17	12	0.05			
6	Oct-10	0.72	5	12	5			
7	May-11	2	2	11.6	2			
8	Sep-11	0.05	0.05	9.63	0.05			
9	Apr-12	0.05	0.05	8.16	0.05			
10	Sep-12	0.05	0.05	9.3	0.05			
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.82	1.82	0.43	2.19			
Mann-Kendall Statistic (S):		-22	-11	-12	3			
Confidence Factor:		97.1%	81.0%	83.2%	56.9%			
Concentration Trend:		Decreasing	No Trend	Stable	No Trend			



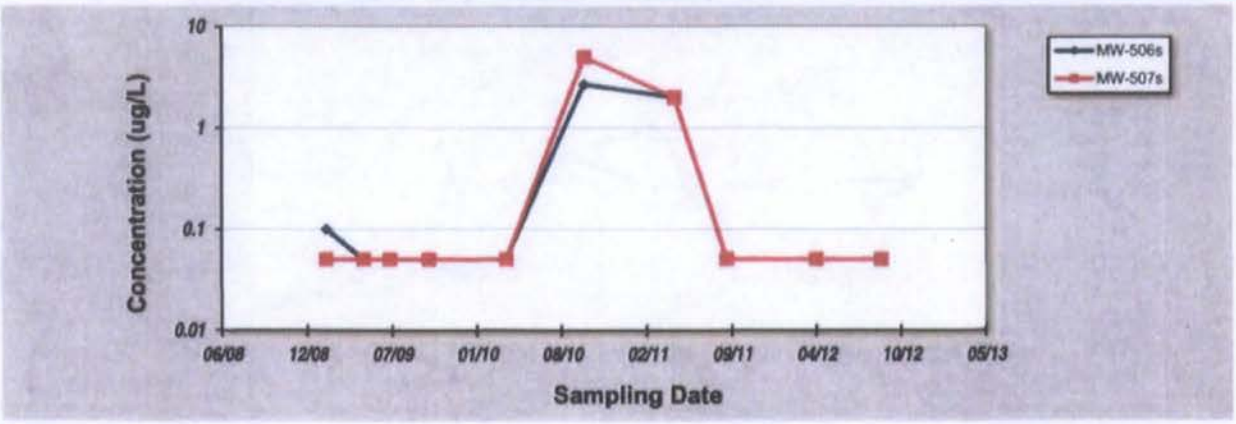
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 18-Mar-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Downgradient Monitoring Wells
Constituent: PCE
Concentration Units: ug/L

Sampling Point ID:		MW-506s	MW-507s					
Sampling Event	Sampling Date	PCE CONCENTRATION (ug/L)						
1	Feb-09	0.1	0.05					
2	May-09	0.05	0.05					
3	Jul-09	0.05	0.05					
4	Oct-09	0.05	0.05					
5	Apr-10	0.05	0.05					
6	Oct-10	2.7	5					
7	May-11	2	2					
8	Sep-11	0.05	0.05					
9	Apr-12	0.05	0.05					
10	Sep-12	0.05	0.05					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.91	2.19					
Mann-Kendall Statistic (S):		-4	3					
Confidence Factor:		60.3%	56.9%					
Concentration Trend:		No Trend	No Trend					



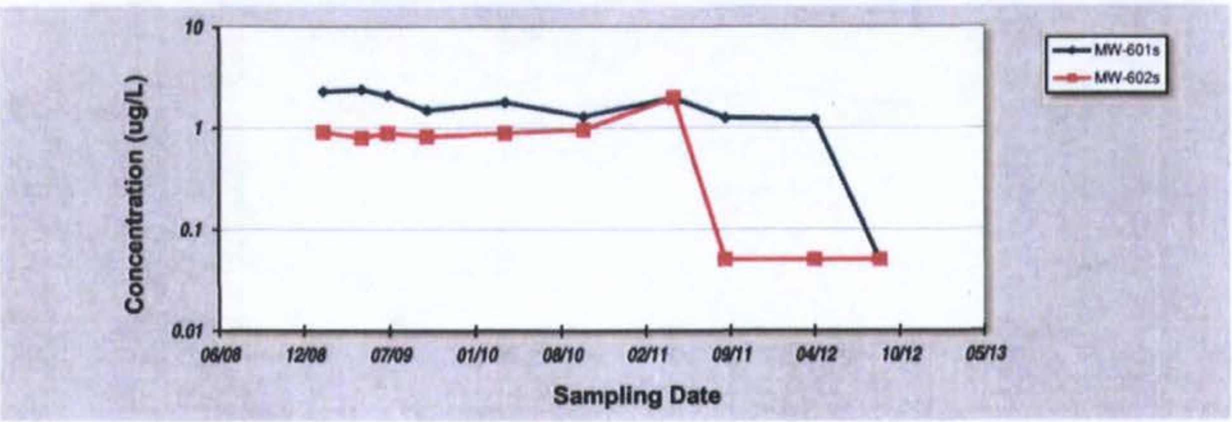
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 18-Mar-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Plume Core Monitoring Wells
Constituent: PCE
Concentration Units: ug/L

Sampling Event	Sampling Date	MW-601s	MW-602s					
		PCE CONCENTRATION (ug/L)						
1	Feb-09	2.3	0.91					
2	May-09	2.4	0.8					
3	Jul-09	2.1	0.89					
4	Oct-09	1.5	0.82					
5	Apr-10	1.8	0.89					
6	Oct-10	1.3	0.96					
7	May-11	2	2					
8	Sep-11	1.26	0.05					
9	Apr-12	1.22	0.05					
10	Sep-12	0.05	0.05					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.44	0.80					
Mann-Kendall Statistic (S):		-35	-11					
Confidence Factor:		100.0%	81.0%					
Concentration Trend:		Decreasing	Stable					



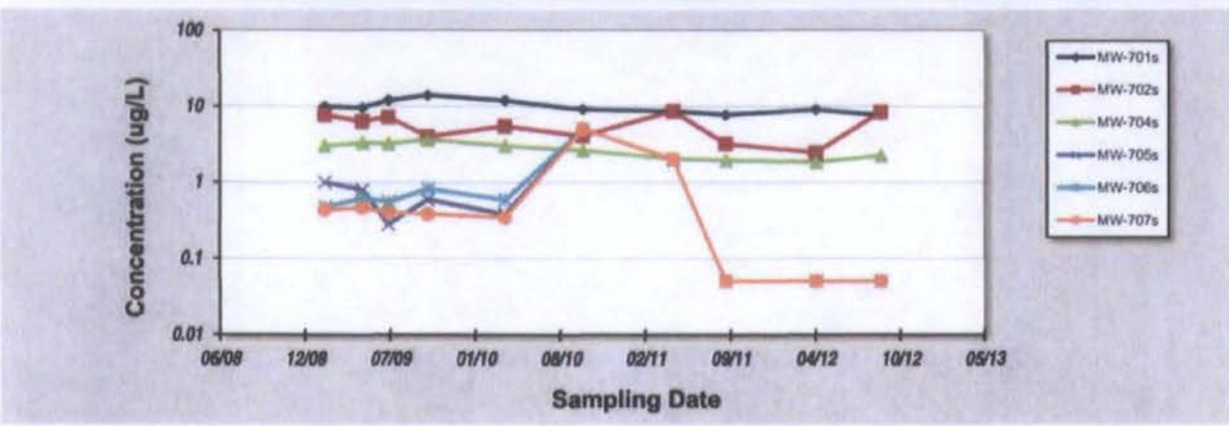
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	18-Mar-13	Job ID:	ACL Monitoring Wells
Facility Name:	Midvale Slag	Constituent:	PCE
Conducted By:	T. Howes	Concentration Units:	ug/L

	Sampling Point ID:	MW-701s	MW-702s	MW-704s	MW-705s	MW-706s	MW-707s	
Sampling Event	Sampling Date	PCE CONCENTRATION (ug/L)						
1	Feb-09	10	7.7	3	1	0.47	0.43	
2	May-09	9.6	6.3	3.3	0.79	0.61	0.46	
3	Jul-09	12	7.2	3.2	0.28	0.55	0.4	
4	Oct-09	14	4	3.6	0.59	0.82	0.38	
5	Apr-10	12	5.5	3	0.38	0.58	0.34	
6	Oct-10	9.1	4.1	2.6	5	5	5	
7	May-11	8.66	8.66	2	2	2	2	
8	Sep-11	7.71	3.2	1.92	0.05	0.05	0.05	
9	Apr-12	9.01	2.46	1.81	0.05	0.05	0.05	
10	Sep-12	7.6	8.4	2.2	0.05	0.05	0.05	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.21	0.39	0.24	1.49	1.48	1.68	
Mann-Kendall Statistic (S):		-26	-11	-28	-18	-8	-20	
Confidence Factor:		98.9%	81.0%	99.4%	93.4%	72.9%	95.5%	
Concentration Trend:		Decreasing	Stable	Decreasing	Prob. Decreasing	No Trend	Decreasing	



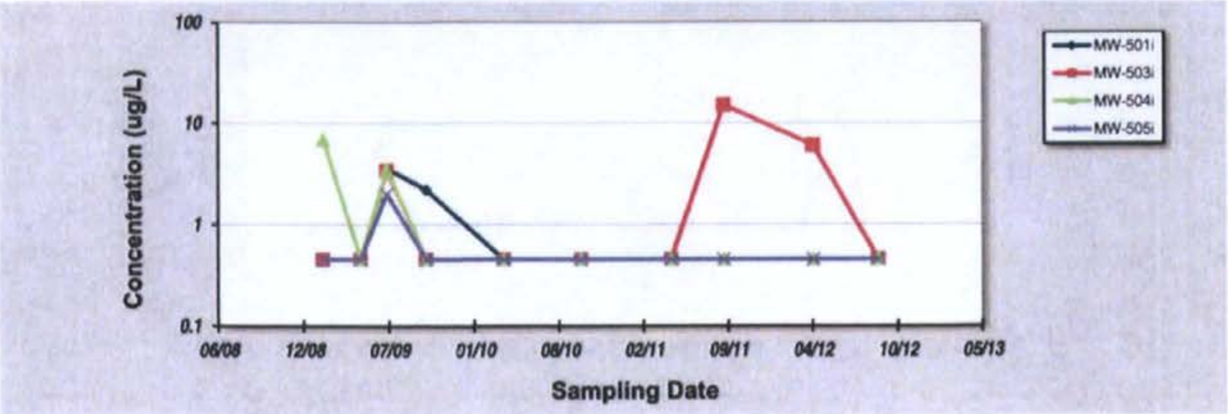
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Upgradient Monitoring Wells
Constituent: Antimony
Concentration Units: ug/L

Sampling Event	Sampling Date	MW-501i	MW-503i	MW-504i	MW-505i			
		ANTIMONY CONCENTRATION (ug/L)						
1	Feb-09	0.45	0.45	6.9	0.45			
2	May-09	0.45	0.45	0.45	0.45			
3	Jul-09	3.6	3.4	3.5	2			
4	Oct-09	2.2	0.45	0.45	0.45			
5	Apr-10	0.45	0.45	0.45	0.45			
6	Oct-10	0.45	0.45	0.45	0.45			
7	May-11	0.45	0.45	0.45	0.45			
8	Sep-11	0.45	15	0.45	0.45			
9	Apr-12	0.45	6	0.45	0.45			
10	Sep-12	0.45	0.45	0.45	0.45			
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.15	1.70	1.54	0.81			
Mann-Kendall Statistic (S):		-9	8	-15	-5			
Confidence Factor:		75.8%	72.9%	89.2%	63.6%			
Concentration Trend:		No Trend	No Trend	No Trend	Stable			



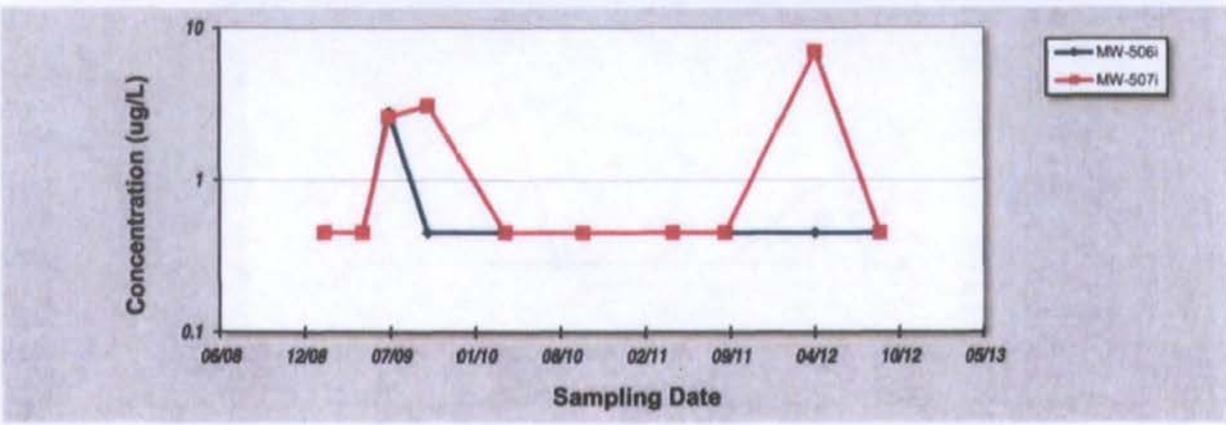
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	**Job ID:**	Downgradient Monitoring Wells
Facility Name:	Midvale Slag	**Constituent:**	Antimony
Conducted By:	T. Howes	**Concentration Units:**	ug/L

Sampling Event	Sampling Date	MW-506i	MW-507i					
		ANTIMONY CONCENTRATION (ug/L)						
1	Feb-09	0.45	0.45					
2	May-09	0.45	0.45					
3	Jul-09	2.8	2.6					
4	Oct-09	0.45	3.1					
5	Apr-10	0.45	0.45					
6	Oct-10	0.45	0.45					
7	May-11	0.45	0.45					
8	Sep-11	0.45	0.45					
9	Apr-12	0.45	7					
10	Sep-12	0.45	0.45					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.08	1.36					
Mann-Kendall Statistic (S):		-5	2					
Confidence Factor:		63.6%	53.5%					
Concentration Trend:		No Trend	No Trend					



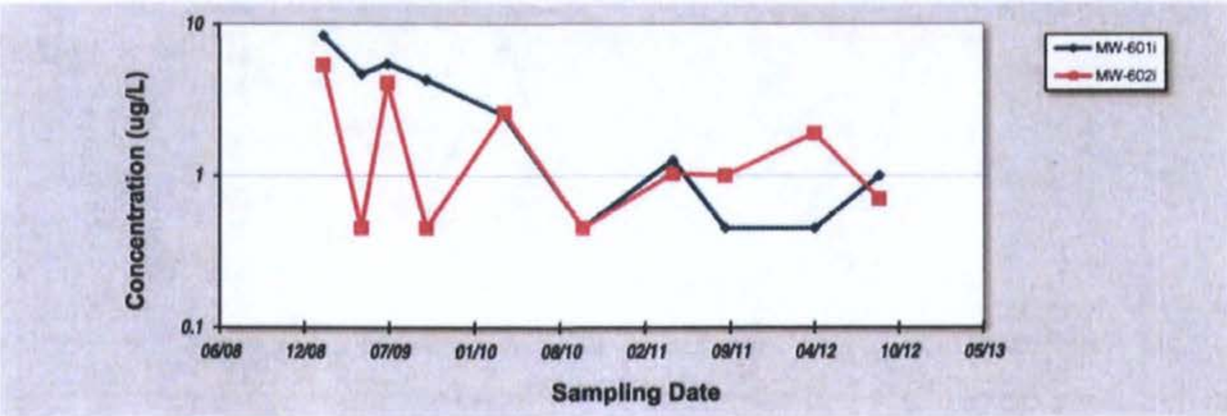
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	**Job ID:**	Plume Core Monitoring Wells
Facility Name:	Midvale Slag	**Constituent:**	Antimony
Conducted By:	T. Howes	**Concentration Units:**	ug/L

	Sampling Point ID:	MW-601i	MW-602i					
Sampling Event	Sampling Date	ANTIMONY CONCENTRATION (ug/L)						
1	Feb-09	8.4	5.4					
2	May-09	4.7	0.45					
3	Jul-09	5.5	4.1					
4	Oct-09	4.3	0.45					
5	Apr-10	2.5	2.6					
6	Oct-10	0.45	0.45					
7	May-11	1.26	1.03					
8	Sep-11	0.45	1					
9	Apr-12	0.45	1.9					
10	Sep-12	1	0.7					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
	Coefficient of Variation:	0.94	0.95					
	Mann-Kendall Statistic (S):	-32	-8					
	Confidence Factor:	99.9%	72.9%					
	Concentration Trend:	Decreasing	Stable					



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
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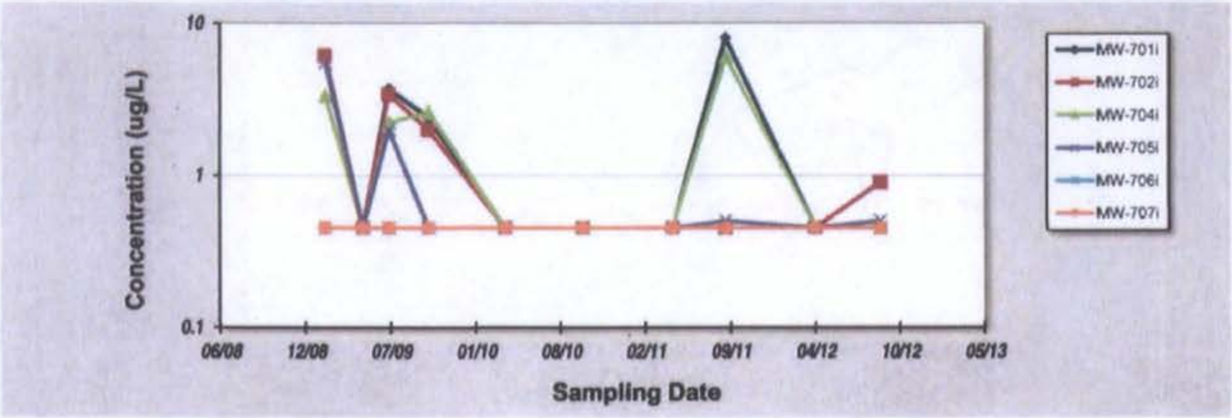
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: ACL Monitoring Wells
Constituent: Antimony
Concentration Units: ug/L

Sampling Point ID:		MW-701i	MW-702i	MW-704i	MW-705i	MW-706i	MW-707i	
Sampling Event	Sampling Date	ANTIMONY CONCENTRATION (ug/L)						
1	Feb-09	6.3	6.1	3.3	5.5	0.45	0.45	
2	May-09	0.45	0.45	0.45	0.45	0.45	0.45	
3	Jul-09	3.7	3.4	2.2	2	0.45	0.45	
4	Oct-09	2.4	2	2.6	0.45	0.45	0.45	
5	Apr-10	0.45	0.45	0.45	0.45	0.45	0.45	
6	Oct-10	0.45	0.45	0.45	0.45	0.45	0.45	
7	May-11	0.45	0.45	0.45	0.45	0.45	0.45	
8	Sep-11	8	0.45	6	0.5	0.45	0.45	
9	Apr-12	0.45	0.45	0.45	0.45	0.45	0.45	
10	Sep-12	0.45	0.9	0.45	0.5	0.45	0.45	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.22	1.25	1.11	1.44	0.00	0.00	
Mann-Kendall Statistic (S):		-12	-14	-10	-5	0	0	
Confidence Factor:		83.2%	87.3%	78.4%	63.6%	45.6%	45.6%	
Concentration Trend:		No Trend	No Trend	No Trend	No Trend	Stable	Stable	



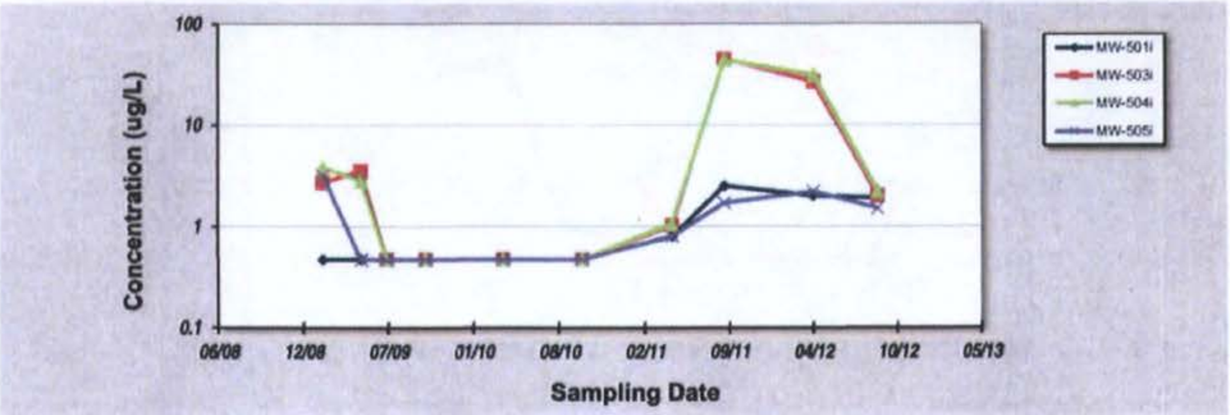
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Upgradient Monitoring Wells
Constituent: Arsenic
Concentration Units: ug/L

Sampling Point ID:		MW-501i	MW-503i	MW-504i	MW-505i			
Sampling Event	Sampling Date	ARSENIC CONCENTRATION (ug/L)						
1	Feb-09	0.47	2.7	3.8	3.2			
2	May-09	0.47	3.5	2.8	0.47			
3	Jul-09	0.47	0.47	0.47	0.47			
4	Oct-09	0.47	0.47	0.47	0.47			
5	Apr-10	0.47	0.47	0.47	0.47			
6	Oct-10	0.47	0.47	0.47	0.47			
7	May-11	0.794	1.02	1.06	0.799			
8	Sep-11	2.5	45	44	1.7			
9	Apr-12	2	27	31	2.2			
10	Sep-12	1.9	2	2.2	1.5			
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.80	1.83	1.79	0.81			
Mann-Kendall Statistic (S):		24	9	7	13			
Confidence Factor:		98.2%	75.8%	70.0%	85.4%			
Concentration Trend:		Increasing	No Trend	No Trend	No Trend			



Notes:
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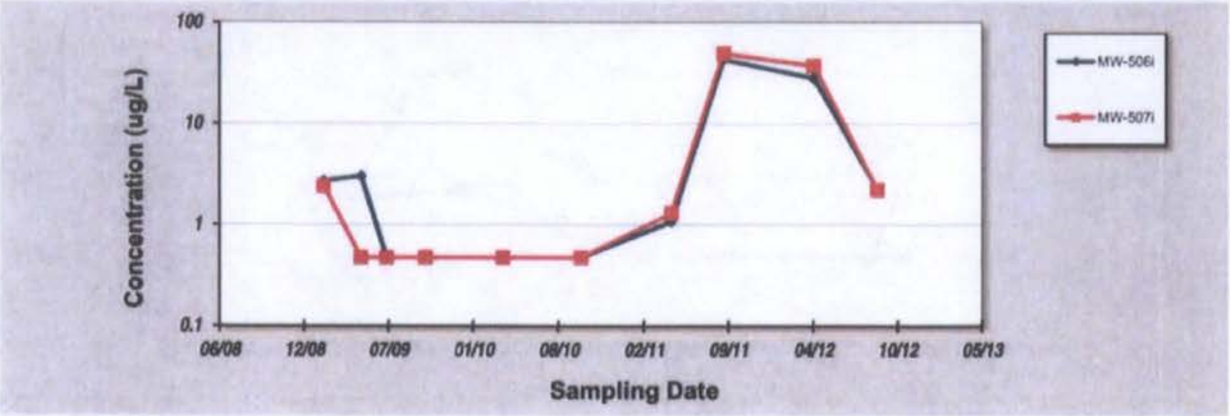
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	**Job ID:**	Downgradient Monitoring Wells
Facility Name:	Midvale Slag	**Constituent:**	Arsenic
Conducted By:	T. Howes	**Concentration Units:**	ug/L

Sampling Event	Sampling Date	MW-506i	MW-507i					
		ARSENIC CONCENTRATION (ug/L)						
1	Feb-09	2.7	2.4					
2	May-09	3	0.47					
3	Jul-09	0.47	0.47					
4	Oct-09	0.47	0.47					
5	Apr-10	0.47	0.47					
6	Oct-10	0.47	0.47					
7	May-11	1.07	1.29					
8	Sep-11	43	49					
9	Apr-12	28	37					
10	Sep-12	2.2	2.2					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.81	1.90					
Mann-Kendall Statistic (S):		9	15					
Confidence Factor:		75.8%	89.2%					
Concentration Trend:		No Trend	No Trend					



Notes:

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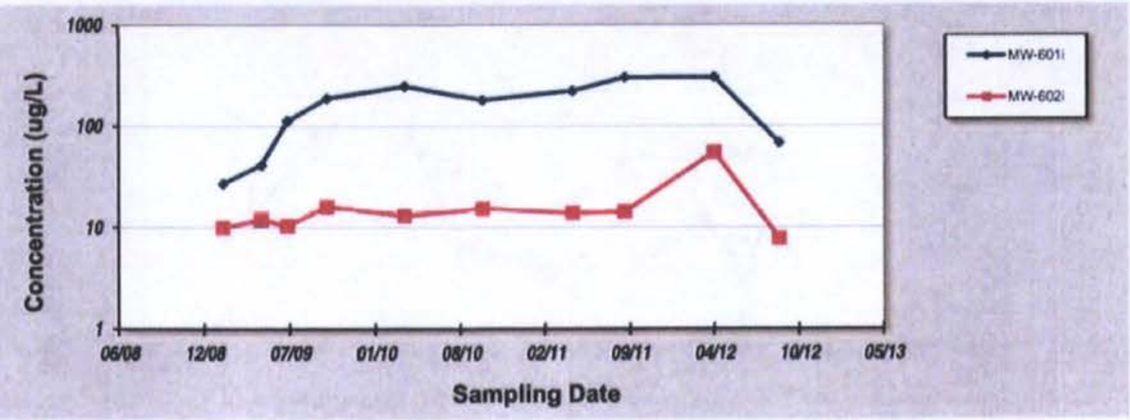
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Plume Core Monitoring Wells
Constituent: Arsenic
Concentration Units: ug/L

Sampling Event	Sampling Date	MW-601i	MW-602i					
		ARSENIC CONCENTRATION (ug/L)						
1	Feb-09	27	9.9					
2	May-09	41.1	11.8					
3	Jul-09	113	10.3					
4	Oct-09	188	15.9					
5	Apr-10	248	13					
6	Oct-10	180	15.2					
7	May-11	223	13.7					
8	Sep-11	301	14.1					
9	Apr-12	303	54.4					
10	Sep-12	67.7	7.7					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.61	0.81					
Mann-Kendall Statistic (S):		25	13					
Confidence Factor:		98.6%	85.4%					
Concentration Trend:		Increasing	No Trend					



Notes:

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DISCLAIMER: *The GSI Mann-Kendall Toolkit is available "as is". Considerable care has been exercised in preparing this software product; however, no party, including without limitation GSI Environmental Inc., makes any representation or warranty regarding the accuracy, correctness, or completeness of the information contained herein, and no such party shall be liable for any direct, indirect, consequential, incidental or other damages resulting from the use of this product or the information contained herein. Information in this publication is subject to change without notice. GSI Environmental Inc., disclaims any responsibility or obligation to update the information contained herein.*

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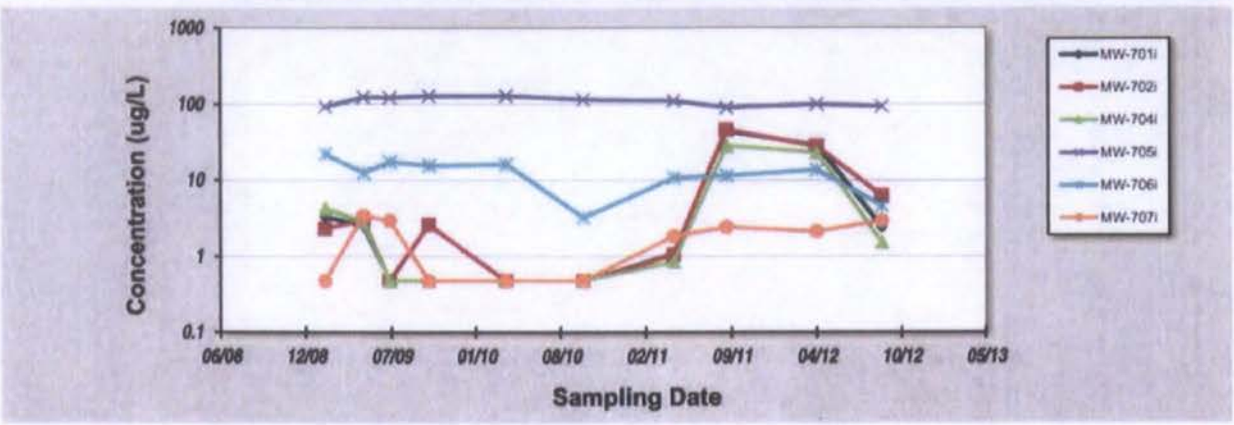
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes

Job ID: ACL Monitoring Wells
Constituent: Arsenic
Concentration Units: ug/L

Sampling Point ID:		MW-701i	MW-702i	MW-704i	MW-705i	MW-706i	MW-707i	
Sampling Event	Sampling Date	ARSENIC CONCENTRATION (ug/L)						
1	Feb-09	3.3	2.3	4.2	93.3	21.8	0.47	
2	May-09	2.5	3	2.8	124	12.4	3.4	
3	Jul-09	0.47	0.47	0.47	122	17.2	2.9	
4	Oct-09	0.47	2.6	0.47	129	15.4	0.47	
5	Apr-10	0.47	0.47	0.47	129	16	0.47	
6	Oct-10	0.47	0.47	0.47	116	3.2	0.47	
7	May-11	1.07	1.05	0.833	111	10.6	1.83	
8	Sep-11	44	46	28	90.8	11.4	2.4	
9	Apr-12	29	28	23	100	13.5	2.1	
10	Sep-12	2.4	6.2	1.5	94	4.6	2.9	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.81	1.70	1.66	0.14	0.45	0.68	
Mann-Kendall Statistic (S):		7	12	7	-16	-21	8	
Confidence Factor:		70.0%	83.2%	70.0%	90.7%	96.4%	72.9%	
Concentration Trend:		No Trend	No Trend	No Trend	Prob. Decreasing	Decreasing	No Trend	



Notes:

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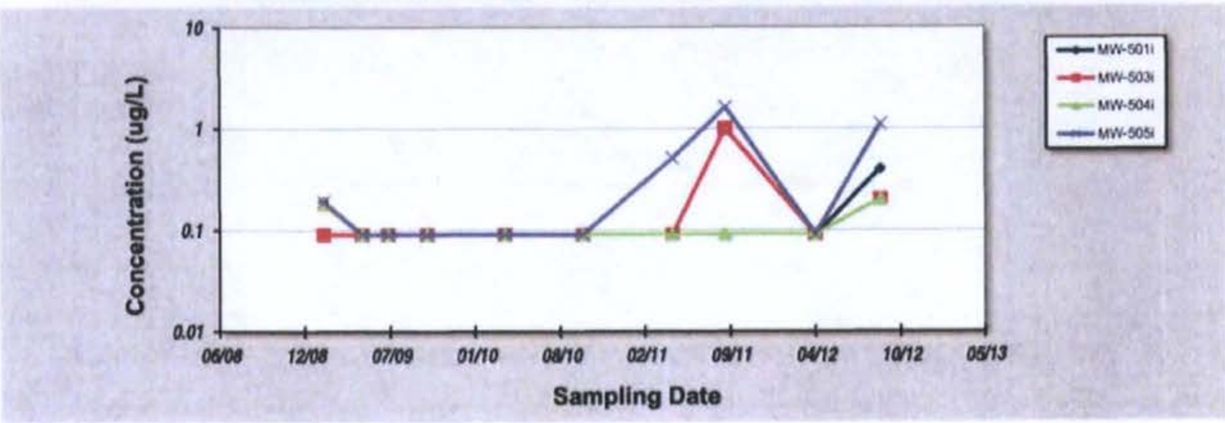
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	Job ID:	Upgradient Monitoring Wells
Facility Name:	Midvale Slag	Constituent:	Cadmium
Conducted By:	T. Howes	Concentration Units:	ug/L

Sampling Event	Sampling Date	MW-501i	MW-503i	MW-504i	MW-505i			
		CADMIUM CONCENTRATION (ug/L)						
1	Feb-09	0.19	0.09	0.18	0.19			
2	May-09	0.09	0.09	0.09	0.09			
3	Jul-09	0.09	0.09	0.09	0.09			
4	Oct-09	0.09	0.09	0.09	0.09			
5	Apr-10	0.09	0.09	0.09	0.09			
6	Oct-10	0.09	0.09	0.09	0.09			
7	May-11	0.09	0.09	0.09	0.512			
8	Sep-11	0.09	1	0.09	1.6			
9	Apr-12	0.09	0.09	0.09	0.09			
10	Sep-12	0.4	0.2	0.2	1.1			
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.76	1.49	0.39	1.35			
Mann-Kendall Statistic (S):		1	13	1	12			
Confidence Factor:		50.0%	85.4%	50.0%	83.2%			
Concentration Trend:		No Trend	No Trend	No Trend	No Trend			



Notes:

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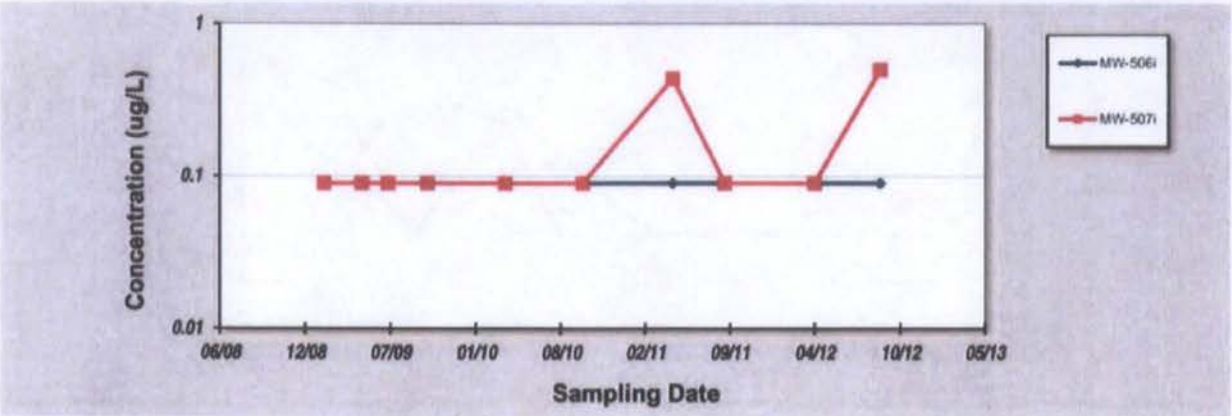
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	**Job ID:**	Downgradient Monitoring Wells
Facility Name:	Midvale Slag	**Constituent:**	Cadmium
Conducted By:	T. Howes	**Concentration Units:**	ug/L

Sampling Point ID:		MW-506I	MW-507I					
Sampling Event	Sampling Date	CADMIUM CONCENTRATION (ug/L)						
1	Feb-09	0.09	0.09					
2	May-09	0.09	0.09					
3	Jul-09	0.09	0.09					
4	Oct-09	0.09	0.09					
5	Apr-10	0.09	0.09					
6	Oct-10	0.09	0.09					
7	May-11	0.09	0.438					
8	Sep-11	0.09	0.09					
9	Apr-12	0.09	0.09					
10	Sep-12	0.09	0.5					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.00	0.97					
Mann-Kendall Statistic (S):		0	13					
Confidence Factor:		45.6%	85.4%					
Concentration Trend:		Stable	No Trend					



Notes:

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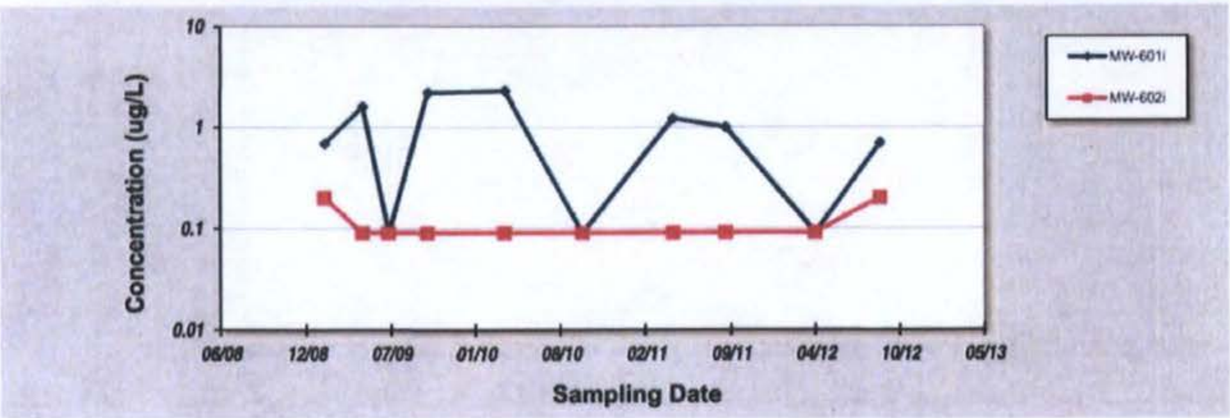
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	**Job ID:**	Plume Core Monitoring Wells
Facility Name:	Midvale Slag	**Constituent:**	Cadmium
Conducted By:	T. Howes	**Concentration Units:**	ug/L

	Sampling Point ID:	MW-601i	MW-602i					
Sampling Event	Sampling Date	CADMIUM CONCENTRATION (ug/L)						
1	Feb-09	0.69	0.2					
2	May-09	1.6	0.09					
3	Jul-09	0.09	0.09					
4	Oct-09	2.2	0.09					
5	Apr-10	2.3	0.09					
6	Oct-10	0.09	0.09					
7	May-11	1.22	0.09					
8	Sep-11	1	0.09					
9	Apr-12	0.09	0.09					
10	Sep-12	0.7	0.2					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.83	0.41					
Mann-Kendall Statistic (S):		-6	0					
Confidence Factor:		66.8%	45.6%					
Concentration Trend:		Stable	Stable					



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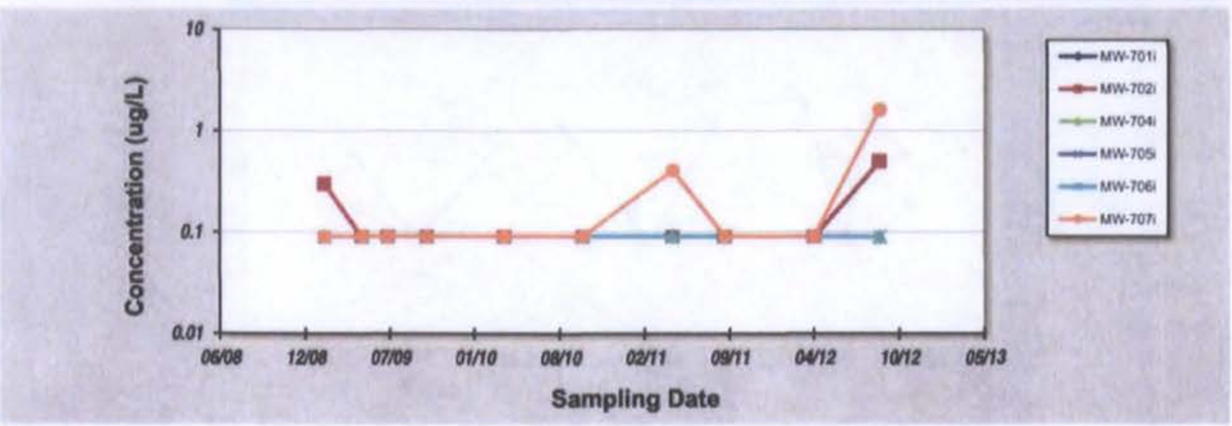
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	**Job ID:**	ACL Monitoring Wells
Facility Name:	Midvale Slag	**Constituent:**	Cadmium
Conducted By:	T. Howes	**Concentration Units:**	ug/L

	Sampling Point ID:	MW-701i	MW-702i	MW-704i	MW-705i	MW-706i	MW-707i	
Sampling Event	Sampling Date	CADMIUM CONCENTRATION (ug/L)						
1	Feb-09	0.09	0.3	0.09	0.09	0.09	0.09	
2	May-09	0.09	0.09	0.09	0.09	0.09	0.09	
3	Jul-09	0.09	0.09	0.09	0.09	0.09	0.09	
4	Oct-09	0.09	0.09	0.09	0.09	0.09	0.09	
5	Apr-10	0.09	0.09	0.09	0.09	0.09	0.09	
6	Oct-10	0.09	0.09	0.09	0.09	0.09	0.09	
7	May-11	0.09	0.09	0.09	0.09	0.09	0.404	
8	Sep-11	0.09	0.09	0.09	0.09	0.09	0.09	
9	Apr-12	0.09	0.09	0.09	0.09	0.09	0.09	
10	Sep-12	0.5	0.5	0.09	0.09	0.09	1.6	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
	Coefficient of Variation:	0.99	0.91	0.00	0.00	0.00	1.75	
	Mann-Kendall Statistic (S):	9	1	0	0	0	13	
	Confidence Factor:	75.8%	50.0%	45.6%	45.6%	45.6%	85.4%	
	Concentration Trend:	No Trend	No Trend	Stable	Stable	Stable	No Trend	



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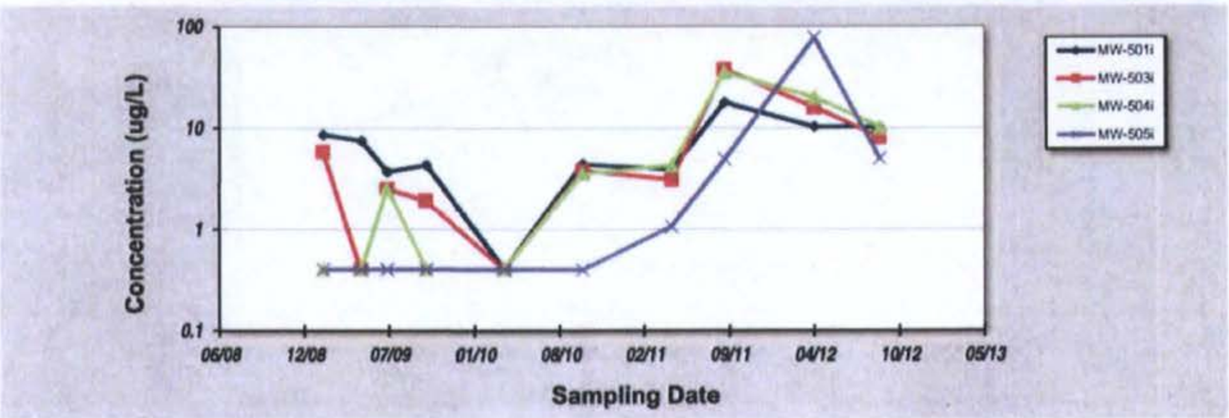
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Upgradient Monitoring Wells
Constituent: Selenium
Concentration Units: ug/L

Sampling Event	Sampling Date	MW-501i	MW-503i	MW-504i	MW-505i			
		SELENIUM CONCENTRATION (ug/L)						
1	Feb-09	8.6	5.8	0.4	0.4			
2	May-09	7.5	0.4	0.4	0.4			
3	Jul-09	3.7	2.5	2.5	0.4			
4	Oct-09	4.3	1.9	0.4	0.4			
5	Apr-10	0.4	0.4	0.4	0.4			
6	Oct-10	4.4	3.8	3.5	0.4			
7	May-11	3.88	3.09	4.27	1.06			
8	Sep-11	17.9	38	35	4.9			
9	Apr-12	10.3	16	20	78			
10	Sep-12	10.2	8.1	10.2	5			
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.70	1.44	1.48	2.66			
Mann-Kendall Statistic (S):		9	18	29	28			
Confidence Factor:		75.8%	93.4%	99.5%	99.4%			
Concentration Trend:		No Trend	Prob. Increasing	Increasing	Increasing			



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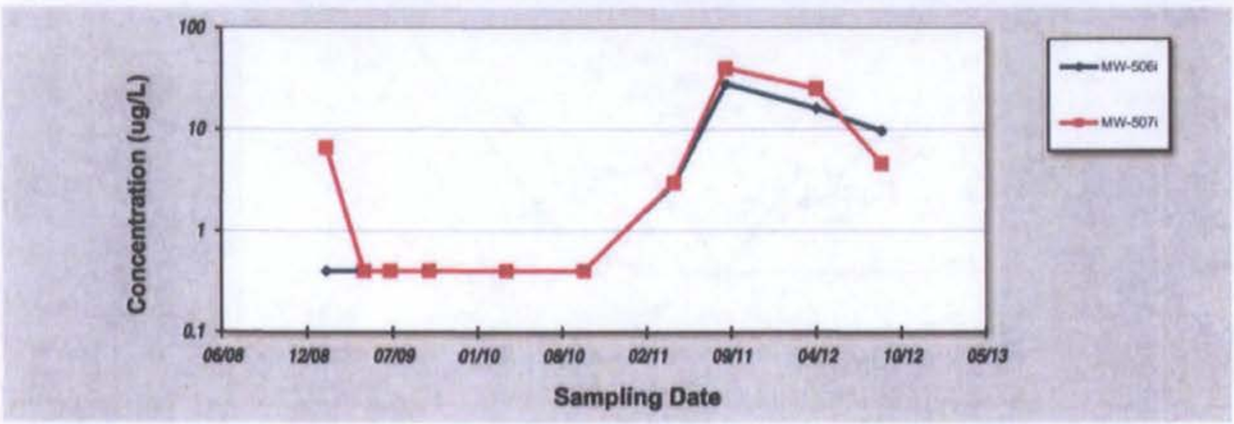
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Downgradient Monitoring Wells
Constituent: Selenium
Concentration Units: ug/L

Sampling Event	Sampling Date	SELENIUM CONCENTRATION (ug/L)						
Sampling Point ID:		MW-506i	MW-507i					
1	Feb-09	0.4	6.6					
2	May-09	0.4	0.4					
3	Jul-09	0.4	0.4					
4	Oct-09	0.4	0.4					
5	Apr-10	0.4	0.4					
6	Oct-10	0.4	0.4					
7	May-11	2.92	2.99					
8	Sep-11	28	40					
9	Apr-12	16	25					
10	Sep-12	9.6	4.6					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.59	1.66					
Mann-Kendall Statistic (S):		24	15					
Confidence Factor:		98.2%	89.2%					
Concentration Trend:		Increasing	No Trend					



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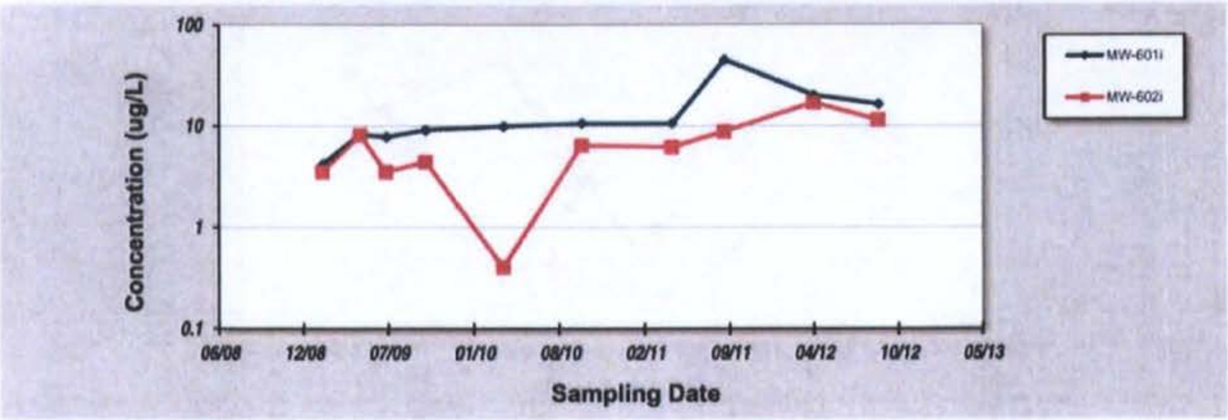
GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	Job ID:	Plume Core Monitoring Wells
Facility Name:	Midvale Slag	Constituent:	Selenium
Conducted By:	T. Howes	Concentration Units:	ug/L

Sampling Event	Sampling Date	MW-601i	MW-602i					
	Sampling Point ID:	SELENIUM CONCENTRATION (ug/L)						
1	Feb-09	4.2	3.5					
2	May-09	8.2	8.1					
3	Jul-09	7.8	3.5					
4	Oct-09	9.1	4.4					
5	Apr-10	9.9	0.4					
6	Oct-10	10.6	6.4					
7	May-11	10.6	6.15					
8	Sep-11	45	8.8					
9	Apr-12	20	16.9					
10	Sep-12	16.3	11.4					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
	Coefficient of Variation:	0.83	0.67					
	Mann-Kendall Statistic (S):	36	24					
	Confidence Factor:	>99.9%	98.2%					
	Concentration Trend:	Increasing	Increasing					



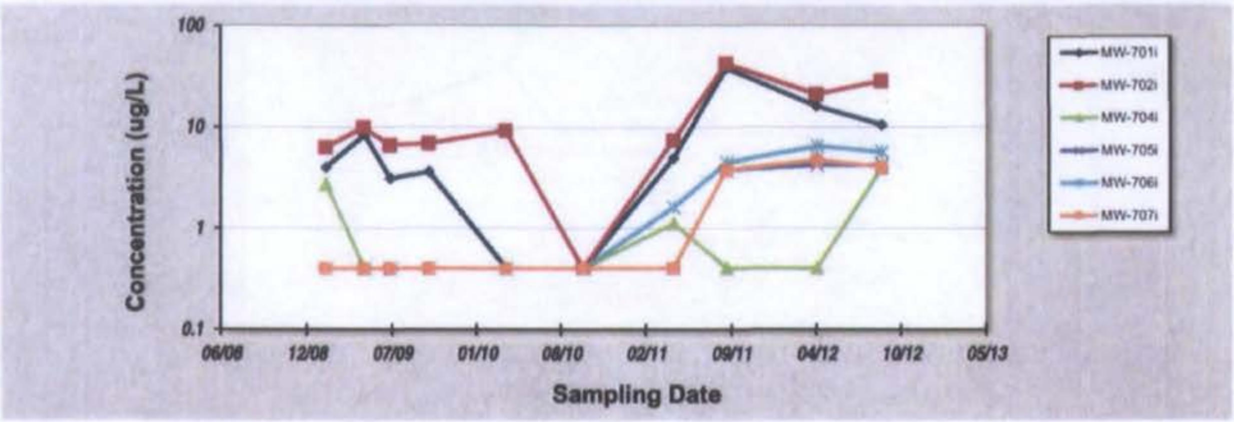
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	**Job ID:**	ACL Monitoring Wells
Facility Name:	Midvale Slag	**Constituent:**	Selenium
Conducted By:	T. Howes	**Concentration Units:**	ug/L

Sampling Event	Sampling Date	MW-701i	MW-702i	MW-704i	MW-705i	MW-706i	MW-707i	
		SELENIUM CONCENTRATION (ug/L)						
1	Feb-09	4	6.3	2.7	0.4	0.4	0.4	
2	May-09	8.4	9.9	0.4	0.4	0.4	0.4	
3	Jul-09	3.1	6.6	0.4	0.4	0.4	0.4	
4	Oct-09	3.6	6.9	0.4	0.4	0.4	0.4	
5	Apr-10	0.4	9.2	0.4	0.4	0.4	0.4	
6	Oct-10	0.4	0.4	0.4	0.4	0.4	0.4	
7	May-11	4.94	7.38	1.1	0.4	1.6	0.4	
8	Sep-11	38	42	0.4	3.7	4.4	3.7	
9	Apr-12	16	21	0.4	4.2	6.4	4.7	
10	Sep-12	10.5	28.6	3.9	4.2	5.6	4	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		1.26	0.93	1.18	1.18	1.20	1.20	
Mann-Kendall Statistic (S):		12	21	4	23	28	22	
Confidence Factor:		83.2%	96.4%	60.3%	97.7%	99.4%	97.1%	
Concentration Trend:		No Trend	Increasing	No Trend	Increasing	Increasing	Increasing	



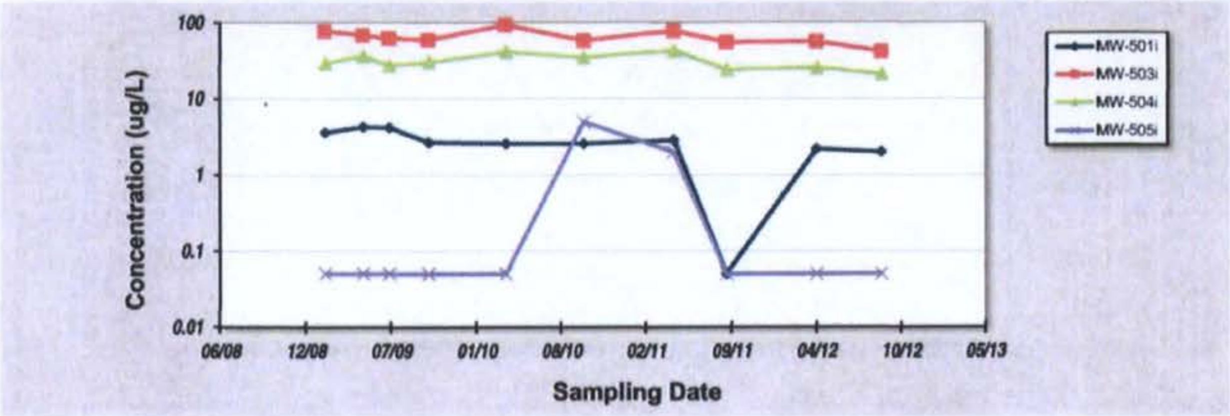
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 18-Mar-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Upgradient Monitoring Wells
Constituent: PCE
Concentration Units: ug/L

Sampling Point ID:		MW-501i	MW-503i	MW-504i	MW-505i			
Sampling Event	Sampling Date	PCE CONCENTRATION (ug/L)						
1	Feb-09	3.6	77	29	0.05			
2	May-09	4.3	68	36	0.05			
3	Jul-09	4.2	62	27	0.05			
4	Oct-09	2.7	59	30	0.05			
5	Apr-10	2.6	93	41	0.05			
6	Oct-10	2.6	58	35	5			
7	May-11	2.9	77.7	42.6	2			
8	Sep-11	0.05	54.7	23.8	0.05			
9	Apr-12	2.2	56	25.3	0.05			
10	Sep-12	2	41.2	20.8	0.05			
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.45	0.23	0.24	2.19			
Mann-Kendall Statistic (S):		-30	-25	-11	3			
Confidence Factor:		99.7%	98.6%	81.0%	56.9%			
Concentration Trend:		Decreasing	Decreasing	Stable	No Trend			



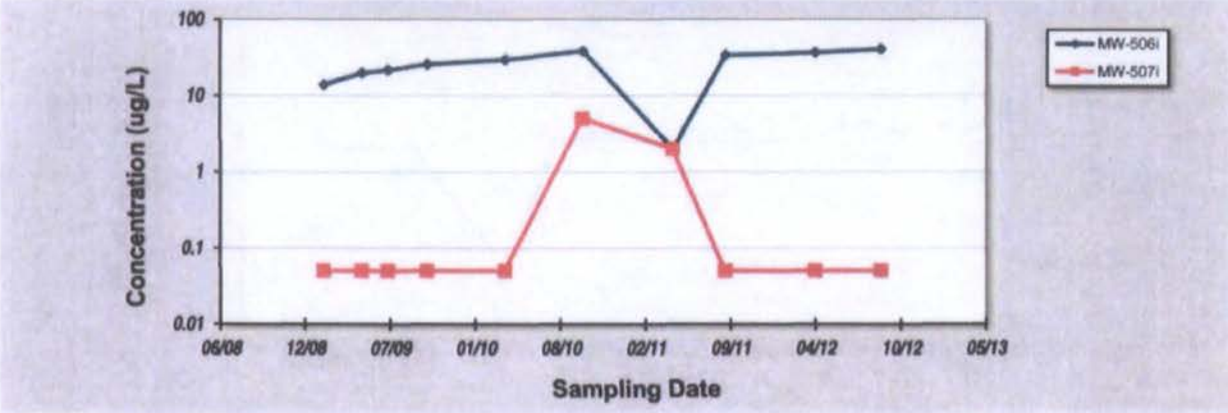
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 18-Mar-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Downgradient Monitoring Wells
Constituent: PCE
Concentration Units: ug/L

Sampling Event	Sampling Date	MW-506i	MW-507i					
		PCE CONCENTRATION (ug/L)						
1	Feb-09	14	0.05					
2	May-09	20	0.05					
3	Jul-09	22	0.05					
4	Oct-09	26	0.05					
5	Apr-10	30	0.05					
6	Oct-10	39	5					
7	May-11	2	2					
8	Sep-11	34.4	0.05					
9	Apr-12	37	0.05					
10	Sep-12	41.2	0.05					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.47	2.19					
Mann-Kendall Statistic (S):		29	3					
Confidence Factor:		99.5%	56.9%					
Concentration Trend:		Increasing	No Trend					



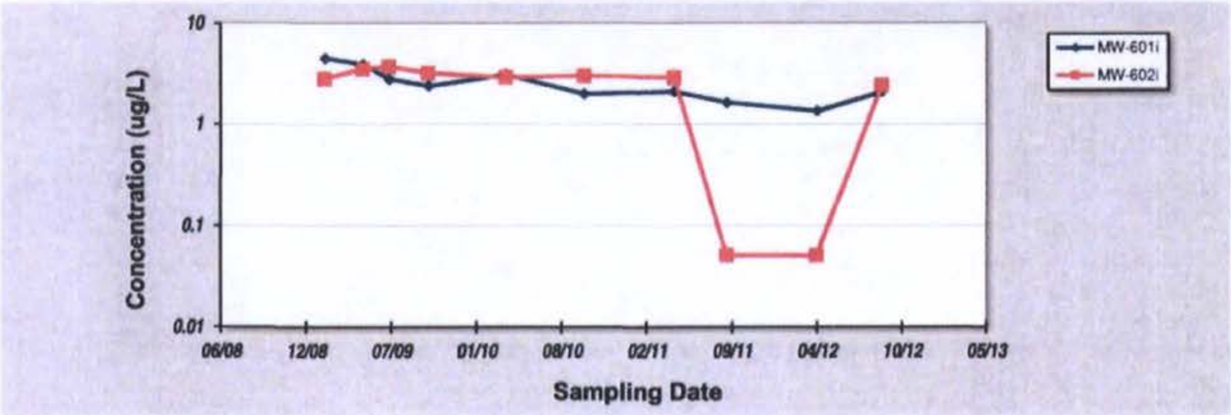
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 18-Mar-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Plume Core Monitoring Wells
Constituent: PCE
Concentration Units: ug/L

Sampling Point ID:		MW-601i	MW-602i					
Sampling Event	Sampling Date	PCE CONCENTRATION (ug/L)						
1	Feb-09	4.5	2.8					
2	May-09	3.9	3.5					
3	Jul-09	2.8	3.7					
4	Oct-09	2.4	3.2					
5	Apr-10	3.1	2.9					
6	Oct-10	2	3					
7	May-11	2.11	2.87					
8	Sep-11	1.64	0.05					
9	Apr-12	1.35	0.05					
10	Sep-12	2.1	2.4					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.39	0.54					
Mann-Kendall Statistic (S):		-33	-24					
Confidence Factor:		99.9%	98.2%					
Concentration Trend:		Decreasing	Decreasing					



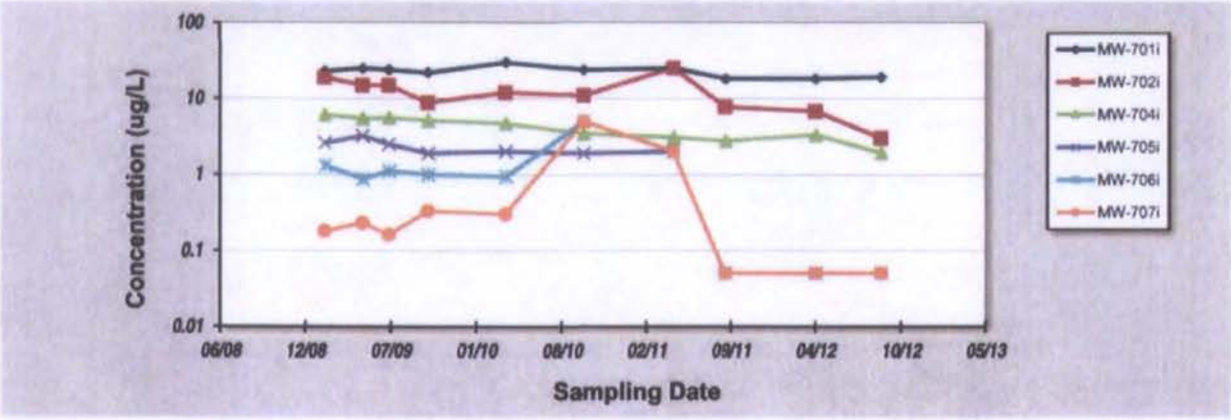
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 18-Mar-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: ACL Monitoring Wells
Constituent: PCE
Concentration Units: ug/L

Sampling Point ID:		MW-701i	MW-702i	MW-704i	MW-705i	MW-706i	MW-707i	
Sampling Event	Sampling Date	PCE CONCENTRATION (ug/L)						
1	Feb-09	23	19	6	2.6	1.3	0.18	
2	May-09	25	15	5.4	3.2	0.86	0.23	
3	Jul-09	24	15	5.5	2.5	1.1	0.16	
4	Oct-09	22	8.8	5.1	1.9	0.99	0.33	
5	Apr-10	30	12	4.6	2	0.93	0.3	
6	Oct-10	24	11	3.4	1.9	5	5	
7	May-11	25.3	25.3	3.06	2	2	2	
8	Sep-11	18.3	7.67	2.74	0.05	0.05	0.05	
9	Apr-12	18.3	6.77	3.27	0.05	0.05	0.05	
10	Sep-12	19.2	3	1.9	0.05	0.05	0.05	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.16	0.53	0.34	0.71	1.19	1.89	
Mann-Kendall Statistic (S):		-13	-28	-39	-32	-16	-8	
Confidence Factor:		85.4%	99.4%	>99.9%	99.9%	90.7%	72.9%	
Concentration Trend:		Stable	Decreasing	Decreasing	Decreasing	Prob. Decreasing	No Trend	



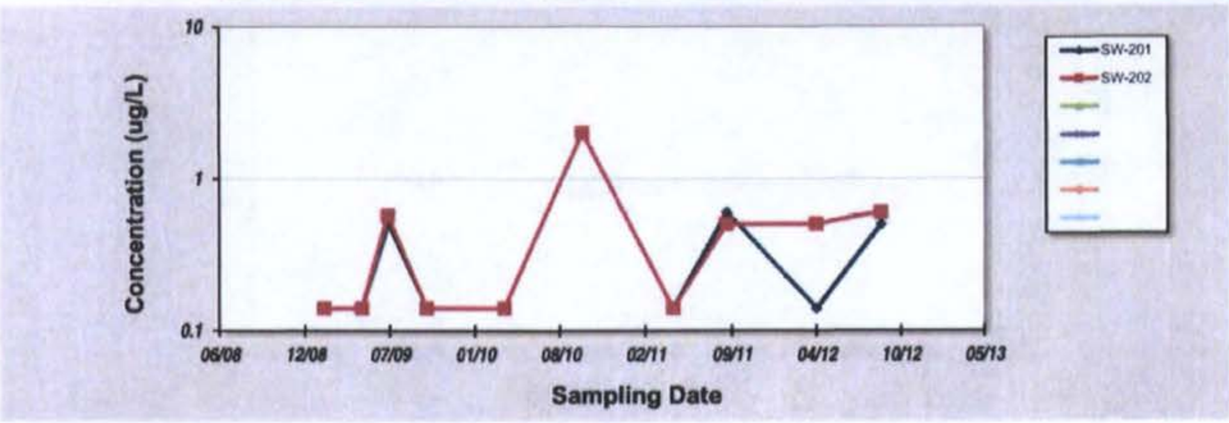
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	**Job ID:**	Surface Water
Facility Name:	Midvale Slag	**Constituent:**	Antimony
Conducted By:	T. Howes	**Concentration Units:**	ug/L

	Sampling Point ID:	SW-201	SW-202					
Sampling Event	Sampling Date	ANTIMONY CONCENTRATION (ug/L)						
1	Feb-09	0.14	0.14					
2	May-09	0.14	0.14					
3	Jul-09	0.51	0.57					
4	Oct-09	0.14	0.14					
5	Apr-10	0.14	0.14					
6	Oct-10	2	2					
7	May-11	0.14	0.14					
8	Sep-11	0.6	0.5					
9	Apr-12	0.14	0.5					
10	Sep-12	0.5	0.6					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
	Coefficient of Variation:	1.30	1.17					
	Mann-Kendall Statistic (S):	8	16					
	Confidence Factor:	72.9%	90.7%					
	Concentration Trend:	No Trend	Prob. Increasing					



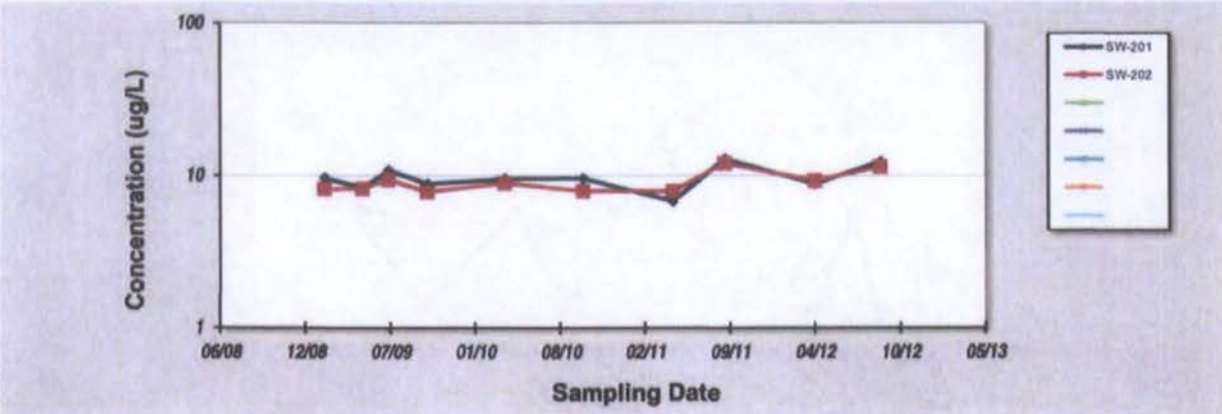
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	5-Feb-13	**Job ID:**	Surface Water
Facility Name:	Midvale Slag	**Constituent:**	Arsenic
Conducted By:	T. Howes	**Concentration Units:**	ug/L

Sampling Point ID:		SW-201	SW-202					
Sampling Event	Sampling Date	ARSENIC CONCENTRATION (ug/L)						
1	Feb-09	9.6	8.1					
2	May-09	8.3	8.2					
3	Jul-09	10.8	9.4					
4	Oct-09	8.8	7.8					
5	Apr-10	9.5	8.9					
6	Oct-10	9.6	7.9					
7	May-11	6.78	7.86					
8	Sep-11	12.8	12					
9	Apr-12	8.8	9.2					
10	Sep-12	12.3	11.4					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.19	0.17					
Mann-Kendall Statistic (S):		7	13					
Confidence Factor:		70.0%	85.4%					
Concentration Trend:		No Trend	No Trend					



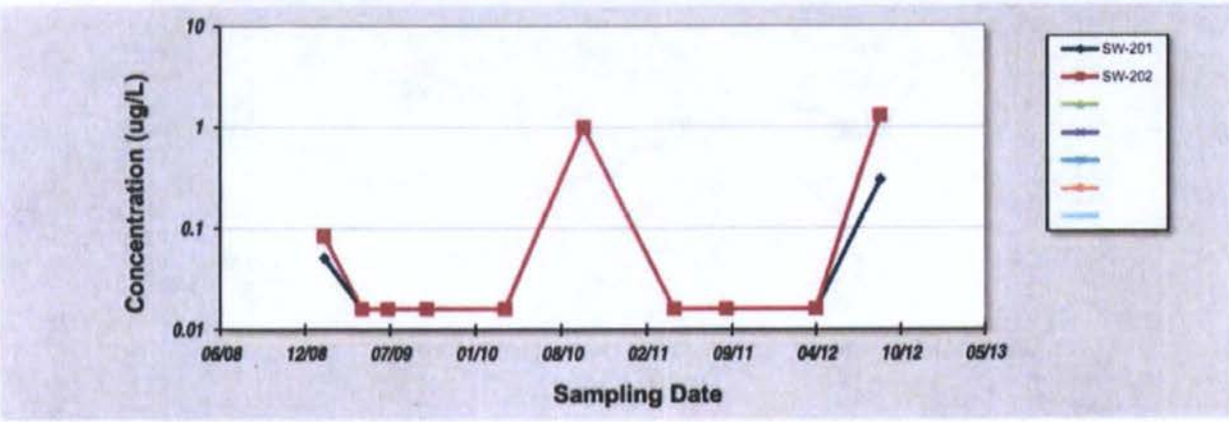
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Surface Water
Constituent: Cadmium
Concentration Units: ug/L

Sampling Point ID:		SW-201	SW-202					
Sampling Event	Sampling Date	CADMIUM CONCENTRATION (ug/L)						
1	Feb-09	0.051	0.083					
2	May-09	0.016	0.016					
3	Jul-09	0.016	0.016					
4	Oct-09	0.016	0.016					
5	Apr-10	0.016	0.016					
6	Oct-10	1	1					
7	May-11	0.016	0.016					
8	Sep-11	0.016	0.016					
9	Apr-12	0.016	0.016					
10	Sep-12	0.3	1.3					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		2.14	1.93					
Mann-Kendall Statistic (S):		2	4					
Confidence Factor:		53.5%	60.3%					
Concentration Trend:		No Trend	No Trend					



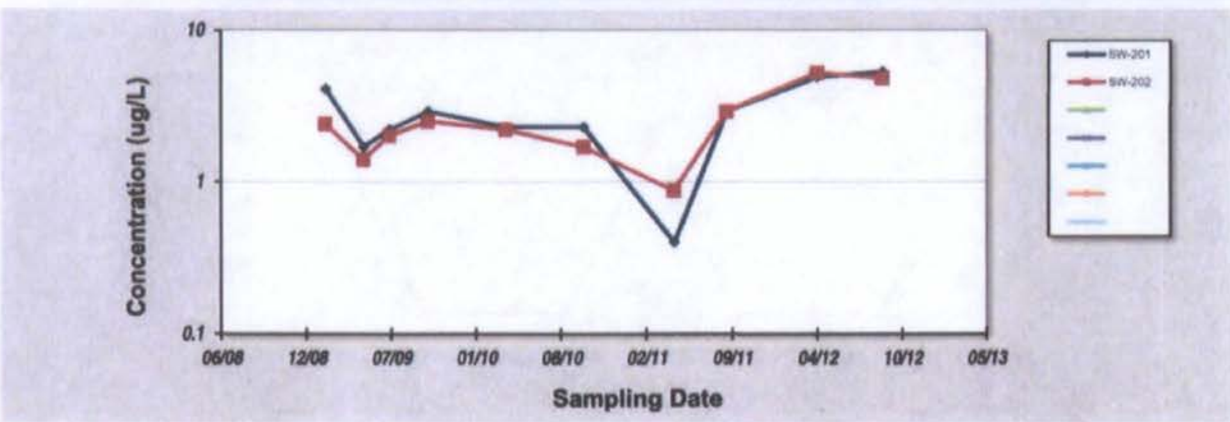
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 5-Feb-13
Facility Name: Midvale Slag
Conducted By: T. Howes
Job ID: Surface Water
Constituent: Selenium
Concentration Units: ug/L

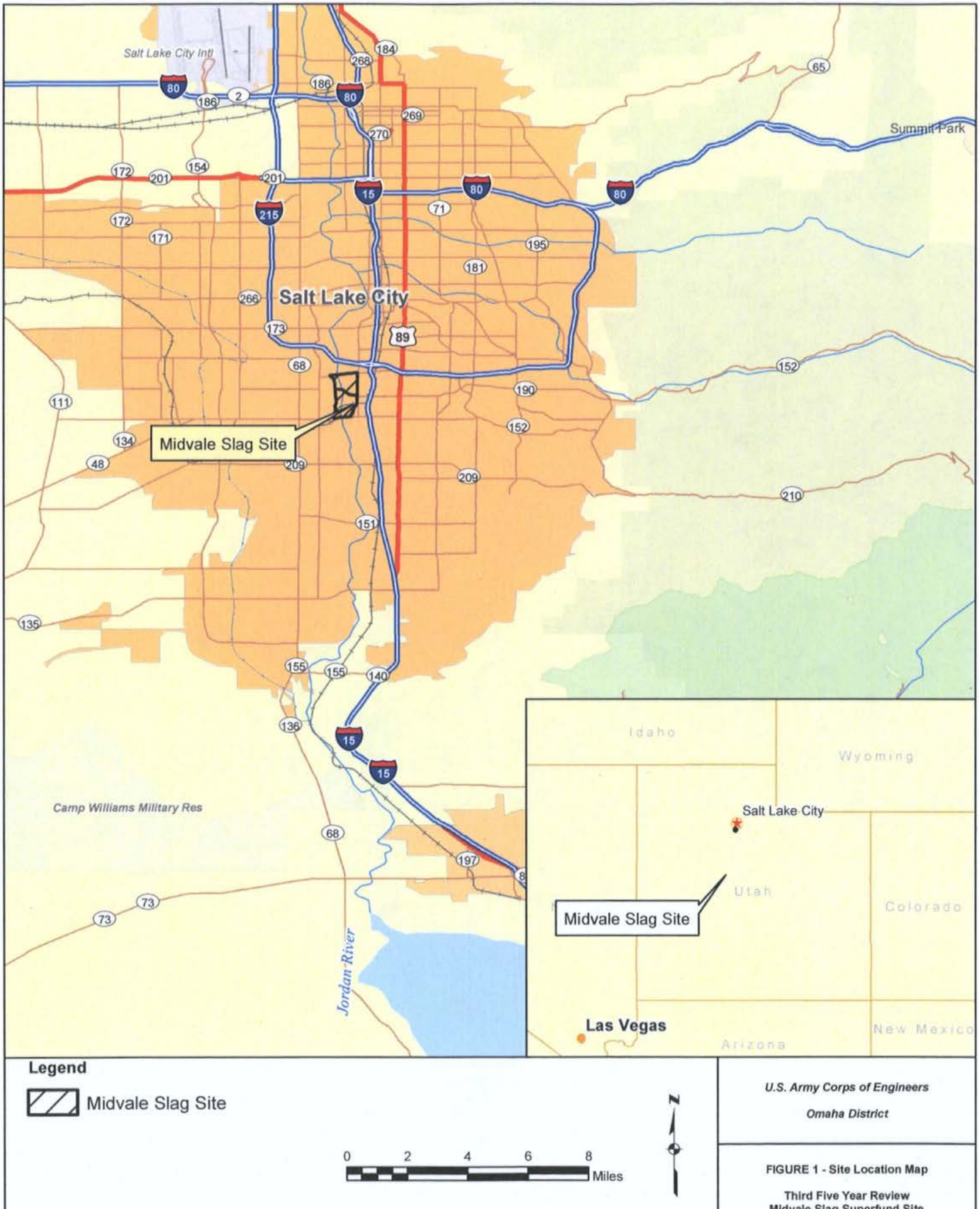
Sampling Event	Sampling Date	SW-201	SW-202					
		SELENIUM CONCENTRATION (ug/L)						
1	Feb-09	4.1	2.4					
2	May-09	1.7	1.4					
3	Jul-09	2.2	2					
4	Oct-09	2.9	2.5					
5	Apr-10	2.3	2.2					
6	Oct-10	2.3	1.7					
7	May-11	0.4	0.876					
8	Sep-11	2.9	2.9					
9	Apr-12	4.9	5.2					
10	Sep-12	5.3	4.8					
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.52	0.54					
Mann-Kendall Statistic (S):		15	15					
Confidence Factor:		89.2%	89.2%					
Concentration Trend:		No Trend	No Trend					



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend, < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

Appendix 5
Figures Referenced in the Report



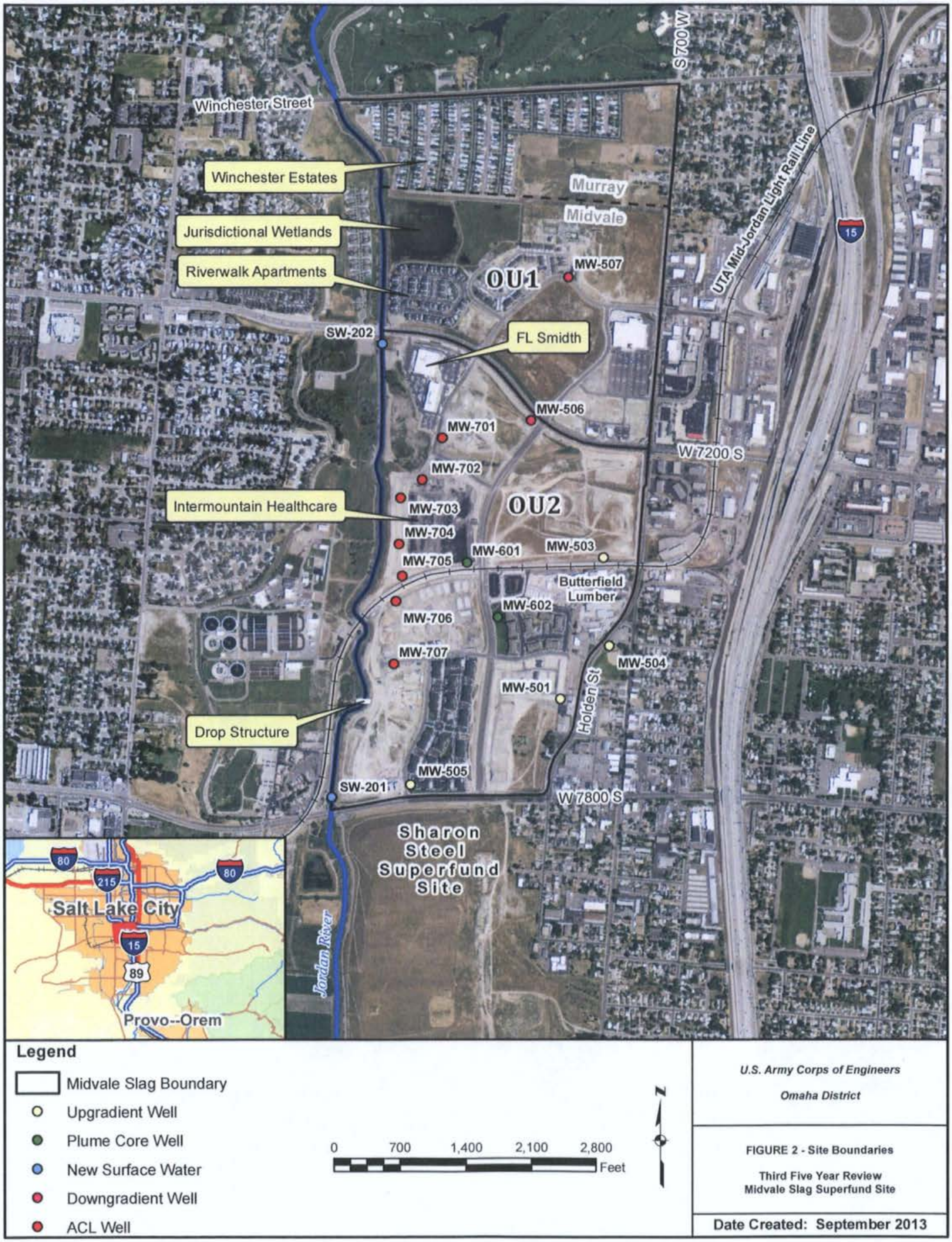
U.S. Army Corps of Engineers

Omaha District

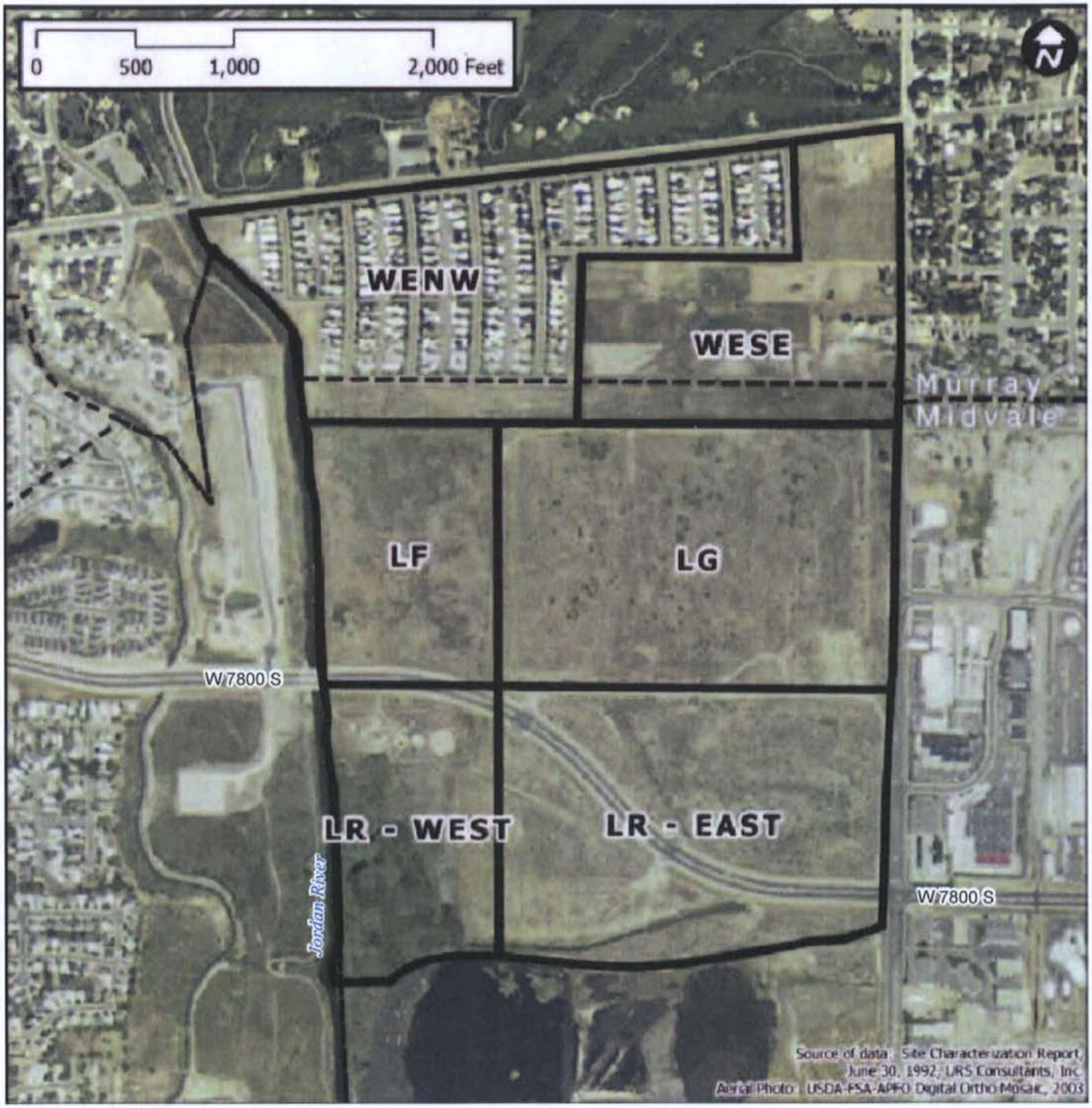
FIGURE 1 - Site Location Map

Third Five Year Review
Midvale Slag Superfund Site

Date Created: September 2013



Winchester Street
S 700 W
Winchester Estates
Murray
Midvale
Jurisdictional Wetlands
Riverwalk Apartments
OU1
MW-507
UTA Mid-Jordan Light Rail Line
15
SW-202
FL Smidth
MW-506
MW-701
W 7200 S
MW-702
MW-703
OU2
Intermountain Healthcare
MW-704
MW-705
MW-601
MW-503
Butterfield Lumber
MW-602
MW-706
MW-707
MW-504
MW-501
Holden St
Drop Structure
MW-505
SW-201
W 7800 S
Sharon Steel Superfund Site
80
215
80
Salt Lake City
15
89
Provo--Orem
Jordan River
Legend
Midvale Slag Boundary
Upgradient Well
Plume Core Well
New Surface Water
Downgradient Well
ACL Well
0
700
1,400
2,100
2,800
Feet
N
U.S. Army Corps of Engineers
Omaha District
FIGURE 2 - Site Boundaries
Third Five Year Review
Midvale Slag Superfund Site
Date Created: September 2013



Legend

OU1 Parcel Boundary

City Limit

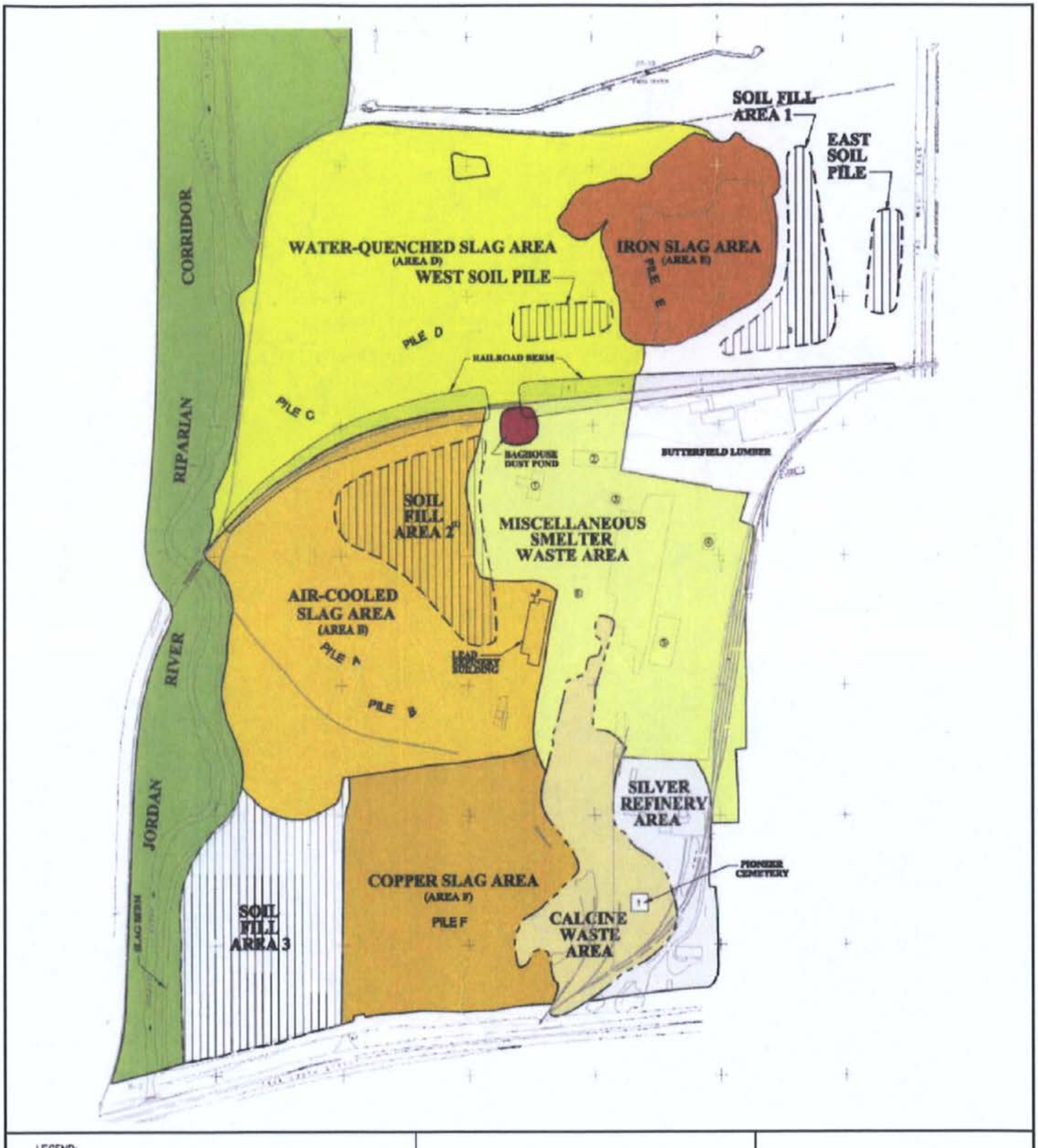
U.S. Army Corps of Engineers

Omaha District

FIGURE 3 - OU1 Parcel Boundaries (excerpt from Second Five Year Review)

Third Five Year Review
Midvale Slag Superfund Site

Date Created: September 2013



LEGEND:

EXISTING BUILDING

APPROXIMATE LOCATION OF DEMOLISHED BUILDINGS

SOIL FILL AREAS

DEMOLISHED BUILDING ID

1. BLAST FURNACE
2. MAIN BAGHOUSE
3. 451 FT. CHIMNEY
4. ARSENIC BAGHOUSE
5. ARSENIC PLANT
6. BAGHOUSE CELLAR

NOTE:

(1) SOIL FILL AREA 2 OVERLIES SLAG IN AIR-COOLED SLAG AREA

N

150 0 150 300

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FIGURE 4 - OU2 Area Designations (excerpt from Second Five Year Review)

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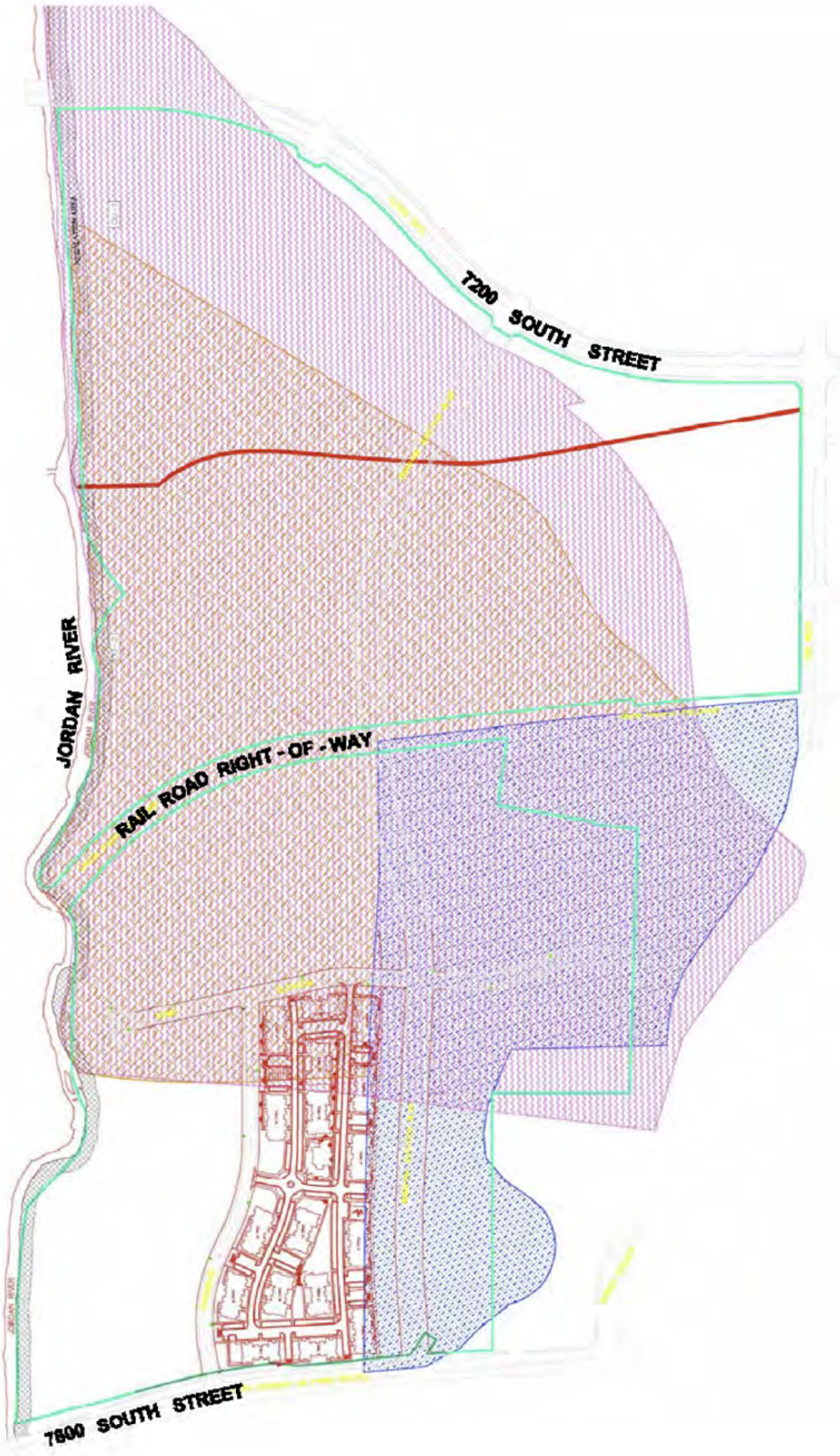

Legend:

- ARSENIC PLUME AREA (1) UTILITY CONSTRUCTION CONTROLS
- VAPOR MITIGATION CONTROL AREA (1)
- SOURCE AREA
- 50' RIVER BUFFER AREA
- OU1/OU2 BOUNDARY (1)
- BOUNDARY

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FIGURE 5 - Utility Controls and Vapor Mitigation Controls Area (excerpt from Second Five Year Review)

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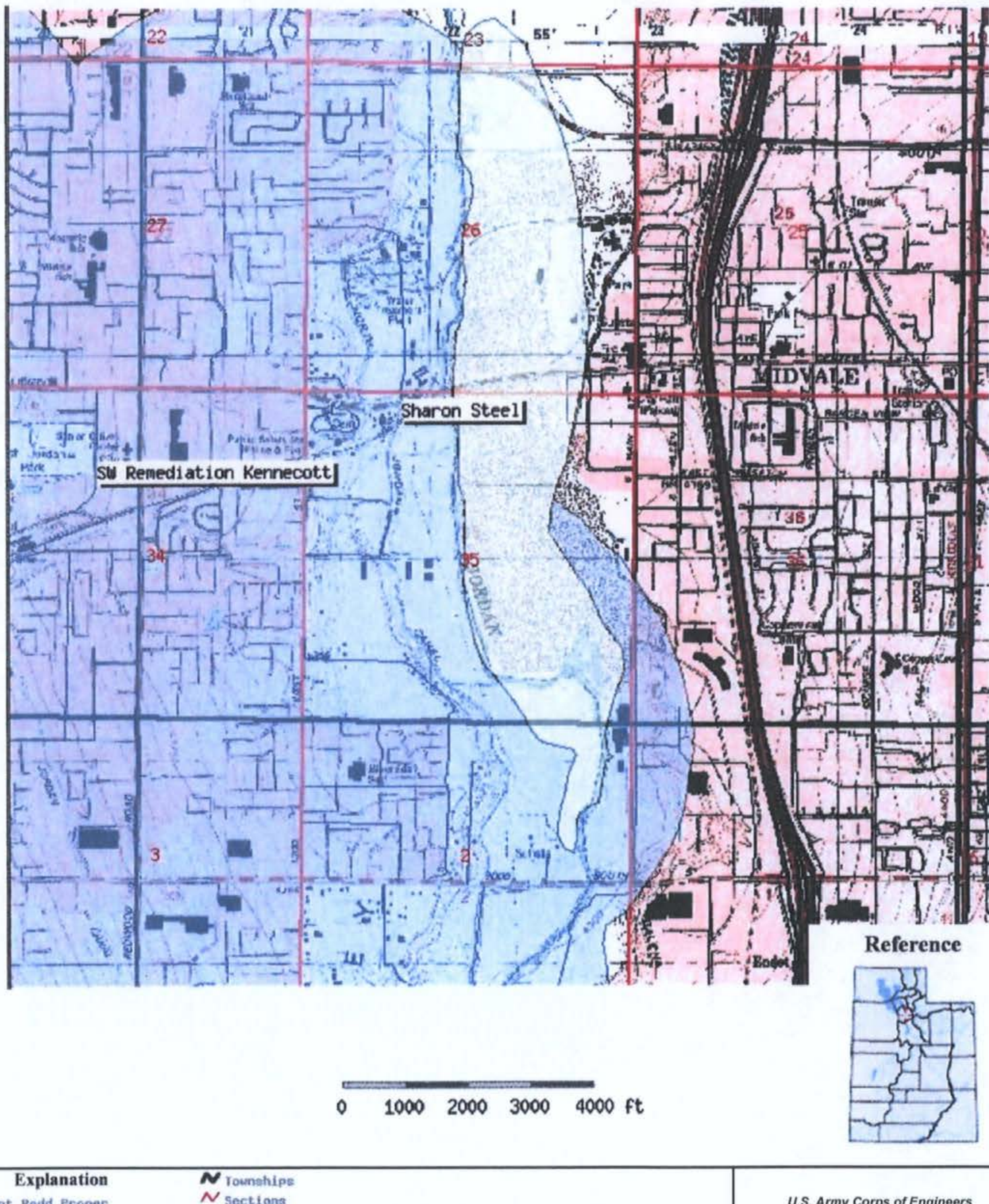

Explanation

- Brent Redd Proper
- Hals Service
- Hill Air Force Base
- Olsens Service
- SW Remediation Kennecott
- Sharon Steel
- TCE Affected Area Tooele
- Teasdale Mercantile Site
- Wasatch Chemical
- Green River IC

- Townships
- Sections
- Primary Route
- Secondary
- Rural Roads
- Minor Roads
- Stream
- Ditch or Canal
- Wash or Ephemeral Drain
- Intermittent Stream
- Aqueduct

N

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FIGURE 6 - Sharon Steel Restricted Area Map from Utah Division of Water Rights website

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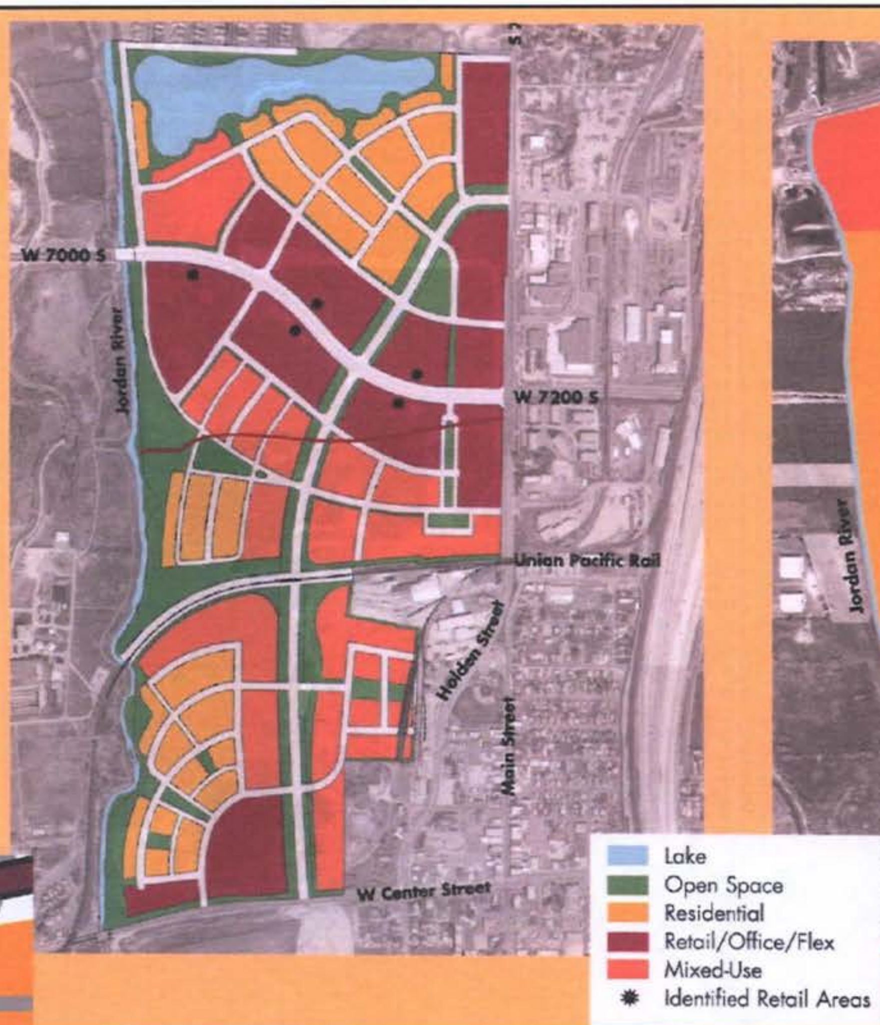
BINGHAM JUNCTION

- 351-acre development at the junction of I-15 and I-215 freeways through a major east-west collector.
- Large-scale, mixed-use development that incorporates major retail, housing and office.
- Transit-oriented development at a new stop on the light rail line.
- The project sits along the Jordan River, providing numerous green spaces. This makes it an ideal location that's different from any other development in the Valley.
- Proposed development of a lake to enhance recreational opportunities.
- Fiber-optic infrastructure.



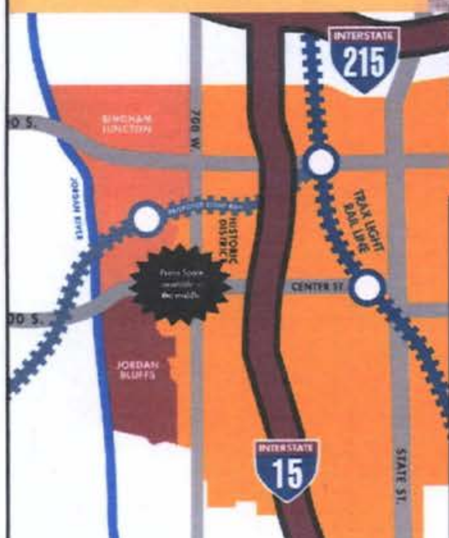


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FIGURE 7 - Midvale City Promotion Brochure - 2013

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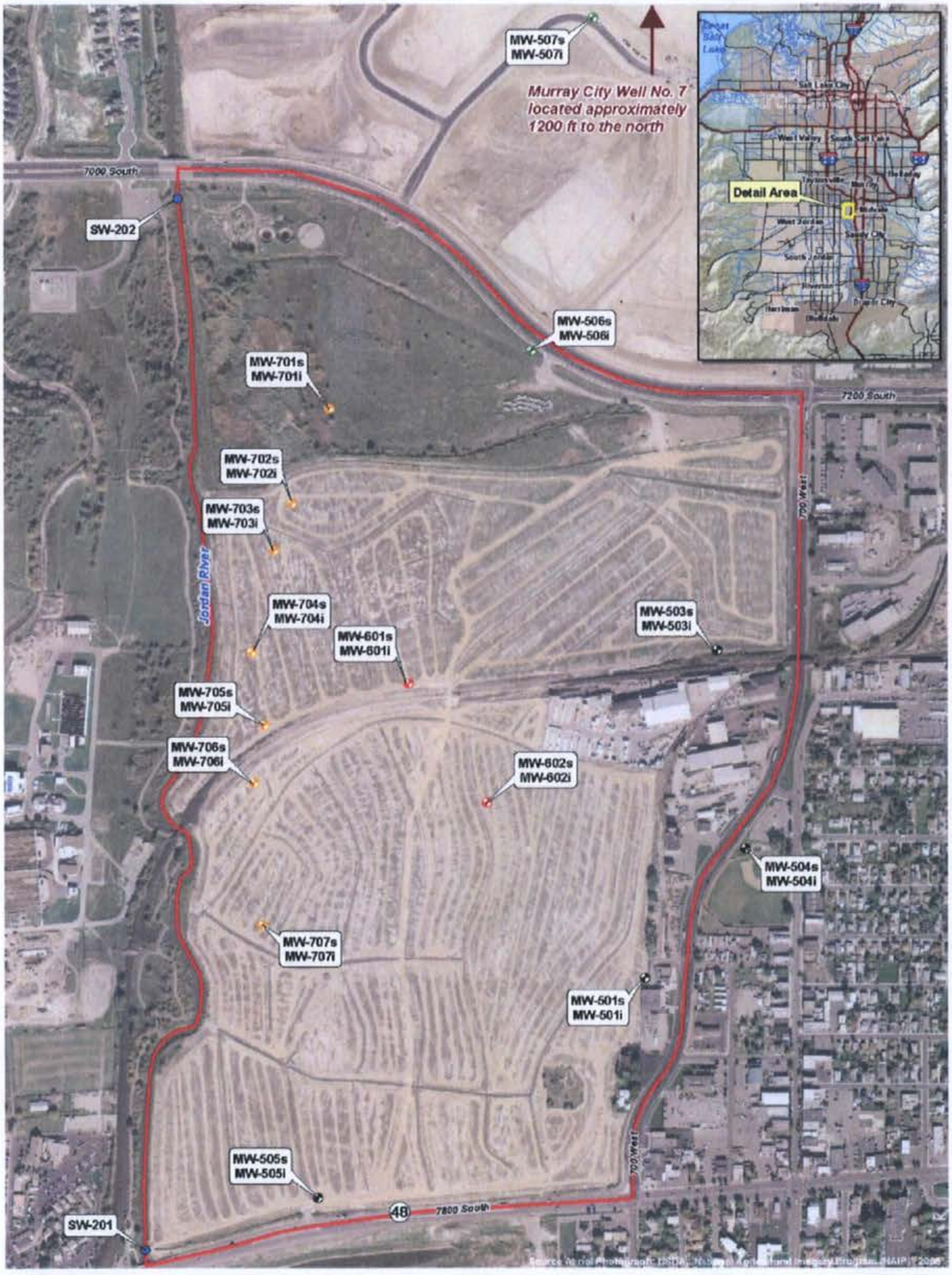

- Alternate Concentration Limit (ACL) Well
- Plume Core Well
- Upgradient Well
- Downgradient Well
- Surface Water Sampling Location
- Site Boundary

0 200 400 600 Feet

N

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FIGURE 8 - Groundwater Wells and Surface Water Sampling Points - excerpt from February 2009 Quarterly Monitoring Report

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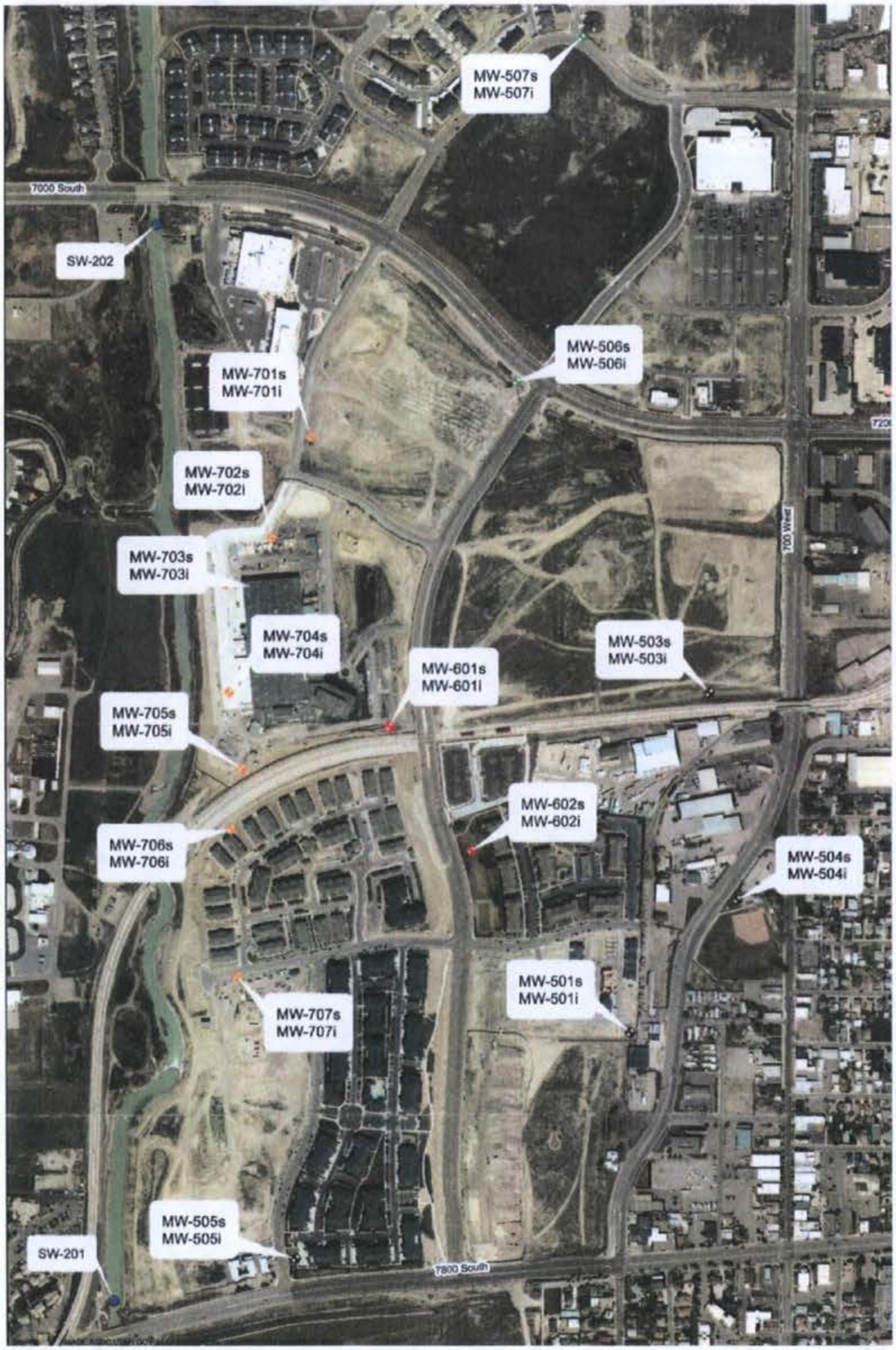

EXPLANATION

- Surface Water Sample Location
- Alternate Concentration Limit (ACL) Monitoring Well
- Plume Core Monitoring Well
- Downgradient Monitoring Well
- Upgradient Monitoring Well

N

0 187.5 375 750 1,125 1,500 Feet

Scale: 1:6,000

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FIGURE 9 - Groundwater Wells and Surface Water Sampling Points - excerpt from September 2012 Semi-Annual Monitoring Report

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