District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company: CHEVRON U.S.A. Inc.	Contact: Edem Sededji
Address: 56 Texas Camp Road, Lovington NM 88260	Telephone No.: Office: (575) 396-4414 Mobile: (432) 234-4437
Facility Name: Lovington San Andreas Battery	Facility Type: Battery

Surface Owner: State of New Mexico	Mineral Owner: State of New Mexico	API No.

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
B	1	17.0S	36E					Lea

Latitude 32.868769° **Longitude** -103.305357°

NATURE OF RELEASE

Type of Release: Spill to Land	Volume of Release: 7.3 bbls of oil and 1.7 bbls of produced water	Volume Recovered: 8.3 bbls
Source of Release: Flare/Vent line	Date and Hour of Occurrence: 05/13/12 6:45 AM	Date and Hour of Discovery: 05/13/12 8:15 AM
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? Mr. Leking via voicemail	
By Whom? David Pagano	Date and Hour: 05/13/12 3:00 PM	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*
N/A

Describe Cause of Problem and Remedial Action Taken.*

Kim-Ray back pressure valve on the Lovington San Andres FWKO failed causing oil to release from the FWKO to the flare/vent line. On discovery, a vacuum truck contacted and vacuumed up the standing fluids. A total of 8.3 bbls of fluids were recovered and sent to disposal. The Kim-Ray back pressure valve was also repaired.

Describe Area Affected and Cleanup Action Taken.*

Visually impacted soils in the area were excavated to a depth of approximately two feet bgs. Five discrete soil confirmation samples were collected from the base of the excavation before the excavated area was reportedly backfilled with imported soils. These sampling results indicated the presence of hydrocarbon concentrations in shallow soils at levels of regulatory concern.

In response to these sampling results, an additional site assessment was conducted to confirm the extents of soil impacts.

Results of the additional assessment activities are provided in the attached report.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: Luke Welch	OIL CONSERVATION DIVISION	
Printed Name: Luke Welch	Approved by Environmental Specialist:	
Title: Project Manager	Approval Date:	Expiration Date:
E-mail Address: LWelch@chevron.com	Conditions of Approval:	Attached ☐
Date: 8/12/14 Phone: (713) 372-0292		

* Attach Additional Sheets If Necessary

ARCADIS U.S., Inc.
2929 Briarpark Drive
Suite 300
Houston
Texas 77042
Tel 713 953 4800
Fax 713 977 4620
www.arcadis-us.com

ENVIRONMENT

Mr. Luke Welch
Project Manager
Chevron Environmental Management Company
1400 Smith Street, Room 07069B
Houston, Texas 77002

Subject:
Site Assessment Report
Lovington San Andres Unit/Lovington Paddock Unit Tank Battery
Lea County, New Mexico

Date:
July 29, 2014

Contact:
Jonathan Olsen

Phone:
713.953.4874

Email:
Jonathan.Olsen@arcadis-us.com

Our ref:
B0048615.0000

Dear Mr. Welch:

On behalf of Chevron Environmental Management Company (CEMC), ARCADIS U.S., Inc. (ARCADIS) prepared this Site Assessment Report (report) to document cleanup actions and soil sampling activities performed in response to a release of approximately 9.00 barrels (bbls) of produced water and oil that occurred at the Lovington San Andres Unit/Lovington Paddock Unit Tank Battery (LSAU/LPU Battery) located in Lea County, New Mexico (site; Figure 1).

To evaluate the potential for this release to impact groundwater, a Site Conceptual Model was developed (Attachment 1). Potential impacts to groundwater are not considered possible due to the following:

- The volume of material released was relatively small (9.00 total bbls);
- Response activities included removal of liquids and impacted surface soil;
- Local climatic conditions are not conducive to leaching due to low rainfall and high evapotranspiration;
- The presence of a caliche layer impedes the vertical migration of liquids; and
- Groundwater is encountered at significant depth (81 feet below ground surface).
- Based on geochemical modeling using USEPA Multimedia Exposure Assessment Model (MULTIMED) Version 2.0 (USEPA 1996), a significantly larger release would be necessary to cause an exceedance of regulatory criteria in groundwater.

This report describes spill response activities for a release that occurred on May 13, 2012 and follow-up soil assessment activities that occurred on November 2, 2013.

Background Information

This section summarizes the site location and description, as well as the regional setting including geology, hydrogeology, nearby drinking water wells, surface water, and climate.

Site Location and Description

The site is located within the Chevron-operated Lovington Oil Field (comprising the Paddock and San Andres Units), approximately 5 miles southeast of the city of Lovington, New Mexico. New Mexico Highway 18 (North Lovington Highway) is located approximately 1 mile southwest of the site.

The site is located in the western edge of the Permian Basin, a 75,000-square-mile area in west Texas and New Mexico that is populated by numerous oil and gas production wells. In New Mexico, the Permian Basin is bounded by the Texas state lines to the south and east, by Roosevelt County to the north, and Chavez County to the west. Lovington (the closest town) is approximately 5 miles northwest of the site and the closest agricultural area is 1 mile southeast of the site.

The site is located approximately 100 feet north of the LSAU/LPU Battery. The site contains the flare for the LSAU/LPU Battery as well as associated aboveground and subsurface piping. The release described in the following sections occurred on the pad constructed for the flare.

Nearby Water Wells and Surface Water

In November 2013, ARCADIS field verified that no surface-water bodies are located within 1,000 feet of the site. Based on satellite imagery, no surface-water bodies were identified within 4 miles of the site (GoogleEarth 2014).

In May 2014, ARCADIS reviewed information obtained from the New Mexico Office of the State Engineer (NMOSE) online database (NMOSE 2011), which indicated that no water-supply wells are located within 1,000 feet of the site. The NMOSE online database identified 619 water-supply wells within a five-mile radius of the site (NMOSE 2011). A petroleum-industry-related water supply well, located approximately 1,316 feet northeast (i.e., hydraulically crossgradient) of the site was identified as the closest designated-use well to the site.

Climate

Monthly average temperatures near the site vary from a minimum of 27.9 degrees Fahrenheit (°F) in January to a maximum of 93.9°F in July (Western Regional Climate Center (WRCC) Hobs, New Mexico (294026) weather station). Total average precipitation in the area of the site recorded from the available WRCC period of record between 1912 and 2013 was approximately 15.75 inches per year (WRCC 2014a).

Due to the arid climate, the site experiences low precipitation and high evapotranspiration rates. The total average evapotranspiration from the available WRCC period of record between 1914 and 2005 was approximately 87.68 inches per year (WRCC 2014b).

Regional Geology and Hydrogeology

The site elevation is approximately 3,840 feet above mean sea level. The site is located in the Querecho Plains immediately west of the Mescalero Ridge, which demarcates the western boundary of the (Miocene to Pliocene) High Plains Ogallala Formation (Reeves 1972). A rapid drop in elevation of 200 to 250 feet occurs west of the northwest-trending Mescalero Ridge. The Ogallala Formation east of the ridge is predominantly composed of unconsolidated alluvial fan deposits of sand and gravel near the base, overlain by interbedded sand and clay in the upper portion (Seni 1980). Repeated depositional events on the High Plains surface beginning approximately 7 million years ago, followed by aerial exposure, generated a thick sequence of caliche horizons that are competent enough to act as a cliff former for the expression of Mescalero Ridge. These hard caliche deposits form the upper portion of the stratigraphic sequence. In the site area, the Ogallala Formation is underlain by red beds of the Upper Triassic-age Dockum Group, The nearest area where the Ogallala is underlain by the Cretaceous-age Trinity Group is approximately 55 miles to the northwest (Fallin 1988).

The Querecho Plain is 80 percent covered by a moderately stable dune field (Reeves 1972) that is deposited on top of Triassic Dockum red beds. The red bed surface, which is 400,000 to 500,000 years old, is relatively flat with minor erosional incisions and a 3- to 13-foot-thick near-surface caliche layer (Bachman 1980). Deposition of sand and the formation of the dune field began 60,000 years ago, with additional development beginning 9,000 years ago (Hall 2002). The surface and interior of these dunes do not contain caliche; however, a 1-foot layer of caliche is common at the bottom of the dunes at the contact with the red bed surface. Groundwater in the area is in the Dockum Group at a depth of approximately 100 feet (Summers 1972).

Compared to the Ogallala Formation to the west of the site, the Dockum Group groundwater is not a major resource in the area, with poor potential water production rates and elevated natural dissolved solids.

Water-supply wells located on the southern High Plains east of Mescalero Ridge in central Lea County and near the site, as discussed in the Nearby Water Wells and Surface Water section of this report, are completed in the High Plains Aquifer (HPA). The HPA consists primarily of the Ogallala Formation, and in localized areas, alluvial sediment of Quaternary age. Near the site, the HPA is present directly above the Triassic-age Dockum Group, which occurs at a depth of approximately 140 feet below ground surface (bgs) (Ash 1963, Fahlquist 2003, Nativ 1988, Nicholson and Clebsch 1961, Tillery 2008). The regional groundwater flow direction is to the east-southeast (Tillery 2008).

Groundwater near the site is encountered at a depth of approximately 81 feet bgs (NMOSE 2014; Attachment 2).

Initial Release Response Activities

A release of approximately 1.7 bbls of produced water and 7.3 bbls of oil occurred at the site on May 13, 2012 due to the failure of a back pressure valve. Chevron personnel from the Mid-Continent Business Unit (MCBU) stopped the release and recovered approximately 8.3 bbls of fluids using a vacuum truck. Chevron MCBU personnel excavated visually impacted soil in the area to a depth of approximately 2 feet bgs and collected five discrete confirmation soil samples from the base of the excavation on June 25, 2012. Information regarding the disposal of the excavated soil was not available to ARCADIS. After collecting the soil samples, the excavated area was reportedly backfilled with imported soil.

Pursuant to New Mexico Oil Conservation Division (NMOCD) requirements (NMOCD 1993), a Notification of Release and Correction (Form C-141) detailing the location, volume of release, and initial and planned cleanup efforts taken was submitted for the site by David Pagano with Chevron MCBU. The original and updated C-141 forms are included as Attachment 3.

Confirmation Soil Sampling

Five discrete confirmation soil samples were collected from the base of the excavation on June 25, 2012. In accordance with the laboratory analytical report (Attachment 4), soil sample containers were transported, on ice, under chain of

custody procedures to Cardinal Laboratories Environmental Analytical Services for the following analyses:

- Benzene, toluene, ethylbenzene, and xylene (BTEX) by United States Environmental Protection Agency (USEPA) Method 8021B
- Total petroleum hydrocarbons as gasoline range organics (TPH-GRO) and total petroleum hydrocarbons as diesel range organics (TPH-DRO) by USEPA Method 8015M
- Chloride by USEPA Method SM4500Cl-B

Confirmation soil sample results are presented in Table 1. The complete laboratory analytical results with chain of custody documentation are included in Attachment 4.

Data Evaluation Approach

Chevron MCBU personnel compared data from the five June 2012 confirmation soil samples to regulatory criteria to provide context for the concentrations of analytes detected and to evaluate if additional sampling was necessary. The regulatory criteria selected are based on potential receptors near the site and consist of the following:

- NMOCD risk-based soil remediation action levels (SRALs) for benzene, total BTEX, and total petroleum hydrocarbons (TPH) for leaks, spills, and releases (NMOCD 1993). SRALs were calculated using the NMOCD criteria presented in the tables below.

Criteria	Site-Specific Result	Ranking Score
Depth to groundwater	50 to 99 feet	10
Wellhead protection area	No	0
Distance to surface-water body	>1,000 feet	0
Total Ranking Score		**10**

SRALs	Benzene (mg/kg)	Total BTEX (mg/kg)	TPH (mg/kg)
	10	50	1,000

Note:

mg/kg = milligrams per kilogram

- New Mexico Administrative Code (NMAC) closure criteria for soil beneath belowgrade tanks, drying pads associated with closed-loop systems, and pits where contents are removed (NMAC 2009).

Criteria	Site-Specific Result	Chloride (mg/kg)
Depth below bottom of pit to groundwater	50 to 100 feet	500

Confirmation Soil Sample Results

The analytical results for BTEX, TPH-GRO, TPH-DRO, and chloride for the five discrete confirmation soil samples collected in June 2012 are provided in Table 1 and summarized below:

- Of the five confirmation soil samples collected, total xylenes were detected above the laboratory reporting limits (LRLs) in only one soil sample collected at LPU BTY SS#1 (0.202 milligrams per kilogram [mg/kg]). Benzene and BTEX were not detected above the SRALs of 10 and 50 mg/kg, respectively.

- TPH-GRO was detected above LRLs in only in one of the five soil sample collected (LPU BTY SS#1; 17.4 mg/kg). TPH-DRO was detected in all five confirmation samplings at concentrations ranging from 222 mg/kg (LPU BTY SS#5) to 4,700 mg/kg (LPU BTY SS#1).

- TPH (TPH-DRO and TPH-GRO) was detected in all five confirmation samples at concentrations ranging from 222 mg/kg (LPU BTY SS#5) to 4,717.4 mg/kg (LPU BTY SS#1). TPH were detected above the SRAL of 1,000 mg/kg in soil samples LPU BTY SS#1.

- Chloride was detected in all five confirmation samples collected at concentrations ranging from 80 mg/kg (LPU BTY SS#1 and LPU BTY SS#5) to 224 mg/kg (LPU BTY SS#4). Chloride was not detected above the NMAC closure criterion of 500 mg/kg in any of the five confirmation soil samples collected.

The complete laboratory analytical results with chain of custody documentation are included in Attachment 4.

TPH concentrations in confirmation soil sample LPU BTY SS#1 were above the regulatory criteria which prompted additional site assessment activities.

Site Assessment Activities

In November 2013, ARCADIS conducted site assessment activities to characterize the lateral and vertical extents of soil impacts at the site. Soil boring locations were selected based on the results of confirmation soil sampling completed at the site in June 2012, locations of pipelines and other equipment at the site, and the extent of the release as documented by Chevron MCBU personnel during the initial response activities. The site assessment activities and results are discussed below.

Pre-Field Activities

Prior to initiating field activities, ARCADIS updated the site-specific Health and Safety Plan in accordance with state and federal requirements. Prior to initiating drilling activities, underground utilities and other potential subsurface obstructions near the proposed boring locations were located and marked. A New Mexico One Call ticket was issued for the site, and a private third-party utility locator cleared all proposed boring locations for potential on- and off-site utilities that were not otherwise identified. Finally, ARCADIS staff conducted a visual inspection of the site to identify potential utility lines. Boring locations were flagged during the utility locate and coordinates were recorded using a Trimble® global positioning unit with differential capability.

Soil Sampling

To evaluate the presence of impacts to soil at the site, ARCADIS advanced three soil borings (LPULSABAT-02, LPULSABAT-03, and LPULSABAT-04) on November 1 and 2, 2013. Soil sampling locations are shown on Figure 2.

Prior to conducting drilling activities, each boring location was cleared for subsurface utilities with an air knife. The air knife could not be advanced more than 2 to 3 inches bgs, due to the presence of a thick caliche layer. Each soil boring was then advanced to a total depth of approximately 25 feet bgs using air rotary drilling equipment.

Soil was continuously logged for stratigraphic characteristics. The soil samples were field screened for the presence of volatile organic compounds using a photo ionization detector (PID) in combination with visual and olfactory screening methods for evidence of petroleum hydrocarbons. The PID used during this investigation was calibrated daily with fresh air and isobutylene gas. Field personnel recorded PID readings, soil types, and other pertinent geologic data on the boring logs (Attachment 5). No staining or elevated PID readings were observed.

Lithologic data indicate that the subsurface material primarily consists of caliche (soil carbonate) profiles including “caprock,” nodular, and sandy caliche layers from approximately 0 to 25 feet bgs (Attachment 5).

Soil Assessment Sampling

Six soil samples were collected from each of the three boring locations (for a total of 18 soil samples) at a depth of 2 feet bgs (the approximate depth of the soil excavation in the initial release response activities) and continuing at 5-foot intervals from 5 to 25 feet bgs.

The assessment soil samples were retained in clean, laboratory-supplied glass jars, labeled, placed in an ice-chilled cooler, and submitted under appropriate chain of custody protocols to TestAmerica Laboratories.

Soil Assessment Sample Analysis

Soil samples collected from each boring were analyzed for the following constituents:

- BTEX by USEPA Method 8021B
- TPH-GRO by USEPA Method 8015B
- TPH-DRO by USEPA Method 8015B
- Chloride by USEPA Method 9056
- Percent moisture by ASTM International Method D2216

Boring Abandonment

Following sampling, the boreholes were filled with soil cuttings from the total depth to ground surface. The ground surface was restored to match the surrounding conditions.

Soil Assessment Comparison Criteria

ARCADIS evaluated soil assessment analytical results for benzene, total BTEX, and TPH by comparing the data with the NMOCD SRALs (NMOCD 1993), as presented in the Data Evaluation Approach section of this report.

To develop an appropriate site-specific soil screening level (SSL) for chloride for use at the site, ARCADIS performed simulations of unsaturated zone flow, transport, and saturated zone mixing of chloride using the MULTIMED model Version 2.0 (USEPA 1996). The NMAC chloride standard for domestic water supply of 250 milligrams per

liter (NMAC 2001) was used to estimate a maximum allowable concentration of chloride in soil that would not leach to groundwater above the standard. The NMAC chloride standard is consistent with the National Secondary Drinking Water Standard for chloride, addressing taste and odor concerns (USEPA 2010).

Conservative site-specific input parameters were used in the MULTIMED (USEPA 1996) simulations compared to actual site and release conditions. Specifically:

- Modeled source lengths and areas modeled are generally significantly larger than the actual chloride-impacted soil areas.
- Chloride-impacted soil was modeled as having a uniform chloride concentration for the entire volume (i.e., area x depth) of specified soil.
- A reduction in chloride concentrations in subsurface soil due to soil chemical transformation or adsorption mechanisms was not included in the model calculations.

Based on the depth to groundwater and the aerial and vertical extents of each of the MULTIMED (USEPA 1996) simulations, with these conservative site-specific input parameters, modeled peak chloride concentrations will reach groundwater in approximately 540 to 860 years.

The Chloride MULTIMED Simulated Soil Screening Levels for the Protection of Groundwater memo is included as Attachment 6. The site-specific SSL was calculated using the input parameters presented in the table below.

Site-Specific Input Parameters	
Source length (m)	20
Source area (m^2)	400
Source depth (m)	0 to 1
Depth to groundwater (m)	20
Chloride SSL (mg/kg)	**100,000[1]**

[1] A chloride SSL of 108,000 mg/kg was calculated using MUTLTIMED (USEPA 1996); however, a maximum allowable soil concentration of 100,000 mg/kg is

recommended in accordance with the New Mexico Environment Department (NMED) risk assessment guidance (NMED 2012).
m = meter
m^2 = square meter

Soil Assessment Sample Results

The analytical results for BTEX, TPH-GRO, TPH-DRO, chloride, and moisture for the 18 soil assessment samples are provided in Table 1 and summarized below:

- BTEX were not detected above LRLs in any of the 18 soil samples collected.

- TPH-GRO was detected in all of the soil samples at concentrations ranging from 2.1 mg/kg (LPULSABAT-02 at 20 feet bgs and LPULSABAT-04 at 10 feet bgs) to 3.5 mg/kg (LPULSABAT-04 at 2 feet bgs). TPH-DRO (9.3 mg/kg) was only detected in one soil sample collected from LPULSABAT-02 at two feet bgs.

- TPH (TPH-GRO and TPH-DRO) were detected in all of the soil samples at concentrations ranging from 2.1 mg/kg (LPULSABAT-02 at 20 feet bgs and LPULSABAT-04 at 10 feet bgs) to 12.2 mg/kg (LPULSABAT-02 at 2 feet bgs).TPH concentrations were not reported above the NMOCD SRAL of 1,000 mg/kg.

- Chloride was detected in all soil samples at concentrations ranging from 12 mg/kg (LPULSABAT-03 at 5 feet bgs) to 490 mg/kg (LPULSABAT-04 at 20 feet bgs). Chloride concentrations were not detected above the site SSL of 100,000 mg/kg.

Laboratory analytical results with chain of custody documentation are provided in Attachment 4.

Summary and Conclusions

A release of produced water and oil occurred at the site on May 13, 2012, due to a back pressure valve failure. Visually impacted soil was excavated to a depth of approximately 2 feet bgs and five discrete confirmation soil samples were collected from the base of the excavation in June 2012. One confirmation soil sample had TPH concentrations above regulatory criteria, which prompted an additional investigation. In November 2013, additional soil samples were collected to assess soil impacts within the observed aerial extent of the release. None of the soil samples collected during the 2013 assessment exceeded the NMOCD SRALs. In addition, chloride concentrations were reported below the site-specific SSL using the MULTIMED model (USEPA 1996).

Although not all chloride concentrations were reported below the NMAC closure criterion of 250 mg/kg (Table 1; NMAC 2009), all chloride concentrations in samples collected during the 2013 assessment were below the site-specific SSL (Attachment 6). Chloride impacts in shallow soil potentially associated with the release were delineated.

Potential migration of remaining petroleum hydrocarbons or chloride to groundwater is not expected due to the small size of the release, low precipitation (WRCC 2014a), and high evapotranspiration rates (WRCC 2014b), and the fine-grained nature of caliche layers present beneath the site. MULTIMED model results demonstrate that the remaining soil concentrations associated with the release do not pose significant risk to groundwater resources or other receptors.

Soil data presented in this report support a conclusion that impacted soil associated with the reported release at the site poses no significant threat to groundwater resources or other receptors. ARCADIS recommends that CEMC submit a request to the NMOCD that no further investigations or additional cleanup actions need to be performed at the site and that the NMOCD grant No Further Action status to the site.

If you have any questions or comments regarding the information presented in this report, please contact Jonathan Olsen at 713.953.4874 or Jonathan.Olsen@arcadis-us.com, or Kathleen Abbott at 925.296.7827 or Kathleen.Abbott@arcadis-us.com.

Sincerely,

ARCADIS U.S., Inc.

Jonathan Olsen
Certified Project Manager

Kathleen M. Abbott, PG
Program Manager

Enclosures:

Table 1	Soil Sampling Analytical Results
Figure 1	Site Location Map – LSAU/LPU
Figure 2	Release and Soil Boring Locations – LSAU/LPU

Attachments:

Attachment 1	Site Conceptual Model

Attachment 2 New Mexico Office of the State Engineer – Depth to Water
Attachment 3 Release Notification and Corrective Action (C-141 Form)
Attachment 4 Laboratory Analytical Reports
Attachment 5 Boring Logs (November 2013)
Attachment 6 Chloride Multimedia Exposure Assessment Model Simulated Soil Screening Levels for the Protection of Groundwater Memo

References:

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ARCADIS

Table

Table 1
Soil Sampling Analytical Results

Site Assessment Report
Lovington San Andres Unit / Lovington Paddock Unit Tank Battery
Lea County, New Mexico

Boring Location ID	Sample Date	Sample Depth (feet bgs)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Total BTEX (mg/kg)	TPH-GRO (mg/kg)	TPH-DRO (mg/kg)	Chloride (mg/kg)	% Moisture
		SRALs [(a)]	**10**	---	---	---	**50**	**1,000**		---	---
		NMAC Closure Criteria [(b)]	---	---	---	---	---	---	---	**500**	---
		MULTIMED Site-Specific SSL [(c)]	---	---	---	---	---	---	---	**100,000**	---
LPU BTY SS#1	6/25/2012	--*	<0.050	<0.050	<0.050	0.202	--	17.4	4,700	80	--
LPU BTY SS#2	6/25/2012	--*	<0.050	<0.050	<0.050	<0.150	--	<10.0	791	96	--
LPU BTY SS#3	6/25/2012	--*	<0.050	<0.050	<0.050	<0.150	--	<10.0	918	32	--
LPU BTY SS#4	6/25/2012	--*	<0.050	<0.050	<0.050	<0.150	--	<10.0	422	224	--
LPU BTY SS#5	6/25/2012	--*	<0.050	<0.050	<0.050	<0.150	--	<10.0	222	80	--
LPULSABAT-02	11/1/2013	2	<0.021	<0.021	<0.021	<0.021	<0.021	2.9	9.3	100	5
	11/1/2013	5	<0.021	<0.021	<0.021	<0.021	<0.021	3.2	<8.8	81	6
	11/1/2013	10	<0.023	<0.023	<0.023	<0.023	<0.023	2.5	<9.7	22	14
	11/1/2013	15	<0.023	<0.023	<0.023	<0.023	<0.023	2.4	<9.4	34	11
	11/1/2013	20	<0.021	<0.021	<0.021	<0.021	<0.021	2.1	<8.6	120	4
	11/1/2013	25	<0.021	<0.021	<0.021	<0.021	<0.021	3.7	<8.6	300	3
LPULSABAT-03	11/1/2013	2	<0.022	<0.022	<0.022	<0.022	<0.022	2.9	<9.1	18	9
	11/1/2013	5	<0.021	<0.021	<0.021	<0.021	<0.021	2.6	<8.6	12	4
	11/1/2013	10	<0.021	<0.021	<0.021	<0.021	<0.021	2.6	<8.9	41	7
	11/1/2013	15	<0.022	<0.022	<0.022	<0.022	<0.022	2.6	<9.2	170	9
	11/1/2013	20	<0.021	<0.021	<0.021	<0.021	<0.021	2.6	<8.8	240	6
	11/1/2013	25	<0.025	<0.025	<0.025	<0.025	<0.025	2.8	<10	400	19
LPULSABAT-04	11/2/2013	2	<0.023	<0.023	<0.023	<0.023	<0.023	3.5	<9.7	39	14
	11/2/2013	5	<0.023	<0.023	<0.023	<0.023	<0.023	3.1	<9.5	30	13
	11/2/2013	10	<0.021	<0.021	<0.021	<0.021	<0.021	2.1	<8.5	290	3
	11/2/2013	15	<0.021	<0.021	<0.021	<0.021	<0.021	2.5	<8.9	360	7
	11/2/2013	20	<0.021	<0.021	<0.021	<0.021	<0.021	2.4	<8.7	490	4
	11/2/2013	25	<0.021	<0.021	<0.021	<0.021	<0.021	2.4	<8.6	210	4

Notes:

%	Percent
mg/kg	Miligram(s) per kilogram
<	Analyte was not detected above the specified method reporting limit
--*	Information regarding the depth of these samples is not available.
--	Not Analyzed/Not Listed
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and total xylenes
MULTIMED	Multimedia Exposure Assessment Model
NMAC	New Mexico Administrative Code
TPH-GRO	Total Petroleum Hydrocarbons as Gasoline Range Organics
TPH-DRO	Total Petroleum Hydrocarbons as Diesel Range Organics
SRAL	Soil remediation action level
SSL	Soil screening level

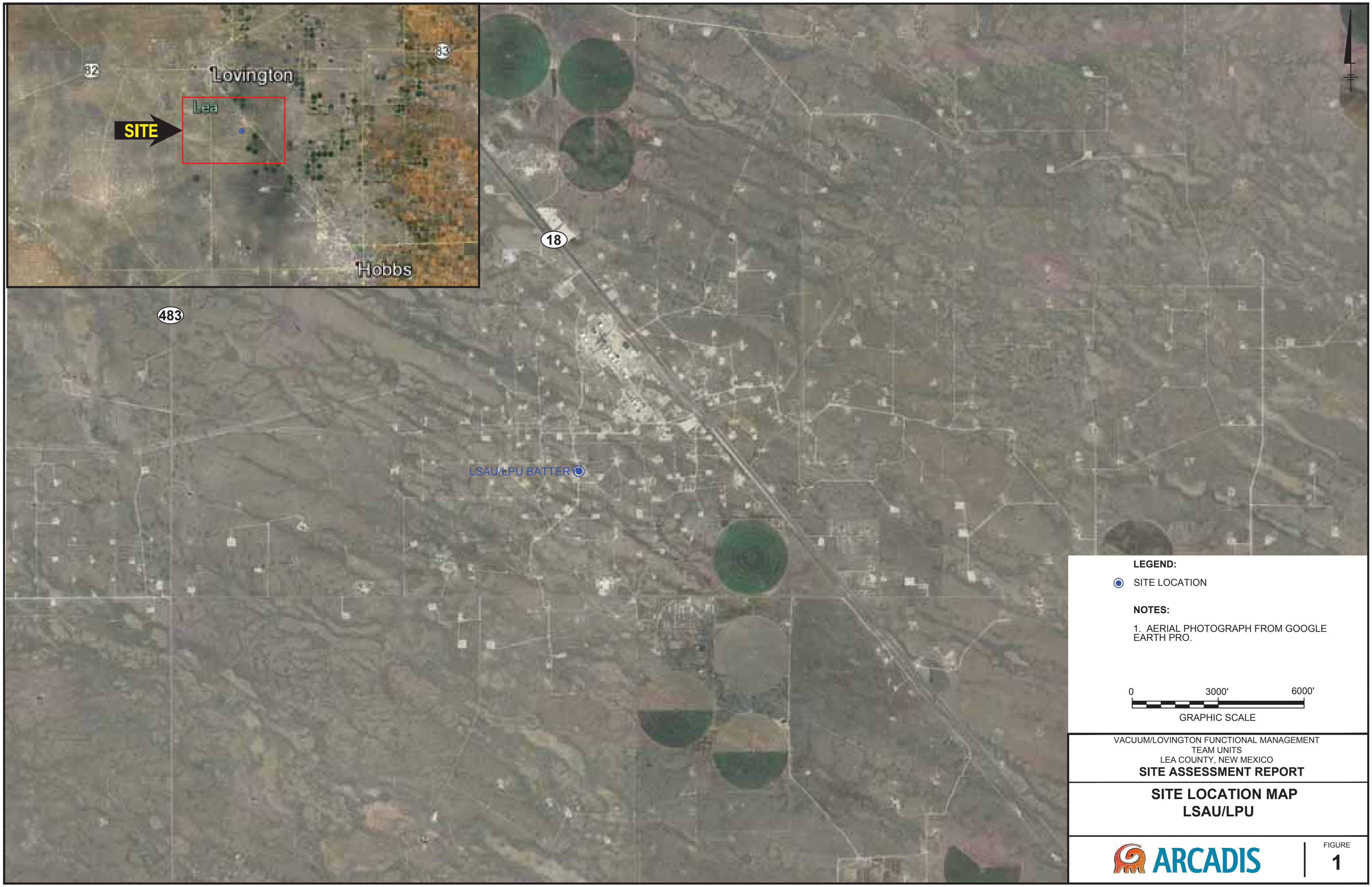
(a) SRALs, for leaks, spills, and releases, New Mexico Oil Conservation Division, August 1993

(b) Title 19, Chapter 15 of the NMAC concerning pits, closed-loop systems, below grade tanks and sumps, and other alternative methods, 19.15.17 NMAC, July 2009

(c) MULTIMED exposure assessment, 2.0 Beta, United States Environmental Protection Agency, October 1996

ARCADIS

Figures



LEGEND:

SITE LOCATION

NOTES:

1. AERIAL PHOTOGRAPH FROM GOOGLE EARTH PRO.

0 3000' 6000'

GRAPHIC SCALE

VACUUM/LOVINGTON FUNCTIONAL MANAGEMENT TEAM UNITS
LEA COUNTY, NEW MEXICO

SITE ASSESSMENT REPORT

SITE LOCATION MAP
LSAU/LPU

ARCADIS

FIGURE
1

CITY: MANCHESTER DIV/GROUP: ENVCAD DB: B.SMALL PM: TM:
G:\ENVCAD\Manchester\ACT\B0048615\0000\00002\B00486150000-N03.dwg LAYOUT: 1 SAVED: 4/25/2014 2:13 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 4/25/2014 2:13 PM BY: SMALL, BRIAN

CITY: MANCHESTER DIV/GROUP: ENVCAD DB: B.SMALL PM: TM
G:\ENVCAD\Manchester\ACT\B0048615\0000\00002\B00486150000.dwg LAYOUT: 8 SAVED: 1/13/2014 12:36 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 1/13/2014 7:40 PM BY: SMALL, BRIAN

LEGEND:

- NOVEMBER 2013 ASSESSMENT SOIL SAMPLING LOCATION
- 1 JUNE 2012 CONFIRMATION SOIL SAMPLING LOCATION
- APPROXIMATE EXTENT OF SPILL
- UNDERGROUND UTILITY LINE

NOTES:

1. AERIAL PHOTOGRAPH FROM GOOGLE EARTH PRO.

2. COORDINATES FOR ALL NOVEMBER 2013 SAMPLE LOCATIONS WERE COLLECTED USING A SUB-METER TRIMBLE GPS UNIT.

3. UTILITIES WERE IDENTIFIED USING GROUND PENETRATING RADAR, RADIO FREQUENCY SURVEY OR VISUAL MEANS.

0 50' 100'
GRAPHIC SCALE

VACUUM/LOVINGTON FUNCTIONAL MANAGEMENT
TEAM UNITS
LEA COUNTY, NEW MEXICO

SITE ASSESSMENT REPORT

RELEASE AND SOIL BORING LOCATIONS LSAU/LPU

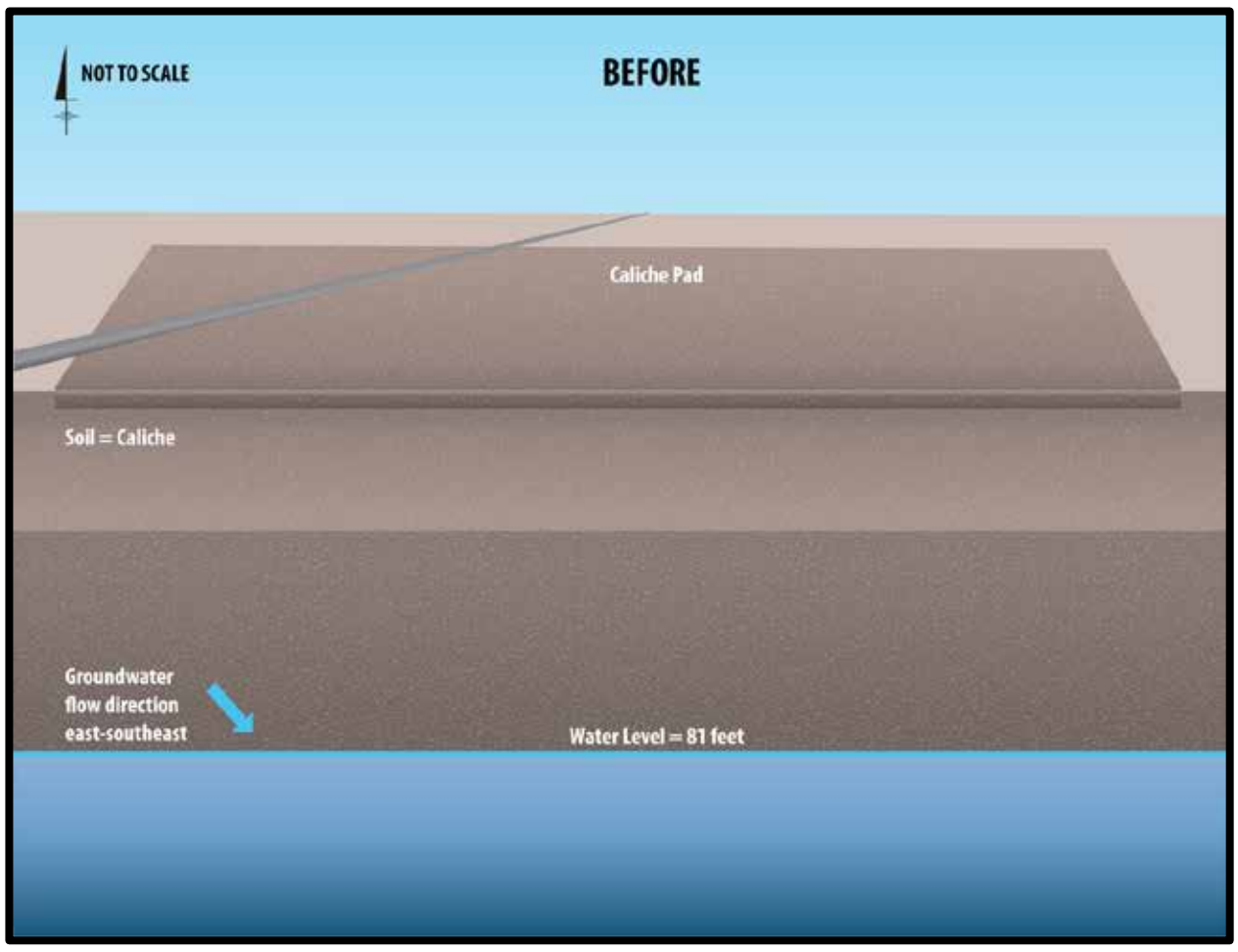
ARCADIS

FIGURE
2

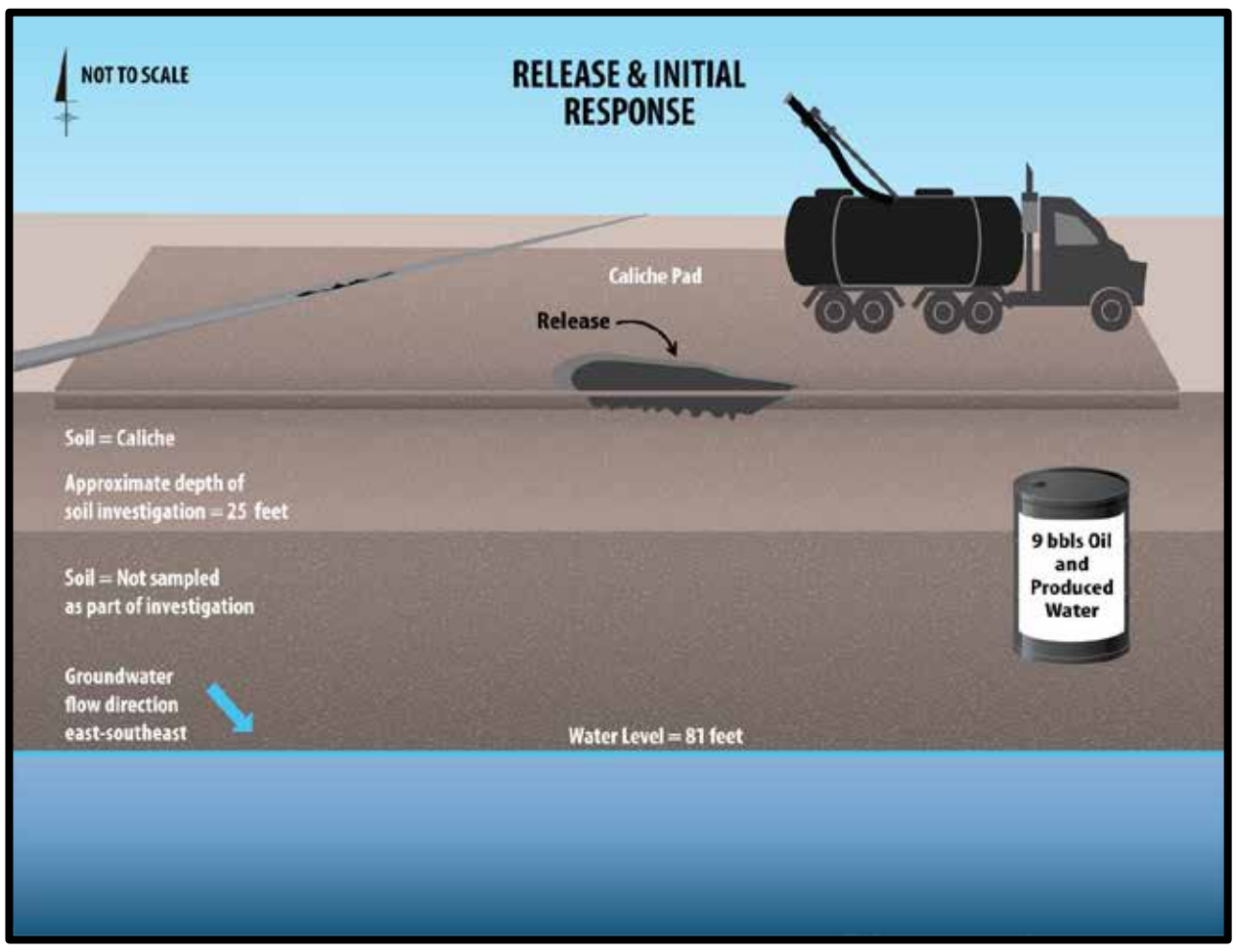
ARCADIS

Attachment 1

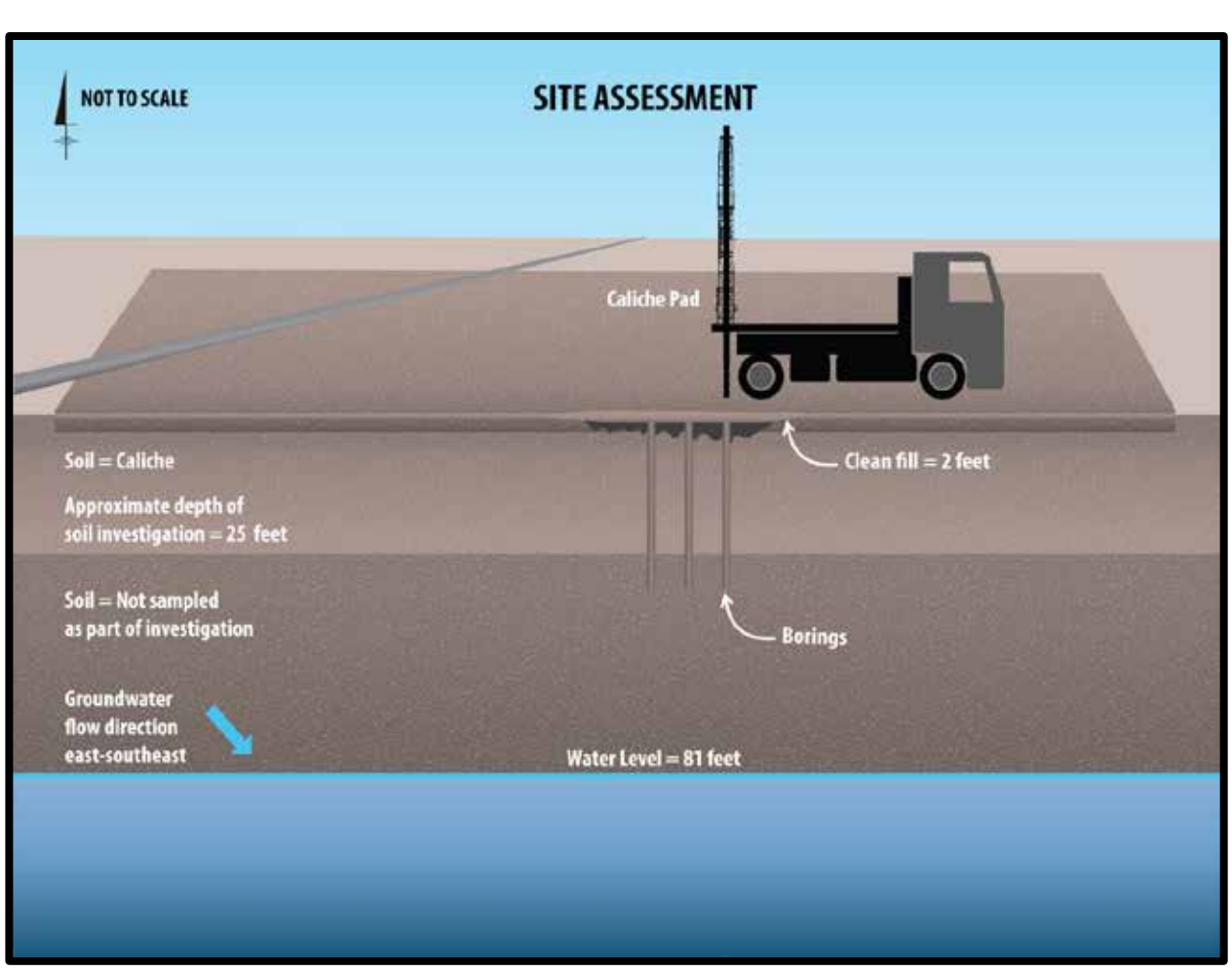
Site Conceptual Model



The site is located in the western edge of the Permian Basin with Lovington (the closest town) located approximately 5 miles northwest of the site. Due to the arid climate, the site experiences low precipitation and high evapotranspiration rates. According to information obtained from the NMOSE online database, groundwater near the site is encountered at a depth of approximately 81 feet bgs.



A release of approximately 1.7 bbls of produced water and 7.3 bbls of oil occurred at the site on May 13, 2012 due to the failure of a back pressure valve. Chevron personnel from the Mid-Continent Business Unit (MCBU) stopped the release and recovered approximately 8.3 bbls of fluids using a vacuum truck. Chevron MCBU personnel excavated visually impacted soil in the area to a depth of approximately 2 feet bgs and collected five discrete confirmation soil samples from the base of the excavation on June 25, 2012. After collecting the soil samples, the excavated area was reportedly backfilled with imported soil. Analyte concentrations in one or more confirmation soil samples were above regulatory criteria, which prompted additional site assessment activities .



In November 2013, ARCADIS conducted site assessment activities to characterize the lateral and vertical extents of soil impacts at the site. Soil boring locations were selected based on the results of confirmation soil sampling completed at the site in June 2012, locations of pipelines and other equipment at the site, and the extent of the release as documented by Chevron MCBU personnel during the initial response activities. Analyte concentrations in samples collected during the 2013 assessment were reported below site-specific criteria. Site assessment activities demonstrate that remaining soil concentrations associated with the release do not pose significant risk to groundwater resources or other receptors.

VACUUM/LOVINGTON FUNCTIONAL MANAGEMENT TEAM UNITS
LEA COUNTY, NEW MEXICO
SITE ASSESSMENT REPORT

Site Conceptual Model
LSAU/LPU

ARCADIS

FIGURE
1

ARCADIS

Attachment 2

New Mexico Office of the State Engineer ï Depth to Water

New Mexico Office of the State Engineer
Water Column/Average Depth to Water

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned, C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest)

(NAD83 UTM in meters)

(In feet)

POD Number	Code	POD Sub-basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
L 12562 POD4		L	LE	4	4	2	36	16S	36E	658584	3638296	308	121	106	15
L 01371		L	LE	4	3	4	36	16S	36E	658603	3638389*	401	115	45	70
L 12562 POD11		L	LE	2	4	2	01	17S	36E	658989	3637831	422	112	97	15
L 01584 POD1		L	LE		2	1	01	17S	36E	658107	3638083*	498	110	48	62
L 01438		L	LE		3	4	36	16S	36E	658504	3638490*	510	110	45	65
L 10633	R	L	LE			4	13	17S	36E	659026	3637389*	736	209	80	129
L 02561		L	LE	3	3	3	31	16S	37E	659210	3638403*	740	137	50	87
L 05486 POD2		L	LE	2	1	1	01	17S	36E	657802	3638175*	816	232	83	149
L 05486		L	LE	2	3	1	01	17S	36E	657808	3637773*	817	225	62	163
L 13332 POD1		L	LE	1	3	3	36	16S	37E	659161	3638638	861	106	102	4
L 01220 POD1		L	LE		3	3	31	16S	37E	659311	3638504*	881	120	55	65
L 01557 POD1		L	LE	4	3	3	36	16S	36E	657796	3638374*	888	110	40	70
L 04058 S19		L	LE	4	3	3	36	16S	36E	657796	3638374*	888	245	50	195
L 01713		L	LE		1	1	01	17S	36E	657703	3638076*	898	150	72	78
L 10633 S	R	L	LE			4	13	17S	36E	659026	3637189*	907	228	120	108
L 01350		L	LE		2	4	36	16S	36E	658901	3638899*	960	110	55	55
L 12562 POD12		L	LE	3	1	3	31	16S	37E	659166	3638783	978	109	94	15
L 02474		L	LE		1	3	06	17S	37E	659331	3637296*	1008	100	40	60
L 12562 POD10		L	LE	2	2	4	36	16S	36E	659032	3638913	1022	113	98	15
L 10633 POD4		L	LE	1	4	4	01	17S	36E	658832	3636987*	1028	209	80	129
L 12562 POD1		L	LE	2	2	4	36	16S	36E	658908	3639001	1059	120	105	15
L 12562 POD2		L	LE	2	2	3	36	16S	36E	659065	3638963	1081	112	97	15
L 04058 POD2		L	LE	2	2	4	36	16S	36E	659000	3638998*	1087	248	62	186
L 04058 S16		L	LE	2	2	4	36	16S	36E	659000	3638998*	1087	235	62	173
L 10633 POD5		L	LE	2	4	4	01	17S	36E	659032	3636987*	1091	228	120	108
L 10633 S2	R	L	LE			4	13	17S	36E	659032	3636987*	1091	196	80	116

***UTM location was derived from PLSS - see Help**

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned, C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)

(quarters are smallest to largest) (NAD83 UTM in meters) (In feet)

POD Number	POD Sub-basin	Code	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
L 10633 S4	L		LE	2	4	4	01	17S	36E	659032	3636987*	1091	204	110	94
L 12562 POD3	L		LE	3	1	3	31	16S	37E	659316	3638878	1144	108	93	15
L 13332 POD2	L		LE	4	3	2	36	16S	36E	658677	3639129	1144	120	104	16
L 02331	L		LE		4	4	01	17S	36E	658933	3636888*	1150	105	48	57
L 12562 POD14	L		LE		2	2	36	16S	36E	658677	3639136	1150	116	101	15
L 02119	L		LE	1	4	3	01	17S	36E	658024	3636973*	1165	130		
L 12562 POD8	L		LE	2	2	4	36	16S	36E	658992	3639097	1178	122	107	15
L 10633 POD6	L		LE	3	4	4	01	17S	36E	658832	3636787*	1223	196	80	116
L 02481	L		LE	4	4	2	02	17S	36E	657405	3637566*	1264	150	76	74
L 04058 S22	L		LE		1	3	36	16S	36E	657691	3638878*	1269	239	68	171
L 04058 S26	L		LE	4	4	2	36	16S	36E	658993	3639200*	1275	237		
L 12562 POD6	L		LE	4	4	2	36	16S	36E	659001	3639212	1288	124	109	15
L 12562 POD5	L		LE	3	3	1	31	16S	37E	659252	3639117	1305	120	105	15
L 12562 POD7	L		LE	4	4	2	36	16S	36E	658912	3639266	1316	122	107	15
L 10652	L		LE		4	3	31	16S	37E	659808	3638511*	1319	248	72	176
L 03676	L		LE		4	2	02	17S	36E	657306	3637667*	1330	75	68	7
L 04058 S23	L		LE		4	2	36	16S	36E	658894	3639301*	1346	119	90	29
L 13332 POD3	L		LE	2	3	2	36	16S	36E	658660	3639363	1377	128	123	5
L 04058 S18	L		LE	4	3	1	36	16S	36E	657783	3639180*	1443	265	50	215
L 12562 POD13	L		LE	2	4	2	36	16S	36E	658956	3639405	1462	120	105	15

Average Depth to Water: **81 feet**

Minimum Depth: **40 feet**

Maximum Depth: **123 feet**

Record Count: 46

Basin/County Search:

County: Lea

UTMNAD83 Radius Search (in meters):

Easting (X): 658596.79 **Northing (Y):** 3637988 **Radius:** 1500

***UTM location was derived from PLSS - see Help**

ARCADIS

Attachment 3

Release Notification and Corrective Action (C-141 Form)

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company CHEVRON U.S.A Inc.	Contact David Pagano
Address 56 Texas Camp Road, Lovington, NM 88260	Telephone No. Office: 575-396-4414 ext 275 Cellular: 505-787-9816
Facility Name Lovington San Andreas Battery	Facility Type Battery

Surface Owner State of New Mexico	Mineral Owner State of New Mexico	API No.

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
B	1	17.0S	36E					Lea

Latitude 32.868769° **Longitude** -103.305357°

NATURE OF RELEASE

Type of Release Spill to Land	Volume of Release 7.3 bbls of oil and 1.7 bbls of produced water	Volume Recovered 8.3 bbls
Source of Release Flare/Vent line	Date and Hour of Occurrence 05/13/12 6:45 AM	Date and Hour of Discovery 05/13/12 8:15 AM
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? Mr. Leking via voicemail	
By Whom? David Pagano	Date and Hour 05/13/12 3PM	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

NA

Describe Cause of Problem and Remedial Action Taken.*

Kim-Ray Back pressure Valve on the Lovington San Andres FWKO failed causing oil to release from the FWKO to the flare/vent line. On discovery vacuum truck contacted and vacuumed up the standing fluids. A total of 8.3bbls of fluids were recovered and sent to disposal.

Describe Area Affected and Cleanup Action Taken.*

Spill was located in pasture and next steps are for the visually contaminated soil to be excavated up to 2 feet and sent off for disposal and confirmation samples to be taken.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: David Pagano	OIL CONSERVATION DIVISION	
Printed Name: David Pagano	Approved by Environmental Specialist:	
Title: Health & Environmental Specialist	Approval Date:	Expiration Date:
E-mail Address: david.pagano@chevron.com	Conditions of Approval:	Attached ☐
Date: 04/24/12 Phone: 505-787-9816		

* Attach Additional Sheets If Necessary

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☒ Final Report

Name of Company: CHEVRON U.S.A. Inc.	Contact: Edem Sededji
Address: 56 Texas Camp Road, Lovington NM 88260	Telephone No.: Office: (575) 396-4414 Mobile: (432) 234-4437
Facility Name: Lovington San Andreas Battery	Facility Type: Battery

Surface Owner: State of New Mexico	Mineral Owner: State of New Mexico	API No.

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
B	1	17.0S	36E					Lea

Latitude 32.868769° **Longitude** -103.305357°

NATURE OF RELEASE

Type of Release: Spill to Land	Volume of Release: 7.3 bbls of oil and 1.7 bbls of produced water	Volume Recovered: 8.3 bbls
Source of Release: Flare/Vent line	Date and Hour of Occurrence: 05/13/12 6:45 AM	Date and Hour of Discovery: 05/13/12 8:15 AM
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? Mr. Leking via voicemail	
By Whom? David Pagano	Date and Hour: 05/13/12 3:00 PM	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*
N/A

Describe Cause of Problem and Remedial Action Taken.*

Kim-Ray back pressure valve on the Lovington San Andres FWKO failed causing oil to release from the FWKO to the flare/vent line. On discovery, a vacuum truck contacted and vacuumed up the standing fluids. A total of 8.3 bbls of fluids were recovered and sent to disposal. The Kim-Ray back pressure valve was also repaired.

Describe Area Affected and Cleanup Action Taken.*

Visually impacted soils in the area were excavated to a depth of approximately two feet bgs. Five discrete soil confirmation samples were collected from the base of the excavation before the excavated area was reportedly backfilled with imported soils. These sampling results indicated the presence of hydrocarbon concentrations in shallow soils at levels of regulatory concern.

In response to these sampling results, an additional site assessment was conducted to confirm the extents of soil impacts.

Results of the additional assessment activities are provided in the attached report.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: Luke Welch	OIL CONSERVATION DIVISION	
Printed Name: Luke Welch	Approved by Environmental Specialist:	
Title: Project Manager	Approval Date:	Expiration Date:
E-mail Address: LWelch@chevron.com	Conditions of Approval:	Attached ☐
Date: 8/12/14 Phone: (713) 372-0292		

* Attach Additional Sheets If Necessary

ARCADIS

Attachment 4

Laboratory Analytical Reports

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

June 28, 2012

DAVID PAGANO

Chevron - Lovington

HCR 60 Box 423

Lovington, NM 88260

RE: SOIL SAMPLES

Enclosed are the results of analyses for samples received by the laboratory on 06/26/12 17:00.

Cardinal Laboratories is accredited through Texas NELAP under certificate number T104704398-11-3. Accreditation applies to drinking water, non-potable water and solid and chemical materials. All accredited analytes are denoted by an asterisk (*). For a complete list of accredited analytes and matrices visit the TCEQ website at www.tceq.texas.gov/field/qa/lab_accred_certif.html.

Cardinal Laboratories is accreditated through the State of Colorado Department of Public Health and Environment for:

Method EPA 552.2	Haloacetic Acids (HAA-5)
Method EPA 524.2	Total Trihalomethanes (TTHM)
Method EPA 524.4	Regulated VOCs (V1, V2, V3)

Accreditation applies to public drinking water matrices.

This report meets NELAP requirements and is made up of a cover page, analytical results, and a copy of the original chain-of-custody. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Celey D. Keene

Celey D. Keene

Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Chevron - Lovington
DAVID PAGANO
HCR 60 Box 423
Lovington NM, 88260
Fax To: None

Received:	06/26/2012	Sampling Date:	06/25/2012
Reported:	06/28/2012	Sampling Type:	Soil
Project Name:	SOIL SAMPLES	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: LPU BTY SS #1 (H201449-01)

BTEX 8021B mg/kg **Analyzed By: ZZZ**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	06/27/2012	ND	2.11	105	2.00	8.79	
Toluene*	<0.050	0.050	06/27/2012	ND	2.12	106	2.00	9.77	
Ethylbenzene*	<0.050	0.050	06/27/2012	ND	2.15	107	2.00	9.79	
Total Xylenes*	**0.202**	0.150	06/27/2012	ND	6.44	107	6.00	10.1	

Surrogate: 4-Bromofluorobenzene (PID *110 %* *89.4-126*

Chloride, SM4500Cl-B mg/kg **Analyzed By: HM**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**80.0**	16.0	06/28/2012	ND	416	104	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS** **S-04**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	**17.4**	10.0	06/27/2012	ND	177	88.3	200	7.87	
DRO >C10-C28	**4700**	10.0	06/27/2012	ND	185	92.4	200	11.5	

Surrogate: 1-Chlorooctane *80.5 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *192 %* *63.6-154*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Chevron - Lovington
DAVID PAGANO
HCR 60 Box 423
Lovington NM, 88260
Fax To: None

Received:	06/26/2012	Sampling Date:	06/25/2012
Reported:	06/28/2012	Sampling Type:	Soil
Project Name:	SOIL SAMPLES	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: LPU BTY SS #2 (H201449-02)

BTEX 8021B mg/kg Analyzed By: ZZZ

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	06/27/2012	ND	2.11	105	2.00	8.79	
Toluene*	<0.050	0.050	06/27/2012	ND	2.12	106	2.00	9.77	
Ethylbenzene*	<0.050	0.050	06/27/2012	ND	2.15	107	2.00	9.79	
Total Xylenes*	<0.150	0.150	06/27/2012	ND	6.44	107	6.00	10.1	

Surrogate: 4-Bromofluorobenzene (PID *105 %* *89.4-126*

Chloride, SM4500Cl-B mg/kg Analyzed By: HM

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**96.0**	16.0	06/28/2012	ND	416	104	400	0.00	

TPH 8015M mg/kg Analyzed By: MS

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	06/27/2012	ND	177	88.3	200	7.87	
DRO >C10-C28	**791**	10.0	06/27/2012	ND	185	92.4	200	11.5	

Surrogate: 1-Chlorooctane *79.0 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *145 %* *63.6-154*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Chevron - Lovington
DAVID PAGANO
HCR 60 Box 423
Lovington NM, 88260
Fax To: None

Received:	06/26/2012	Sampling Date:	06/25/2012
Reported:	06/28/2012	Sampling Type:	Soil
Project Name:	SOIL SAMPLES	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: LPU BTY SS #3 (H201449-03)

BTEX 8021B mg/kg **Analyzed By: ZZZ**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	06/27/2012	ND	2.11	105	2.00	8.79	
Toluene*	<0.050	0.050	06/27/2012	ND	2.12	106	2.00	9.77	
Ethylbenzene*	<0.050	0.050	06/27/2012	ND	2.15	107	2.00	9.79	
Total Xylenes*	<0.150	0.150	06/27/2012	ND	6.44	107	6.00	10.1	

Surrogate: 4-Bromofluorobenzene (PID *105 %* *89.4-126*

Chloride, SM4500Cl-B mg/kg **Analyzed By: HM**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**32.0**	16.0	06/28/2012	ND	416	104	400	0.00	

TPH 8015M mg/kg **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	06/27/2012	ND	177	88.3	200	7.87	
DRO >C10-C28	**918**	10.0	06/27/2012	ND	185	92.4	200	11.5	

Surrogate: 1-Chlorooctane *72.7 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *99.9 %* *63.6-154*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Chevron - Lovington
DAVID PAGANO
HCR 60 Box 423
Lovington NM, 88260
Fax To: None

Received:	06/26/2012	Sampling Date:	06/25/2012
Reported:	06/28/2012	Sampling Type:	Soil
Project Name:	SOIL SAMPLES	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: LPU BTY SS #4 (H201449-04)

BTEX 8021B mg/kg **Analyzed By: ZZZ**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	06/27/2012	ND	2.11	105	2.00	8.79	
Toluene*	<0.050	0.050	06/27/2012	ND	2.12	106	2.00	9.77	
Ethylbenzene*	<0.050	0.050	06/27/2012	ND	2.15	107	2.00	9.79	
Total Xylenes*	<0.150	0.150	06/27/2012	ND	6.44	107	6.00	10.1	

Surrogate: 4-Bromofluorobenzene (PID *105 %* *89.4-126*

Chloride, SM4500Cl-B mg/kg **Analyzed By: HM**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**224**	16.0	06/28/2012	ND	416	104	400	3.92	

TPH 8015M mg/kg **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	06/27/2012	ND	177	88.3	200	7.87	
DRO >C10-C28	**422**	10.0	06/27/2012	ND	185	92.4	200	11.5	

Surrogate: 1-Chlorooctane *74.5 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *93.5 %* *63.6-154*

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Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Analytical Results For:

Chevron - Lovington
DAVID PAGANO
HCR 60 Box 423
Lovington NM, 88260
Fax To: None

Received:	06/26/2012	Sampling Date:	06/25/2012
Reported:	06/28/2012	Sampling Type:	Soil
Project Name:	SOIL SAMPLES	Sampling Condition:	Cool & Intact
Project Number:	NONE GIVEN	Sample Received By:	Jodi Henson
Project Location:	NOT GIVEN		

Sample ID: LPU BTY SS #5 (H201449-05)

BTEX 8021B mg/kg **Analyzed By: ZZZ**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Benzene*	<0.050	0.050	06/27/2012	ND	2.11	105	2.00	8.79	
Toluene*	<0.050	0.050	06/27/2012	ND	2.12	106	2.00	9.77	
Ethylbenzene*	<0.050	0.050	06/27/2012	ND	2.15	107	2.00	9.79	
Total Xylenes*	<0.150	0.150	06/27/2012	ND	6.44	107	6.00	10.1	

Surrogate: 4-Bromofluorobenzene (PID *105 %* *89.4-126*

Chloride, SM4500Cl-B mg/kg **Analyzed By: HM**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
Chloride	**80.0**	16.0	06/28/2012	ND	416	104	400	3.92	

TPH 8015M mg/kg **Analyzed By: MS**

Analyte	Result	Reporting Limit	Analyzed	Method Blank	BS	% Recovery	True Value QC	RPD	Qualifier
GRO C6-C10	<10.0	10.0	06/27/2012	ND	177	88.3	200	7.87	
DRO >C10-C28	**222**	10.0	06/27/2012	ND	185	92.4	200	11.5	

Surrogate: 1-Chlorooctane *73.2 %* *65.2-140*

Surrogate: 1-Chlorooctadecane *87.9 %* *63.6-154*

Cardinal Laboratories *=Accredited Analyte

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

PHONE (575) 393-2326 ° 101 E. MARLAND ° HOBBS, NM 88240

Notes and Definitions

S-04	The surrogate recovery for this sample is outside of established control limits due to a sample matrix effect.
QM-4X	The spike recovery was outside of QC acceptance limits for the MS and/or MSD due to analyte concentration at 4 times or greater the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
ND	Analyte NOT DETECTED at or above the reporting limit
RPD	Relative Percent Difference
**	Samples not received at proper temperature of 6°C or below.
***	Insufficient time to reach temperature.
-	Chloride by SM4500Cl-B does not require samples be received at or below 6°C
	Samples reported on an as received basis (wet) unless otherwise noted on report

Celey D. Keene

Celey D. Keene, Lab Director/Quality Manager

CARDINAL Laboratories

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240
(575) 393-2326 FAX (575) 393-2476

Company Name: Chevron
Project Manager: David Pagano
Address: 56 Texas Camp Rd.
City: Lovington State: NM Zip: 88260
Phone #: 505-787-9816 Fax #:
Project #: Project Owner:
Project Name:
Project Location:
Sampler Name:

BILL TO
P.O. #:
Company: Chevron
Attn: Nick Moschetti
Address: 56 Texas Camp Rd.
City: Lovington
State: NM Zip: 88260
Phone #: 575-396-4414 x201
Fax #:

ANALYSIS REQUEST

FOR LAB USE ONLY

Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	PRESERV.: ACID/BASE:	ICE / COOL	OTHER:	SAMPLING: DATE	TIME	TPH	BTEX	Chlorides
H201449																	
1	LPU BTY SS #1	G	1			✓							6/25/12	9:15	✓	✓	✓
2	LPU BTY SS #2	G	1			✓								9:18			
3	LPU BTY SS #3	G	1			✓								9:20			
4	LPU BTY SS #4	G	1			✓								9:25			
5	LPU BTY SS #5	G	1			✓								9:29			

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequental damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By: David Pagano Date: 6/26/12 Time: 5:00 Received By: Jodi Henson
Relinquished By: Date: Time: Received By:
Delivered By: (Circle One)
Sampler - UPS - Bus - Other: 4.5°C

Sample Condition: Cool ☑ Yes ☐ No Intact ☑ Yes ☐ No
CHECKED BY: (Initials)

Phone Result: ☐ Yes ☐ No Add'l Phone #:
Fax Result: ☐ Yes ☐ No Add'l Fax #:
REMARKS:

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Houston
6310 Rothway Street
Houston, TX 77040
Tel: (713)690-4444

TestAmerica Job ID: 600-82259-1
Client Project/Site: HES Transfer Sites, Lea County NM

For:
ARCADIS U.S., Inc.
2929 Briarpark Drive
Suite 300
Houston, Texas 77042

Attn: Mr. Jonathan Olsen

SKudchadkar

Authorized for release by:
11/22/2013 4:56:24 PM

Sachin Kudchadkar, Senior Project Manager
(713)690-4444
sachin.kudchadkar@testamericainc.com

Table of Contents

Job ID: 600-82259-1

Laboratory: TestAmerica Houston

Narrative

Job Narrative
600-82259-1

Comments
No additional comments.

Receipt
The samples were received on 11/7/2013 7:01 AM; the samples arrived in good condition, properly preserved and, where required, on ice.
The temperatures of the 5 coolers at receipt time were 1.6º C, 1.7º C, 3.0º C, 3.0º C and 3.7º C.

GC/MS VOA
No analytical or quality issues were noted.

GC VOA
No analytical or quality issues were noted.

GC Semi VOA
No analytical or quality issues were noted.

General Chemistry
Method(s) 9056: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 120752 were outside control limits for Chloride.
The associated laboratory control sample (LCS) recovery met acceptance criteria.

Method(s) 9056: The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 120752 were outside control limits for Chloride.
The associated laboratory control sample (LCS) recovery met acceptance criteria.

No other analytical or quality issues were noted.

Industrial Hygiene
No analytical or quality issues were noted.

Organic Prep
No analytical or quality issues were noted.

Method Summary

Client: ARCADIS U.S., Inc.
Project/Site: HES Transfer Sites, Lea County NM

TestAmerica Job ID: 600-82259-1

Method	Method Description	Protocol	Laboratory
8015B	Gasoline Range Organics - (GC)	SW846	TAL HOU
8021B	Volatile Organic Compounds (GC)	SW846	TAL HOU
8015B	Diesel Range Organics (DRO) (GC)	SW846	TAL HOU
9056	Anions, Ion Chromatography	SW846	TAL HOU
Moisture	Percent Moisture	EPA	TAL HOU

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL HOU = TestAmerica Houston, 6310 Rothway Street, Houston, TX 77040, TEL (713)690-4444

Sample Summary

Client: ARCADIS U.S., Inc.
Project/Site: HES Transfer Sites, Lea County NM

TestAmerica Job ID: 600-82259-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
600-82259-7	LPULSABAT-02-02	Solid	11/01/13 14:53	11/07/13 07:01
600-82259-8	LPULSABAT-02-05	Solid	11/01/13 14:55	11/07/13 07:01
600-82259-9	LPULSABAT-02-10	Solid	11/01/13 14:57	11/07/13 07:01
600-82259-10	LPULSABAT-02-15	Solid	11/01/13 15:00	11/07/13 07:01
600-82259-11	LPULSABAT-02-20	Solid	11/01/13 15:02	11/07/13 07:01
600-82259-12	LPULSABAT-02-25	Solid	11/01/13 15:04	11/07/13 07:01
600-82259-13	LPULSABAT-03-02	Solid	11/01/13 15:38	11/07/13 07:01
600-82259-14	LPULSABAT-03-05	Solid	11/01/13 15:42	11/07/13 07:01
600-82259-15	LPULSABAT-03-10	Solid	11/01/13 15:44	11/07/13 07:01
600-82259-16	LPULSABAT-03-15	Solid	11/01/13 15:46	11/07/13 07:01
600-82259-17	LPULSABAT-03-20	Solid	11/01/13 15:48	11/07/13 07:01
600-82259-18	LPULSABAT-03-25	Solid	11/01/13 15:50	11/07/13 07:01
600-82259-19	LPULSABAT-04-02	Solid	11/02/13 10:41	11/07/13 07:01
600-82259-20	LPULSABAT-04-05	Solid	11/02/13 10:43	11/07/13 07:01
600-82259-21	LPULSABAT-04-10	Solid	11/02/13 10:45	11/07/13 07:01
600-82259-22	LPULSABAT-04-15	Solid	11/02/13 10:47	11/07/13 07:01
600-82259-23	LPULSABAT-04-20	Solid	11/02/13 10:49	11/07/13 07:01
600-82259-24	LPULSABAT-04-25	Solid	11/02/13 10:51	11/07/13 07:01

Client Sample ID: LPULSABAT-02-02

Lab Sample ID: 600-82259-7

Date Collected: 11/01/13 14:53
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 94.8

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	2.9		1.1		mg/Kg	☼	11/07/13 10:12	11/11/13 11:28	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*104*		*50 - 150*	*11/07/13 10:12*	*11/11/13 11:28*	*1*
4-Bromofluorobenzene	*94*		*50 - 150*	*11/07/13 10:12*	*11/11/13 11:28*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 19:39	1
Toluene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 19:39	1
Ethylbenzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 19:39	1
Xylenes, Total	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 19:39	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*105*		*43 - 141*	*11/07/13 09:01*	*11/14/13 19:39*	*1*
a,a,a-Trifluorotoluene	*90*		*44 - 134*	*11/07/13 09:01*	*11/14/13 19:39*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	9.3		8.7		mg/Kg	☼	11/11/13 10:58	11/12/13 18:54	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*83*		*60 - 140*	*11/11/13 10:58*	*11/12/13 18:54*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	5.2		1.0		%			11/07/13 13:58	1
Percent Solids	95		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	100		4.2		mg/Kg	☼		11/16/13 14:41	1

Client Sample ID: LPULSABAT-02-05

Lab Sample ID: 600-82259-8

Date Collected: 11/01/13 14:55
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 93.6

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	3.2		1.1		mg/Kg	☼	11/07/13 10:12	11/11/13 11:53	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*105*		*50 - 150*	*11/07/13 10:12*	*11/11/13 11:53*	*1*
4-Bromofluorobenzene	*94*		*50 - 150*	*11/07/13 10:12*	*11/11/13 11:53*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 20:01	1
Toluene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 20:01	1
Ethylbenzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 20:01	1

Client Sample ID: LPULSABAT-02-05

Lab Sample ID: 600-82259-8

Date Collected: 11/01/13 14:55
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 93.6

Method: 8021B - Volatile Organic Compounds (GC) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Xylenes, Total	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 20:01	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*68*		*43 - 141*	*11/07/13 09:01*	*11/14/13 20:01*	*1*
a,a,a-Trifluorotoluene	*57*		*44 - 134*	*11/07/13 09:01*	*11/14/13 20:01*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		8.8		mg/Kg	☼	11/11/13 10:58	11/12/13 20:34	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*86*		*60 - 140*	*11/11/13 10:58*	*11/12/13 20:34*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**6.4**		1.0		%			11/07/13 13:58	1
Percent Solids	**94**		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**81**		4.3		mg/Kg	☼		11/16/13 14:54	1

Client Sample ID: LPULSABAT-02-10

Lab Sample ID: 600-82259-9

Date Collected: 11/01/13 14:57
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 85.7

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	**2.5**		1.2		mg/Kg	☼	11/07/13 10:12	11/11/13 12:18	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*105*		*50 - 150*	*11/07/13 10:12*	*11/11/13 12:18*	*1*
4-Bromofluorobenzene	*95*		*50 - 150*	*11/07/13 10:12*	*11/11/13 12:18*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.023		mg/Kg	☼	11/07/13 09:01	11/14/13 20:22	1
Toluene	ND		0.023		mg/Kg	☼	11/07/13 09:01	11/14/13 20:22	1
Ethylbenzene	ND		0.023		mg/Kg	☼	11/07/13 09:01	11/14/13 20:22	1
Xylenes, Total	ND		0.023		mg/Kg	☼	11/07/13 09:01	11/14/13 20:22	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*98*		*43 - 141*	*11/07/13 09:01*	*11/14/13 20:22*	*1*
a,a,a-Trifluorotoluene	*75*		*44 - 134*	*11/07/13 09:01*	*11/14/13 20:22*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		9.7		mg/Kg	☼	11/11/13 10:58	11/12/13 21:07	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*73*		*60 - 140*	*11/11/13 10:58*	*11/12/13 21:07*	*1*

Client: ARCADIS U.S., Inc.
Project/Site: HES Transfer Sites, Lea County NM

TestAmerica Job ID: 600-82259-1

Client Sample ID: LPULSABAT-02-10

Lab Sample ID: 600-82259-9

Date Collected: 11/01/13 14:57
Matrix: Solid
Date Received: 11/07/13 07:01

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	14		1.0		%			11/07/13 13:58	1
Percent Solids	86		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	22		4.7		mg/Kg	☼		11/16/13 15:08	1

Client Sample ID: LPULSABAT-02-15

Lab Sample ID: 600-82259-10

Date Collected: 11/01/13 15:00
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 88.6

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	2.4		1.1		mg/Kg	☼	11/07/13 10:12	11/11/13 13:00	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*104*		*50 - 150*	*11/07/13 10:12*	*11/11/13 13:00*	*1*
4-Bromofluorobenzene	*89*		*50 - 150*	*11/07/13 10:12*	*11/11/13 13:00*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.023		mg/Kg	☼	11/07/13 16:30	11/14/13 13:31	1
Toluene	ND		0.023		mg/Kg	☼	11/07/13 16:30	11/14/13 13:31	1
Ethylbenzene	ND		0.023		mg/Kg	☼	11/07/13 16:30	11/14/13 13:31	1
Xylenes, Total	ND		0.023		mg/Kg	☼	11/07/13 16:30	11/14/13 13:31	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*98*		*43 - 141*	*11/07/13 16:30*	*11/14/13 13:31*	*1*
a,a,a-Trifluorotoluene	*98*		*44 - 134*	*11/07/13 16:30*	*11/14/13 13:31*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		9.4		mg/Kg	☼	11/11/13 10:58	11/12/13 21:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*71*		*60 - 140*	*11/11/13 10:58*	*11/12/13 21:41*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	11		1.0		%			11/07/13 13:58	1
Percent Solids	89		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	34		4.5		mg/Kg	☼		11/16/13 15:21	1

Client Sample ID: LPULSABAT-02-20

Lab Sample ID: 600-82259-11

Date Collected: 11/01/13 15:02
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 96.2

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	2.1		1.0		mg/Kg	☼	11/07/13 10:12	11/11/13 13:25	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*104*		*50 - 150*	*11/07/13 10:12*	*11/11/13 13:25*	*1*
4-Bromofluorobenzene	*91*		*50 - 150*	*11/07/13 10:12*	*11/11/13 13:25*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 21:06	1
Toluene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 21:06	1
Ethylbenzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 21:06	1
Xylenes, Total	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 21:06	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*91*		*43 - 141*	*11/07/13 09:01*	*11/14/13 21:06*	*1*
a,a,a-Trifluorotoluene	*76*		*44 - 134*	*11/07/13 09:01*	*11/14/13 21:06*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		8.6		mg/Kg	☼	11/11/13 10:58	11/12/13 22:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*64*		*60 - 140*	*11/11/13 10:58*	*11/12/13 22:14*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	3.8		1.0		%			11/07/13 13:58	1
Percent Solids	96		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	120		4.2		mg/Kg	☼		11/16/13 16:02	1

Client Sample ID: LPULSABAT-02-25

Lab Sample ID: 600-82259-12

Date Collected: 11/01/13 15:04
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 96.8

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	3.7		1.0		mg/Kg	☼	11/07/13 10:12	11/11/13 13:50	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*106*		*50 - 150*	*11/07/13 10:12*	*11/11/13 13:50*	*1*
4-Bromofluorobenzene	*95*		*50 - 150*	*11/07/13 10:12*	*11/11/13 13:50*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 21:28	1
Toluene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 21:28	1
Ethylbenzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 21:28	1

Client Sample ID: LPULSABAT-02-25

Lab Sample ID: 600-82259-12

Date Collected: 11/01/13 15:04
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 96.8

Method: 8021B - Volatile Organic Compounds (GC) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Xylenes, Total	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 21:28	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*95*		*43 - 141*	*11/07/13 09:01*	*11/14/13 21:28*	*1*
a,a,a-Trifluorotoluene	*77*		*44 - 134*	*11/07/13 09:01*	*11/14/13 21:28*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		8.6		mg/Kg	☼	11/11/13 10:58	11/12/13 22:47	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*75*		*60 - 140*	*11/11/13 10:58*	*11/12/13 22:47*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**3.2**		1.0		%			11/07/13 13:58	1
Percent Solids	**97**		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**300**		4.1		mg/Kg	☼		11/16/13 16:15	1

Client Sample ID: LPULSABAT-03-02

Lab Sample ID: 600-82259-13

Date Collected: 11/01/13 15:38
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 91.3

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	**2.9**		1.1		mg/Kg	☼	11/07/13 10:12	11/11/13 14:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*106*		*50 - 150*	*11/07/13 10:12*	*11/11/13 14:15*	*1*
4-Bromofluorobenzene	*99*		*50 - 150*	*11/07/13 10:12*	*11/11/13 14:15*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.022		mg/Kg	☼	11/07/13 09:01	11/14/13 21:50	1
Toluene	ND		0.022		mg/Kg	☼	11/07/13 09:01	11/14/13 21:50	1
Ethylbenzene	ND		0.022		mg/Kg	☼	11/07/13 09:01	11/14/13 21:50	1
Xylenes, Total	ND		0.022		mg/Kg	☼	11/07/13 09:01	11/14/13 21:50	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*82*		*43 - 141*	*11/07/13 09:01*	*11/14/13 21:50*	*1*
a,a,a-Trifluorotoluene	*70*		*44 - 134*	*11/07/13 09:01*	*11/14/13 21:50*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		9.1		mg/Kg	☼	11/11/13 10:58	11/12/13 23:53	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*69*		*60 - 140*	*11/11/13 10:58*	*11/12/13 23:53*	*1*

Client Sample ID: LPULSABAT-03-02

Lab Sample ID: 600-82259-13

Date Collected: 11/01/13 15:38

Matrix: Solid

Date Received: 11/07/13 07:01

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	8.7		1.0		%			11/07/13 13:58	1
Percent Solids	91		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	18		4.4		mg/Kg	☼		11/16/13 16:56	1

Client Sample ID: LPULSABAT-03-05

Lab Sample ID: 600-82259-14

Date Collected: 11/01/13 15:42

Matrix: Solid

Date Received: 11/07/13 07:01

Percent Solids: 96.5

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	2.6		1.0		mg/Kg	☼	11/07/13 10:12	11/11/13 14:40	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*105*		*50 - 150*	*11/07/13 10:12*	*11/11/13 14:40*	*1*
4-Bromofluorobenzene	*96*		*50 - 150*	*11/07/13 10:12*	*11/11/13 14:40*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 22:12	1
Toluene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 22:12	1
Ethylbenzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 22:12	1
Xylenes, Total	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 22:12	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*104*		*43 - 141*	*11/07/13 09:01*	*11/14/13 22:12*	*1*
a,a,a-Trifluorotoluene	*80*		*44 - 134*	*11/07/13 09:01*	*11/14/13 22:12*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		8.6		mg/Kg	☼	11/11/13 10:58	11/13/13 00:26	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*67*		*60 - 140*	*11/11/13 10:58*	*11/13/13 00:26*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	3.5		1.0		%			11/07/13 13:58	1
Percent Solids	96		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	12		4.1		mg/Kg	☼		11/16/13 17:10	1

Client Sample ID: LPULSABAT-03-10

Lab Sample ID: 600-82259-15

Date Collected: 11/01/13 15:44
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 93.1

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	2.6		1.1		mg/Kg	☼	11/07/13 10:12	11/11/13 16:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*106*		*50 - 150*	*11/07/13 10:12*	*11/11/13 16:15*	*1*
4-Bromofluorobenzene	*94*		*50 - 150*	*11/07/13 10:12*	*11/11/13 16:15*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 23:18	1
Toluene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 23:18	1
Ethylbenzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 23:18	1
Xylenes, Total	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/14/13 23:18	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*118*		*43 - 141*	*11/07/13 09:01*	*11/14/13 23:18*	*1*
a,a,a-Trifluorotoluene	*81*		*44 - 134*	*11/07/13 09:01*	*11/14/13 23:18*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		8.9		mg/Kg	☼	11/11/13 10:58	11/13/13 00:58	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*68*		*60 - 140*	*11/11/13 10:58*	*11/13/13 00:58*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	6.9		1.0		%			11/07/13 13:58	1
Percent Solids	93		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	41		4.3		mg/Kg	☼		11/16/13 17:23	1

Client Sample ID: LPULSABAT-03-15

Lab Sample ID: 600-82259-16

Date Collected: 11/01/13 15:46
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 90.6

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	2.6		1.1		mg/Kg	☼	11/07/13 10:12	11/11/13 16:40	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*105*		*50 - 150*	*11/07/13 10:12*	*11/11/13 16:40*	*1*
4-Bromofluorobenzene	*95*		*50 - 150*	*11/07/13 10:12*	*11/11/13 16:40*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.022		mg/Kg	☼	11/07/13 16:30	11/14/13 13:51	1
Toluene	ND		0.022		mg/Kg	☼	11/07/13 16:30	11/14/13 13:51	1
Ethylbenzene	ND		0.022		mg/Kg	☼	11/07/13 16:30	11/14/13 13:51	1

Client Sample ID: LPULSABAT-03-15

Date Collected: 11/01/13 15:46
Date Received: 11/07/13 07:01

Lab Sample ID: 600-82259-16
Matrix: Solid
Percent Solids: 90.6

Method: 8021B - Volatile Organic Compounds (GC) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Xylenes, Total	ND		0.022		mg/Kg	☼	11/07/13 16:30	11/14/13 13:51	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*103*		*43 - 141*	*11/07/13 16:30*	*11/14/13 13:51*	*1*
a,a,a-Trifluorotoluene	*100*		*44 - 134*	*11/07/13 16:30*	*11/14/13 13:51*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		9.2		mg/Kg	☼	11/11/13 10:58	11/13/13 01:31	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*69*		*60 - 140*	*11/11/13 10:58*	*11/13/13 01:31*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**9.4**		1.0		%			11/07/13 13:58	1
Percent Solids	**91**		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**170**		4.4		mg/Kg	☼		11/16/13 17:37	1

Client Sample ID: LPULSABAT-03-20

Date Collected: 11/01/13 15:48
Date Received: 11/07/13 07:01

Lab Sample ID: 600-82259-17
Matrix: Solid
Percent Solids: 94.3

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	**2.6**		1.1		mg/Kg	☼	11/07/13 10:12	11/11/13 17:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*106*		*50 - 150*	*11/07/13 10:12*	*11/11/13 17:05*	*1*
4-Bromofluorobenzene	*95*		*50 - 150*	*11/07/13 10:12*	*11/11/13 17:05*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/15/13 00:02	1
Toluene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/15/13 00:02	1
Ethylbenzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/15/13 00:02	1
Xylenes, Total	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/15/13 00:02	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*107*		*43 - 141*	*11/07/13 09:01*	*11/15/13 00:02*	*1*
a,a,a-Trifluorotoluene	*75*		*44 - 134*	*11/07/13 09:01*	*11/15/13 00:02*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		8.8		mg/Kg	☼	11/11/13 10:58	11/13/13 02:04	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*66*		*60 - 140*	*11/11/13 10:58*	*11/13/13 02:04*	*1*

Client Sample ID: LPULSABAT-03-20

Lab Sample ID: 600-82259-17

Date Collected: 11/01/13 15:48
Matrix: Solid
Date Received: 11/07/13 07:01

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	5.7		1.0		%			11/07/13 13:58	1
Percent Solids	94		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	240		4.2		mg/Kg	☼		11/16/13 17:50	1

Client Sample ID: LPULSABAT-03-25

Lab Sample ID: 600-82259-18

Date Collected: 11/01/13 15:50
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 81.1

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	2.8		1.2		mg/Kg	☼	11/07/13 10:12	11/11/13 18:19	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*103*		*50 - 150*	*11/07/13 10:12*	*11/11/13 18:19*	*1*
4-Bromofluorobenzene	*91*		*50 - 150*	*11/07/13 10:12*	*11/11/13 18:19*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.025		mg/Kg	☼	11/07/13 09:01	11/15/13 07:25	1
Toluene	ND		0.025		mg/Kg	☼	11/07/13 09:01	11/15/13 07:25	1
Ethylbenzene	ND		0.025		mg/Kg	☼	11/07/13 09:01	11/15/13 07:25	1
Xylenes, Total	ND		0.025		mg/Kg	☼	11/07/13 09:01	11/15/13 07:25	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*96*		*43 - 141*	*11/07/13 09:01*	*11/15/13 07:25*	*1*
a,a,a-Trifluorotoluene	*69*		*44 - 134*	*11/07/13 09:01*	*11/15/13 07:25*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		10		mg/Kg	☼	11/11/13 10:58	11/13/13 02:36	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*70*		*60 - 140*	*11/11/13 10:58*	*11/13/13 02:36*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	19		1.0		%			11/07/13 13:58	1
Percent Solids	81		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	400		4.9		mg/Kg	☼		11/16/13 18:04	1

Client Sample ID: LPULSABAT-04-02

Lab Sample ID: 600-82259-19

Date Collected: 11/02/13 10:41
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 85.7

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	3.5		1.2		mg/Kg	☼	11/07/13 10:12	11/11/13 18:44	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*105*		*50 - 150*	*11/07/13 10:12*	*11/11/13 18:44*	*1*
4-Bromofluorobenzene	*95*		*50 - 150*	*11/07/13 10:12*	*11/11/13 18:44*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.023		mg/Kg	☼	11/07/13 09:01	11/15/13 07:53	1
Toluene	ND		0.023		mg/Kg	☼	11/07/13 09:01	11/15/13 07:53	1
Ethylbenzene	ND		0.023		mg/Kg	☼	11/07/13 09:01	11/15/13 07:53	1
Xylenes, Total	ND		0.023		mg/Kg	☼	11/07/13 09:01	11/15/13 07:53	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*89*		*43 - 141*	*11/07/13 09:01*	*11/15/13 07:53*	*1*
a,a,a-Trifluorotoluene	*63*		*44 - 134*	*11/07/13 09:01*	*11/15/13 07:53*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		9.7		mg/Kg	☼	11/11/13 10:58	11/13/13 03:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*74*		*60 - 140*	*11/11/13 10:58*	*11/13/13 03:09*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	14		1.0		%			11/07/13 13:58	1
Percent Solids	86		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	39		4.7		mg/Kg	☼		11/16/13 19:38	1

Client Sample ID: LPULSABAT-04-05

Lab Sample ID: 600-82259-20

Date Collected: 11/02/13 10:43
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 87.1

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	3.1		1.1		mg/Kg	☼	11/07/13 10:12	11/11/13 19:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*105*		*50 - 150*	*11/07/13 10:12*	*11/11/13 19:09*	*1*
4-Bromofluorobenzene	*95*		*50 - 150*	*11/07/13 10:12*	*11/11/13 19:09*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.023		mg/Kg	☼	11/07/13 09:01	11/15/13 11:01	1
Toluene	ND		0.023		mg/Kg	☼	11/07/13 09:01	11/15/13 11:01	1
Ethylbenzene	ND		0.023		mg/Kg	☼	11/07/13 09:01	11/15/13 11:01	1

Client Sample ID: LPULSABAT-04-05

Lab Sample ID: 600-82259-20

Date Collected: 11/02/13 10:43
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 87.1

Method: 8021B - Volatile Organic Compounds (GC) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Xylenes, Total	ND		0.023		mg/Kg	☼	11/07/13 09:01	11/15/13 11:01	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*99*		*43 - 141*	*11/07/13 09:01*	*11/15/13 11:01*	*1*
a,a,a-Trifluorotoluene	*89*		*44 - 134*	*11/07/13 09:01*	*11/15/13 11:01*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		9.5		mg/Kg	☼	11/11/13 10:58	11/13/13 03:41	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*70*		*60 - 140*	*11/11/13 10:58*	*11/13/13 03:41*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**13**		1.0		%			11/07/13 13:58	1
Percent Solids	**87**		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**30**		4.6		mg/Kg	☼		11/16/13 19:52	1

Client Sample ID: LPULSABAT-04-10

Lab Sample ID: 600-82259-21

Date Collected: 11/02/13 10:45
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 97.4

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	**2.1**		1.0		mg/Kg	☼	11/07/13 10:12	11/11/13 19:34	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*104*		*50 - 150*	*11/07/13 10:12*	*11/11/13 19:34*	*1*
4-Bromofluorobenzene	*92*		*50 - 150*	*11/07/13 10:12*	*11/11/13 19:34*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/15/13 08:37	1
Toluene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/15/13 08:37	1
Ethylbenzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/15/13 08:37	1
Xylenes, Total	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/15/13 08:37	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*109*		*43 - 141*	*11/07/13 09:01*	*11/15/13 08:37*	*1*
a,a,a-Trifluorotoluene	*59*		*44 - 134*	*11/07/13 09:01*	*11/15/13 08:37*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		8.5		mg/Kg	☼	11/11/13 10:58	11/13/13 04:14	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*65*		*60 - 140*	*11/11/13 10:58*	*11/13/13 04:14*	*1*

Client Sample ID: LPULSABAT-04-10

Lab Sample ID: 600-82259-21

Date Collected: 11/02/13 10:45

Matrix: Solid

Date Received: 11/07/13 07:01

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	2.6		1.0		%			11/07/13 13:58	1
Percent Solids	97		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	290		4.1		mg/Kg	☼		11/16/13 20:05	1

Client Sample ID: LPULSABAT-04-15

Lab Sample ID: 600-82259-22

Date Collected: 11/02/13 10:47

Matrix: Solid

Date Received: 11/07/13 07:01

Percent Solids: 93.1

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	2.5		1.1		mg/Kg	☼	11/07/13 10:12	11/11/13 19:59	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*104*		*50 - 150*	*11/07/13 10:12*	*11/11/13 19:59*	*1*
4-Bromofluorobenzene	*93*		*50 - 150*	*11/07/13 10:12*	*11/11/13 19:59*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/15/13 11:23	1
Toluene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/15/13 11:23	1
Ethylbenzene	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/15/13 11:23	1
Xylenes, Total	ND		0.021		mg/Kg	☼	11/07/13 09:01	11/15/13 11:23	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*139*		*43 - 141*	*11/07/13 09:01*	*11/15/13 11:23*	*1*
a,a,a-Trifluorotoluene	*100*		*44 - 134*	*11/07/13 09:01*	*11/15/13 11:23*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		8.9		mg/Kg	☼	11/11/13 10:58	11/13/13 04:46	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*68*		*60 - 140*	*11/11/13 10:58*	*11/13/13 04:46*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	6.9		1.0		%			11/07/13 13:58	1
Percent Solids	93		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	360		4.3		mg/Kg	☼		11/16/13 20:32	1

Client Sample ID: LPULSABAT-04-20

Lab Sample ID: 600-82259-23

Date Collected: 11/02/13 10:49
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 95.7

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	2.4		1.0		mg/Kg	☼	11/07/13 10:12	11/11/13 20:24	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*104*		*50 - 150*	*11/07/13 10:12*	*11/11/13 20:24*	*1*
4-Bromofluorobenzene	*95*		*50 - 150*	*11/07/13 10:12*	*11/11/13 20:24*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.021		mg/Kg	☼	11/07/13 16:30	11/14/13 14:12	1
Toluene	ND		0.021		mg/Kg	☼	11/07/13 16:30	11/14/13 14:12	1
Ethylbenzene	ND		0.021		mg/Kg	☼	11/07/13 16:30	11/14/13 14:12	1
Xylenes, Total	ND		0.021		mg/Kg	☼	11/07/13 16:30	11/14/13 14:12	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*111*		*43 - 141*	*11/07/13 16:30*	*11/14/13 14:12*	*1*
a,a,a-Trifluorotoluene	*104*		*44 - 134*	*11/07/13 16:30*	*11/14/13 14:12*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		8.7		mg/Kg	☼	11/11/13 10:58	11/13/13 05:51	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*64*		*60 - 140*	*11/11/13 10:58*	*11/13/13 05:51*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	4.3		1.0		%			11/07/13 13:58	1
Percent Solids	96		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	490		8.4		mg/Kg	☼		11/16/13 20:46	2

Client Sample ID: LPULSABAT-04-25

Lab Sample ID: 600-82259-24

Date Collected: 11/02/13 10:51
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 96.1

Method: 8015B - Gasoline Range Organics - (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	2.4		1.0		mg/Kg	☼	11/07/13 10:12	11/11/13 20:49	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*103*		*50 - 150*	*11/07/13 10:12*	*11/11/13 20:49*	*1*
4-Bromofluorobenzene	*95*		*50 - 150*	*11/07/13 10:12*	*11/11/13 20:49*	*1*

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.021		mg/Kg	☼	11/07/13 16:30	11/14/13 14:32	1
Toluene	ND		0.021		mg/Kg	☼	11/07/13 16:30	11/14/13 14:32	1
Ethylbenzene	ND		0.021		mg/Kg	☼	11/07/13 16:30	11/14/13 14:32	1

Client: ARCADIS U.S., Inc.
Project/Site: HES Transfer Sites, Lea County NM

TestAmerica Job ID: 600-82259-1

Client Sample ID: LPULSABAT-04-25
Date Collected: 11/02/13 10:51
Date Received: 11/07/13 07:01

Lab Sample ID: 600-82259-24
Matrix: Solid
Percent Solids: 96.1

Method: 8021B - Volatile Organic Compounds (GC) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Xylenes, Total	ND		0.021		mg/Kg	☼	11/07/13 16:30	11/14/13 14:32	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*112*		*43 - 141*	*11/07/13 16:30*	*11/14/13 14:32*	*1*
a,a,a-Trifluorotoluene	*104*		*44 - 134*	*11/07/13 16:30*	*11/14/13 14:32*	*1*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		8.6		mg/Kg	☼	11/11/13 10:58	11/13/13 06:23	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*70*		*60 - 140*	*11/11/13 10:58*	*11/13/13 06:23*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**3.9**		1.0		%			11/07/13 13:58	1
Percent Solids	**96**		1.0		%			11/07/13 13:58	1

General Chemistry - Soluble

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**210**		4.2		mg/Kg	☼		11/16/13 21:26	1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
F	MS/MSD Recovery and/or RPD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Surrogate Summary

Client: ARCADIS U.S., Inc.
Project/Site: HES Transfer Sites, Lea County NM

TestAmerica Job ID: 600-82259-1

Method: 8015B - Gasoline Range Organics - (GC)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)											
		TFT1	BFB1										
Lab Sample ID	Client Sample ID	(50-150)	(50-150)										
600-82259-7	LPULSABAT-02-02	104	94										
600-82259-7 MS	LPULSABAT-02-02	106	98										
600-82259-7 MSD	LPULSABAT-02-02	109	102										
600-82259-8	LPULSABAT-02-05	105	94										
600-82259-9	LPULSABAT-02-10	105	95										
600-82259-10	LPULSABAT-02-15	104	89										
600-82259-11	LPULSABAT-02-20	104	91										
600-82259-12	LPULSABAT-02-25	106	95										
600-82259-13	LPULSABAT-03-02	106	99										
600-82259-14	LPULSABAT-03-05	105	96										
600-82259-15	LPULSABAT-03-10	106	94										
600-82259-16	LPULSABAT-03-15	105	95										
600-82259-17	LPULSABAT-03-20	106	95										
600-82259-18	LPULSABAT-03-25	103	91										
600-82259-19	LPULSABAT-04-02	105	95										
600-82259-20	LPULSABAT-04-05	105	95										
600-82259-21	LPULSABAT-04-10	104	92										
600-82259-22	LPULSABAT-04-15	104	93										
600-82259-23	LPULSABAT-04-20	104	95										
600-82259-24	LPULSABAT-04-25	103	95										
LCS 600-120592/1-A	Lab Control Sample	100	103										
MB 600-120592/2-A	Method Blank	102	97										

Surrogate Legend

TFT = a,a,a-Trifluorotoluene

BFB = 4-Bromofluorobenzene

Method: 8021B - Volatile Organic Compounds (GC)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)											
		BFB1	TFT1										
Lab Sample ID	Client Sample ID	(43-141)	(44-134)										
600-82259-7	LPULSABAT-02-02	105	90										
600-82259-7 MS	LPULSABAT-02-02	105	95										
600-82259-7 MSD	LPULSABAT-02-02	104	96										
600-82259-8	LPULSABAT-02-05	68	57										
600-82259-9	LPULSABAT-02-10	98	75										
600-82259-10	LPULSABAT-02-15	98	98										
600-82259-11	LPULSABAT-02-20	91	76										
600-82259-12	LPULSABAT-02-25	95	77										
600-82259-13	LPULSABAT-03-02	82	70										
600-82259-14	LPULSABAT-03-05	104	80										
600-82259-15	LPULSABAT-03-10	118	81										
600-82259-16	LPULSABAT-03-15	103	100										
600-82259-17	LPULSABAT-03-20	107	75										
600-82259-18	LPULSABAT-03-25	96	69										
600-82259-19	LPULSABAT-04-02	89	63										
600-82259-20	LPULSABAT-04-05	99	89										

Method: 8021B - Volatile Organic Compounds (GC) (Continued)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)									
Lab Sample ID	Client Sample ID	BFB1 (43-141)	TFT1 (44-134)								
600-82259-21	LPULSABAT-04-10	109	59								
600-82259-22	LPULSABAT-04-15	139	100								
600-82259-23	LPULSABAT-04-20	111	104								
600-82259-24	LPULSABAT-04-25	112	104								
LCS 600-120588/1-A	Lab Control Sample	96	92								
LCS 600-120602/1-A	Lab Control Sample	95	92								
LCSD 600-120602/7-A	Lab Control Sample Dup	117	99								
MB 600-120588/2-A	Method Blank	99	99								
MB 600-120602/2-A	Method Blank	101	96								

Surrogate Legend

BFB = 4-Bromofluorobenzene

TFT = a,a,a-Trifluorotoluene

Method: 8015B - Diesel Range Organics (DRO) (GC)

Matrix: Solid **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)									
Lab Sample ID	Client Sample ID	OTPH1 (60-140)									
600-82259-7	LPULSABAT-02-02	83									
600-82259-7 MS	LPULSABAT-02-02	129									
600-82259-7 MSD	LPULSABAT-02-02	120									
600-82259-8	LPULSABAT-02-05	86									
600-82259-9	LPULSABAT-02-10	73									
600-82259-10	LPULSABAT-02-15	71									
600-82259-11	LPULSABAT-02-20	64									
600-82259-12	LPULSABAT-02-25	75									
600-82259-13	LPULSABAT-03-02	69									
600-82259-14	LPULSABAT-03-05	67									
600-82259-15	LPULSABAT-03-10	68									
600-82259-16	LPULSABAT-03-15	69									
600-82259-17	LPULSABAT-03-20	66									
600-82259-18	LPULSABAT-03-25	70									
600-82259-19	LPULSABAT-04-02	74									
600-82259-20	LPULSABAT-04-05	70									
600-82259-21	LPULSABAT-04-10	65									
600-82259-22	LPULSABAT-04-15	68									
600-82259-23	LPULSABAT-04-20	64									
600-82259-24	LPULSABAT-04-25	70									
LCS 600-120114/2-A	Lab Control Sample	97									
MB 600-120114/1-A	Method Blank	71									

Surrogate Legend

OTPH = o-Terphenyl

Method: 8015B - Gasoline Range Organics - (GC)

Lab Sample ID: MB 600-120592/2-A
Matrix: Solid
Analysis Batch: 120827

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 120592

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
WI Gasoline Range Organics (C6-C10)	ND		1.0		mg/Kg		11/07/13 10:12	11/11/13 11:03	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
a,a,a-Trifluorotoluene	*102*		*50 - 150*	*11/07/13 10:12*	*11/11/13 11:03*	*1*
4-Bromofluorobenzene	*97*		*50 - 150*	*11/07/13 10:12*	*11/11/13 11:03*	*1*

Lab Sample ID: LCS 600-120592/1-A
Matrix: Solid
Analysis Batch: 120827

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 120592

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
WI Gasoline Range Organics (C6-C10)	5.00	5.04		mg/Kg		101	49 - 151

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
a,a,a-Trifluorotoluene	*100*		*50 - 150*
4-Bromofluorobenzene	*103*		*50 - 150*

Lab Sample ID: 600-82259-7 MS
Matrix: Solid
Analysis Batch: 120827

Client Sample ID: LPULSABAT-02-02
Prep Type: Total/NA
Prep Batch: 120592

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
WI Gasoline Range Organics (C6-C10)	2.9		5.29	7.70		mg/Kg	☼	91	50 - 150

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
a,a,a-Trifluorotoluene	*106*		*50 - 150*
4-Bromofluorobenzene	*98*		*50 - 150*

Lab Sample ID: 600-82259-7 MSD
Matrix: Solid
Analysis Batch: 120827

Client Sample ID: LPULSABAT-02-02
Prep Type: Total/NA
Prep Batch: 120592

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
WI Gasoline Range Organics (C6-C10)	2.9		5.29	5.55		mg/Kg	☼	50	50 - 150	32	30

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
a,a,a-Trifluorotoluene	*109*		*50 - 150*
4-Bromofluorobenzene	*102*		*50 - 150*

Method: 8021B - Volatile Organic Compounds (GC)

Lab Sample ID: MB 600-120588/2-A
Matrix: Solid
Analysis Batch: 121083

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 120588

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.020		mg/Kg		11/07/13 09:01	11/14/13 19:17	1
Toluene	ND		0.020		mg/Kg		11/07/13 09:01	11/14/13 19:17	1
Ethylbenzene	ND		0.020		mg/Kg		11/07/13 09:01	11/14/13 19:17	1
Xylenes, Total	ND		0.020		mg/Kg		11/07/13 09:01	11/14/13 19:17	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*99*		*43 - 141*	*11/07/13 09:01*	*11/14/13 19:17*	*1*
a,a,a-Trifluorotoluene	*99*		*44 - 134*	*11/07/13 09:01*	*11/14/13 19:17*	*1*

Lab Sample ID: LCS 600-120588/1-A
Matrix: Solid
Analysis Batch: 121083

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 120588

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	1.00	0.952		mg/Kg		95	69 - 133
Toluene	1.00	0.945		mg/Kg		94	70 - 134
Ethylbenzene	1.00	0.914		mg/Kg		91	71 - 139
Xylenes, Total	3.01	2.80		mg/Kg		93	70 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*96*		*43 - 141*
a,a,a-Trifluorotoluene	*92*		*44 - 134*

Lab Sample ID: 600-82259-7 MS
Matrix: Solid
Analysis Batch: 121083

Client Sample ID: LPULSABAT-02-02
Prep Type: Total/NA
Prep Batch: 120588

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	ND		1.06	1.02		mg/Kg	☼	97	50 - 150
Toluene	ND		1.06	1.05		mg/Kg	☼	99	50 - 150
Ethylbenzene	ND		1.06	1.03		mg/Kg	☼	98	50 - 150
Xylenes, Total	ND		3.17	3.11		mg/Kg	☼	98	50 - 150

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene	*105*		*43 - 141*
a,a,a-Trifluorotoluene	*95*		*44 - 134*

Lab Sample ID: 600-82259-7 MSD
Matrix: Solid
Analysis Batch: 121083

Client Sample ID: LPULSABAT-02-02
Prep Type: Total/NA
Prep Batch: 120588

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	ND		1.06	1.05		mg/Kg	☼	100	50 - 150	3	20
Toluene	ND		1.06	1.07		mg/Kg	☼	102	50 - 150	2	20
Ethylbenzene	ND		1.06	1.05		mg/Kg	☼	100	50 - 150	2	20
Xylenes, Total	ND		3.17	3.17		mg/Kg	☼	100	50 - 150	2	20

Method: 8021B - Volatile Organic Compounds (GC) (Continued)

Lab Sample ID: 600-82259-7 MSD
Matrix: Solid
Analysis Batch: 121083

Client Sample ID: LPULSABAT-02-02
Prep Type: Total/NA
Prep Batch: 120588

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene	*104*		*43 - 141*
a,a,a-Trifluorotoluene	*96*		*44 - 134*

Lab Sample ID: MB 600-120602/2-A
Matrix: Solid
Analysis Batch: 121186

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 120602

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.020		mg/Kg		11/07/13 16:10	11/14/13 12:51	1
Toluene	ND		0.020		mg/Kg		11/07/13 16:10	11/14/13 12:51	1
Ethylbenzene	ND		0.020		mg/Kg		11/07/13 16:10	11/14/13 12:51	1
Xylenes, Total	ND		0.020		mg/Kg		11/07/13 16:10	11/14/13 12:51	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*101*		*43 - 141*	*11/07/13 16:10*	*11/14/13 12:51*	*1*
a,a,a-Trifluorotoluene	*96*		*44 - 134*	*11/07/13 16:10*	*11/14/13 12:51*	*1*

Lab Sample ID: LCS 600-120602/1-A
Matrix: Solid
Analysis Batch: 121186

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 120602

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	1.00	0.937		mg/Kg		93	69 - 133
Toluene	1.00	0.966		mg/Kg		96	70 - 134
Ethylbenzene	1.00	0.930		mg/Kg		93	71 - 139
Xylenes, Total	3.01	2.98		mg/Kg		99	70 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*95*		*43 - 141*
a,a,a-Trifluorotoluene	*92*		*44 - 134*

Lab Sample ID: LCSD 600-120602/7-A
Matrix: Solid
Analysis Batch: 121186

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 120602

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	1.00	0.811		mg/Kg		81	69 - 133	17	20
Toluene	1.00	1.05		mg/Kg		105	70 - 134	10	20
Ethylbenzene	1.00	1.05		mg/Kg		104	71 - 139	10	20
Xylenes, Total	3.01	3.35		mg/Kg		111	70 - 130	17	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*117*		*43 - 141*
a,a,a-Trifluorotoluene	*99*		*44 - 134*

Method: 8015B - Diesel Range Organics (DRO) (GC)

Lab Sample ID: MB 600-120114/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 120353 — **Prep Batch: 120114**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Diesel Range Organics [C10-C28]	ND		8.3		mg/Kg		11/11/13 10:58	11/12/13 17:47	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*71*		*60 - 140*	*11/11/13 10:58*	*11/12/13 17:47*	*1*

Lab Sample ID: LCS 600-120114/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 120353 — **Prep Batch: 120114**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Diesel Range Organics [C10-C28]	33.3	33.1		mg/Kg		99	70 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*97*		*60 - 140*

Lab Sample ID: 600-82259-7 MS — **Client Sample ID: LPULSABAT-02-02**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 120353 — **Prep Batch: 120114**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Diesel Range Organics [C10-C28]	9.3		35.1	49.0		mg/Kg	☼	113	70 - 130

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
o-Terphenyl	*129*		*60 - 140*

Lab Sample ID: 600-82259-7 MSD — **Client Sample ID: LPULSABAT-02-02**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 120353 — **Prep Batch: 120114**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Diesel Range Organics [C10-C28]	9.3		35.1	45.7		mg/Kg	☼	104	70 - 130	7	30

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
o-Terphenyl	*120*		*60 - 140*

Method: 9056 - Anions, Ion Chromatography

Lab Sample ID: MB 600-120661/1-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Soluble**
Analysis Batch: 120752

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		4.0		mg/Kg			11/16/13 10:38	1

Method: 9056 - Anions, Ion Chromatography (Continued)

Lab Sample ID: MB 600-120661/21-A — **Client Sample ID: Method Blank**
Matrix: Solid — **Prep Type: Soluble**
Analysis Batch: 120752

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		4.0		mg/Kg			11/16/13 18:44	1

Lab Sample ID: LCS 600-120661/22-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Soluble**
Analysis Batch: 120752

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	200	209		mg/Kg		105	90 - 110

Lab Sample ID: LCS 600-120661/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Solid — **Prep Type: Soluble**
Analysis Batch: 120752

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	200	210		mg/Kg		105	90 - 110

Lab Sample ID: 600-82259-12 MS — **Client Sample ID: LPULSABAT-02-25**
Matrix: Solid — **Prep Type: Soluble**
Analysis Batch: 120752

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	300		103	372	F	mg/Kg	☼	66	80 - 120

Lab Sample ID: 600-82259-12 MSD — **Client Sample ID: LPULSABAT-02-25**
Matrix: Solid — **Prep Type: Soluble**
Analysis Batch: 120752

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	300		103	369	F	mg/Kg	☼	64	80 - 120	1	20

Lab Sample ID: 600-82259-18 MS — **Client Sample ID: LPULSABAT-03-25**
Matrix: Solid — **Prep Type: Soluble**
Analysis Batch: 120752

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	400		123	477	F	mg/Kg	☼	65	80 - 120

Lab Sample ID: 600-82259-18 MSD — **Client Sample ID: LPULSABAT-03-25**
Matrix: Solid — **Prep Type: Soluble**
Analysis Batch: 120752

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	400		123	473	F	mg/Kg	☼	61	80 - 120	1	20

Method: Moisture - Percent Moisture

Lab Sample ID: 600-82259-7 DU
Matrix: Solid
Analysis Batch: 119895

Client Sample ID: LPULSABAT-02-02
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	5.2			5.9		%				12	20
Percent Solids	95			94		%				0.7	20

Lab Sample ID: 600-82259-18 DU
Matrix: Solid
Analysis Batch: 119895

Client Sample ID: LPULSABAT-03-25
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture	19			20		%				7	20
Percent Solids	81			80		%				2	20

GC VOA

Prep Batch: 120588

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-82259-7	LPULSABAT-02-02	Total/NA	Solid	5030B	
600-82259-7 MS	LPULSABAT-02-02	Total/NA	Solid	5030B	
600-82259-7 MSD	LPULSABAT-02-02	Total/NA	Solid	5030B	
600-82259-8	LPULSABAT-02-05	Total/NA	Solid	5030B	
600-82259-9	LPULSABAT-02-10	Total/NA	Solid	5030B	
600-82259-11	LPULSABAT-02-20	Total/NA	Solid	5030B	
600-82259-12	LPULSABAT-02-25	Total/NA	Solid	5030B	
600-82259-13	LPULSABAT-03-02	Total/NA	Solid	5030B	
600-82259-14	LPULSABAT-03-05	Total/NA	Solid	5030B	
600-82259-15	LPULSABAT-03-10	Total/NA	Solid	5030B	
600-82259-17	LPULSABAT-03-20	Total/NA	Solid	5030B	
600-82259-18	LPULSABAT-03-25	Total/NA	Solid	5030B	
600-82259-19	LPULSABAT-04-02	Total/NA	Solid	5030B	
600-82259-20	LPULSABAT-04-05	Total/NA	Solid	5030B	
600-82259-21	LPULSABAT-04-10	Total/NA	Solid	5030B	
600-82259-22	LPULSABAT-04-15	Total/NA	Solid	5030B	
LCS 600-120588/1-A	Lab Control Sample	Total/NA	Solid	5030B	
MB 600-120588/2-A	Method Blank	Total/NA	Solid	5030B	

Prep Batch: 120592

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-82259-7	LPULSABAT-02-02	Total/NA	Solid	5030B	
600-82259-7 MS	LPULSABAT-02-02	Total/NA	Solid	5030B	
600-82259-7 MSD	LPULSABAT-02-02	Total/NA	Solid	5030B	
600-82259-8	LPULSABAT-02-05	Total/NA	Solid	5030B	
600-82259-9	LPULSABAT-02-10	Total/NA	Solid	5030B	
600-82259-10	LPULSABAT-02-15	Total/NA	Solid	5030B	
600-82259-11	LPULSABAT-02-20	Total/NA	Solid	5030B	
600-82259-12	LPULSABAT-02-25	Total/NA	Solid	5030B	
600-82259-13	LPULSABAT-03-02	Total/NA	Solid	5030B	
600-82259-14	LPULSABAT-03-05	Total/NA	Solid	5030B	
600-82259-15	LPULSABAT-03-10	Total/NA	Solid	5030B	
600-82259-16	LPULSABAT-03-15	Total/NA	Solid	5030B	
600-82259-17	LPULSABAT-03-20	Total/NA	Solid	5030B	
600-82259-18	LPULSABAT-03-25	Total/NA	Solid	5030B	
600-82259-19	LPULSABAT-04-02	Total/NA	Solid	5030B	
600-82259-20	LPULSABAT-04-05	Total/NA	Solid	5030B	
600-82259-21	LPULSABAT-04-10	Total/NA	Solid	5030B	
600-82259-22	LPULSABAT-04-15	Total/NA	Solid	5030B	
600-82259-23	LPULSABAT-04-20	Total/NA	Solid	5030B	
600-82259-24	LPULSABAT-04-25	Total/NA	Solid	5030B	
LCS 600-120592/1-A	Lab Control Sample	Total/NA	Solid	5030B	
MB 600-120592/2-A	Method Blank	Total/NA	Solid	5030B	

Prep Batch: 120602

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-82259-10	LPULSABAT-02-15	Total/NA	Solid	5030B	
600-82259-16	LPULSABAT-03-15	Total/NA	Solid	5030B	
600-82259-23	LPULSABAT-04-20	Total/NA	Solid	5030B	
600-82259-24	LPULSABAT-04-25	Total/NA	Solid	5030B	
LCS 600-120602/1-A	Lab Control Sample	Total/NA	Solid	5030B	

GC VOA (Continued)

Prep Batch: 120602 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCSD 600-120602/7-A	Lab Control Sample Dup	Total/NA	Solid	5030B	
MB 600-120602/2-A	Method Blank	Total/NA	Solid	5030B	

Analysis Batch: 120827

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-82259-7	LPULSABAT-02-02	Total/NA	Solid	8015B	120592
600-82259-7 MS	LPULSABAT-02-02	Total/NA	Solid	8015B	120592
600-82259-7 MSD	LPULSABAT-02-02	Total/NA	Solid	8015B	120592
600-82259-8	LPULSABAT-02-05	Total/NA	Solid	8015B	120592
600-82259-9	LPULSABAT-02-10	Total/NA	Solid	8015B	120592
600-82259-10	LPULSABAT-02-15	Total/NA	Solid	8015B	120592
600-82259-11	LPULSABAT-02-20	Total/NA	Solid	8015B	120592
600-82259-12	LPULSABAT-02-25	Total/NA	Solid	8015B	120592
600-82259-13	LPULSABAT-03-02	Total/NA	Solid	8015B	120592
600-82259-14	LPULSABAT-03-05	Total/NA	Solid	8015B	120592
600-82259-15	LPULSABAT-03-10	Total/NA	Solid	8015B	120592
600-82259-16	LPULSABAT-03-15	Total/NA	Solid	8015B	120592
600-82259-17	LPULSABAT-03-20	Total/NA	Solid	8015B	120592
600-82259-18	LPULSABAT-03-25	Total/NA	Solid	8015B	120592
600-82259-19	LPULSABAT-04-02	Total/NA	Solid	8015B	120592
600-82259-20	LPULSABAT-04-05	Total/NA	Solid	8015B	120592
600-82259-21	LPULSABAT-04-10	Total/NA	Solid	8015B	120592
600-82259-22	LPULSABAT-04-15	Total/NA	Solid	8015B	120592
600-82259-23	LPULSABAT-04-20	Total/NA	Solid	8015B	120592
600-82259-24	LPULSABAT-04-25	Total/NA	Solid	8015B	120592
LCS 600-120592/1-A	Lab Control Sample	Total/NA	Solid	8015B	120592
MB 600-120592/2-A	Method Blank	Total/NA	Solid	8015B	120592

Analysis Batch: 121083

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-82259-7	LPULSABAT-02-02	Total/NA	Solid	8021B	120588
600-82259-7 MS	LPULSABAT-02-02	Total/NA	Solid	8021B	120588
600-82259-7 MSD	LPULSABAT-02-02	Total/NA	Solid	8021B	120588
600-82259-8	LPULSABAT-02-05	Total/NA	Solid	8021B	120588
600-82259-9	LPULSABAT-02-10	Total/NA	Solid	8021B	120588
600-82259-11	LPULSABAT-02-20	Total/NA	Solid	8021B	120588
600-82259-12	LPULSABAT-02-25	Total/NA	Solid	8021B	120588
600-82259-13	LPULSABAT-03-02	Total/NA	Solid	8021B	120588
600-82259-14	LPULSABAT-03-05	Total/NA	Solid	8021B	120588
600-82259-15	LPULSABAT-03-10	Total/NA	Solid	8021B	120588
600-82259-17	LPULSABAT-03-20	Total/NA	Solid	8021B	120588
600-82259-18	LPULSABAT-03-25	Total/NA	Solid	8021B	120588
600-82259-19	LPULSABAT-04-02	Total/NA	Solid	8021B	120588
600-82259-20	LPULSABAT-04-05	Total/NA	Solid	8021B	120588
600-82259-21	LPULSABAT-04-10	Total/NA	Solid	8021B	120588
600-82259-22	LPULSABAT-04-15	Total/NA	Solid	8021B	120588
LCS 600-120588/1-A	Lab Control Sample	Total/NA	Solid	8021B	120588
MB 600-120588/2-A	Method Blank	Total/NA	Solid	8021B	120588

GC VOA (Continued)

Analysis Batch: 121186

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-82259-10	LPULSABAT-02-15	Total/NA	Solid	8021B	120602
600-82259-16	LPULSABAT-03-15	Total/NA	Solid	8021B	120602
600-82259-23	LPULSABAT-04-20	Total/NA	Solid	8021B	120602
600-82259-24	LPULSABAT-04-25	Total/NA	Solid	8021B	120602
LCS 600-120602/1-A	Lab Control Sample	Total/NA	Solid	8021B	120602
LCSD 600-120602/7-A	Lab Control Sample Dup	Total/NA	Solid	8021B	120602
MB 600-120602/2-A	Method Blank	Total/NA	Solid	8021B	120602

GC Semi VOA

Prep Batch: 120114

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-82259-7	LPULSABAT-02-02	Total/NA	Solid	3550B	
600-82259-7 MS	LPULSABAT-02-02	Total/NA	Solid	3550B	
600-82259-7 MSD	LPULSABAT-02-02	Total/NA	Solid	3550B	
600-82259-8	LPULSABAT-02-05	Total/NA	Solid	3550B	
600-82259-9	LPULSABAT-02-10	Total/NA	Solid	3550B	
600-82259-10	LPULSABAT-02-15	Total/NA	Solid	3550B	
600-82259-11	LPULSABAT-02-20	Total/NA	Solid	3550B	
600-82259-12	LPULSABAT-02-25	Total/NA	Solid	3550B	
600-82259-13	LPULSABAT-03-02	Total/NA	Solid	3550B	
600-82259-14	LPULSABAT-03-05	Total/NA	Solid	3550B	
600-82259-15	LPULSABAT-03-10	Total/NA	Solid	3550B	
600-82259-16	LPULSABAT-03-15	Total/NA	Solid	3550B	
600-82259-17	LPULSABAT-03-20	Total/NA	Solid	3550B	
600-82259-18	LPULSABAT-03-25	Total/NA	Solid	3550B	
600-82259-19	LPULSABAT-04-02	Total/NA	Solid	3550B	
600-82259-20	LPULSABAT-04-05	Total/NA	Solid	3550B	
600-82259-21	LPULSABAT-04-10	Total/NA	Solid	3550B	
600-82259-22	LPULSABAT-04-15	Total/NA	Solid	3550B	
600-82259-23	LPULSABAT-04-20	Total/NA	Solid	3550B	
600-82259-24	LPULSABAT-04-25	Total/NA	Solid	3550B	
LCS 600-120114/2-A	Lab Control Sample	Total/NA	Solid	3550B	
MB 600-120114/1-A	Method Blank	Total/NA	Solid	3550B	

Analysis Batch: 120353

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-82259-7	LPULSABAT-02-02	Total/NA	Solid	8015B	120114
600-82259-7 MS	LPULSABAT-02-02	Total/NA	Solid	8015B	120114
600-82259-7 MSD	LPULSABAT-02-02	Total/NA	Solid	8015B	120114
600-82259-8	LPULSABAT-02-05	Total/NA	Solid	8015B	120114
600-82259-9	LPULSABAT-02-10	Total/NA	Solid	8015B	120114
600-82259-10	LPULSABAT-02-15	Total/NA	Solid	8015B	120114
600-82259-11	LPULSABAT-02-20	Total/NA	Solid	8015B	120114
600-82259-12	LPULSABAT-02-25	Total/NA	Solid	8015B	120114
600-82259-13	LPULSABAT-03-02	Total/NA	Solid	8015B	120114
600-82259-14	LPULSABAT-03-05	Total/NA	Solid	8015B	120114
600-82259-15	LPULSABAT-03-10	Total/NA	Solid	8015B	120114
600-82259-16	LPULSABAT-03-15	Total/NA	Solid	8015B	120114
600-82259-17	LPULSABAT-03-20	Total/NA	Solid	8015B	120114

GC Semi VOA (Continued)

Analysis Batch: 120353 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-82259-18	LPULSABAT-03-25	Total/NA	Solid	8015B	120114
600-82259-19	LPULSABAT-04-02	Total/NA	Solid	8015B	120114
600-82259-20	LPULSABAT-04-05	Total/NA	Solid	8015B	120114
600-82259-21	LPULSABAT-04-10	Total/NA	Solid	8015B	120114
600-82259-22	LPULSABAT-04-15	Total/NA	Solid	8015B	120114
600-82259-23	LPULSABAT-04-20	Total/NA	Solid	8015B	120114
600-82259-24	LPULSABAT-04-25	Total/NA	Solid	8015B	120114
LCS 600-120114/2-A	Lab Control Sample	Total/NA	Solid	8015B	120114
MB 600-120114/1-A	Method Blank	Total/NA	Solid	8015B	120114

General Chemistry

Analysis Batch: 119895

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-82259-7	LPULSABAT-02-02	Total/NA	Solid	Moisture	
600-82259-7 DU	LPULSABAT-02-02	Total/NA	Solid	Moisture	
600-82259-8	LPULSABAT-02-05	Total/NA	Solid	Moisture	
600-82259-9	LPULSABAT-02-10	Total/NA	Solid	Moisture	
600-82259-10	LPULSABAT-02-15	Total/NA	Solid	Moisture	
600-82259-11	LPULSABAT-02-20	Total/NA	Solid	Moisture	
600-82259-12	LPULSABAT-02-25	Total/NA	Solid	Moisture	
600-82259-13	LPULSABAT-03-02	Total/NA	Solid	Moisture	
600-82259-14	LPULSABAT-03-05	Total/NA	Solid	Moisture	
600-82259-15	LPULSABAT-03-10	Total/NA	Solid	Moisture	
600-82259-16	LPULSABAT-03-15	Total/NA	Solid	Moisture	
600-82259-17	LPULSABAT-03-20	Total/NA	Solid	Moisture	
600-82259-18	LPULSABAT-03-25	Total/NA	Solid	Moisture	
600-82259-18 DU	LPULSABAT-03-25	Total/NA	Solid	Moisture	
600-82259-19	LPULSABAT-04-02	Total/NA	Solid	Moisture	
600-82259-20	LPULSABAT-04-05	Total/NA	Solid	Moisture	
600-82259-21	LPULSABAT-04-10	Total/NA	Solid	Moisture	
600-82259-22	LPULSABAT-04-15	Total/NA	Solid	Moisture	
600-82259-23	LPULSABAT-04-20	Total/NA	Solid	Moisture	
600-82259-24	LPULSABAT-04-25	Total/NA	Solid	Moisture	

Leach Batch: 120661

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-82259-7	LPULSABAT-02-02	Soluble	Solid	DI Leach	
600-82259-8	LPULSABAT-02-05	Soluble	Solid	DI Leach	
600-82259-9	LPULSABAT-02-10	Soluble	Solid	DI Leach	
600-82259-10	LPULSABAT-02-15	Soluble	Solid	DI Leach	
600-82259-11	LPULSABAT-02-20	Soluble	Solid	DI Leach	
600-82259-12	LPULSABAT-02-25	Soluble	Solid	DI Leach	
600-82259-12 MS	LPULSABAT-02-25	Soluble	Solid	DI Leach	
600-82259-12 MSD	LPULSABAT-02-25	Soluble	Solid	DI Leach	
600-82259-13	LPULSABAT-03-02	Soluble	Solid	DI Leach	
600-82259-14	LPULSABAT-03-05	Soluble	Solid	DI Leach	
600-82259-15	LPULSABAT-03-10	Soluble	Solid	DI Leach	
600-82259-16	LPULSABAT-03-15	Soluble	Solid	DI Leach	
600-82259-17	LPULSABAT-03-20	Soluble	Solid	DI Leach	

General Chemistry (Continued)

Leach Batch: 120661 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-82259-18	LPULSABAT-03-25	Soluble	Solid	DI Leach	
600-82259-18 MS	LPULSABAT-03-25	Soluble	Solid	DI Leach	
600-82259-18 MSD	LPULSABAT-03-25	Soluble	Solid	DI Leach	
600-82259-19	LPULSABAT-04-02	Soluble	Solid	DI Leach	
600-82259-20	LPULSABAT-04-05	Soluble	Solid	DI Leach	
600-82259-21	LPULSABAT-04-10	Soluble	Solid	DI Leach	
600-82259-22	LPULSABAT-04-15	Soluble	Solid	DI Leach	
600-82259-23	LPULSABAT-04-20	Soluble	Solid	DI Leach	
600-82259-24	LPULSABAT-04-25	Soluble	Solid	DI Leach	
LCS 600-120661/22-A	Lab Control Sample	Soluble	Solid	DI Leach	
LCS 600-120661/2-A	Lab Control Sample	Soluble	Solid	DI Leach	
MB 600-120661/1-A	Method Blank	Soluble	Solid	DI Leach	
MB 600-120661/21-A	Method Blank	Soluble	Solid	DI Leach	

Analysis Batch: 120752

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
600-82259-7	LPULSABAT-02-02	Soluble	Solid	9056	120661
600-82259-8	LPULSABAT-02-05	Soluble	Solid	9056	120661
600-82259-9	LPULSABAT-02-10	Soluble	Solid	9056	120661
600-82259-10	LPULSABAT-02-15	Soluble	Solid	9056	120661
600-82259-11	LPULSABAT-02-20	Soluble	Solid	9056	120661
600-82259-12	LPULSABAT-02-25	Soluble	Solid	9056	120661
600-82259-12 MS	LPULSABAT-02-25	Soluble	Solid	9056	120661
600-82259-12 MSD	LPULSABAT-02-25	Soluble	Solid	9056	120661
600-82259-13	LPULSABAT-03-02	Soluble	Solid	9056	120661
600-82259-14	LPULSABAT-03-05	Soluble	Solid	9056	120661
600-82259-15	LPULSABAT-03-10	Soluble	Solid	9056	120661
600-82259-16	LPULSABAT-03-15	Soluble	Solid	9056	120661
600-82259-17	LPULSABAT-03-20	Soluble	Solid	9056	120661
600-82259-18	LPULSABAT-03-25	Soluble	Solid	9056	120661
600-82259-18 MS	LPULSABAT-03-25	Soluble	Solid	9056	120661
600-82259-18 MSD	LPULSABAT-03-25	Soluble	Solid	9056	120661
600-82259-19	LPULSABAT-04-02	Soluble	Solid	9056	120661
600-82259-20	LPULSABAT-04-05	Soluble	Solid	9056	120661
600-82259-21	LPULSABAT-04-10	Soluble	Solid	9056	120661
600-82259-22	LPULSABAT-04-15	Soluble	Solid	9056	120661
600-82259-23	LPULSABAT-04-20	Soluble	Solid	9056	120661
600-82259-24	LPULSABAT-04-25	Soluble	Solid	9056	120661
LCS 600-120661/22-A	Lab Control Sample	Soluble	Solid	9056	120661
LCS 600-120661/2-A	Lab Control Sample	Soluble	Solid	9056	120661
MB 600-120661/1-A	Method Blank	Soluble	Solid	9056	120661
MB 600-120661/21-A	Method Blank	Soluble	Solid	9056	120661

Lab Chronicle

Client: ARCADIS U.S., Inc.
Project/Site: HES Transfer Sites, Lea County NM

TestAmerica Job ID: 600-82259-1

Client Sample ID: LPULSABAT-02-02

Lab Sample ID: 600-82259-7

Date Collected: 11/01/13 14:53
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 94.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 11:28	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/14/13 19:39	MHT	TAL HOU
Total/NA	Prep	3550B			30.02 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.02 g	1.0 mL	120353	11/12/13 18:54	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 14:41	DAW	TAL HOU

Client Sample ID: LPULSABAT-02-05

Lab Sample ID: 600-82259-8

Date Collected: 11/01/13 14:55
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 93.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 11:53	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/14/13 20:01	MHT	TAL HOU
Total/NA	Prep	3550B			30.06 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.06 g	1.0 mL	120353	11/12/13 20:34	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 14:54	DAW	TAL HOU

Client Sample ID: LPULSABAT-02-10

Lab Sample ID: 600-82259-9

Date Collected: 11/01/13 14:57
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 85.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 12:18	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/14/13 20:22	MHT	TAL HOU
Total/NA	Prep	3550B			30.08 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.08 g	1.0 mL	120353	11/12/13 21:07	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 15:08	DAW	TAL HOU

Lab Chronicle

Client: ARCADIS U.S., Inc.
Project/Site: HES Transfer Sites, Lea County NM

TestAmerica Job ID: 600-82259-1

Client Sample ID: LPULSABAT-02-15

Lab Sample ID: 600-82259-10

Date Collected: 11/01/13 15:00
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 88.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 13:00	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120602	11/07/13 16:30	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121186	11/14/13 13:31	MHT	TAL HOU
Total/NA	Prep	3550B			30.03 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.03 g	1.0 mL	120353	11/12/13 21:41	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 15:21	DAW	TAL HOU

Client Sample ID: LPULSABAT-02-20

Lab Sample ID: 600-82259-11

Date Collected: 11/01/13 15:02
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 96.2

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 13:25	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/14/13 21:06	MHT	TAL HOU
Total/NA	Prep	3550B			30.04 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.04 g	1.0 mL	120353	11/12/13 22:14	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 16:02	DAW	TAL HOU

Client Sample ID: LPULSABAT-02-25

Lab Sample ID: 600-82259-12

Date Collected: 11/01/13 15:04
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 96.8

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 13:50	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/14/13 21:28	MHT	TAL HOU
Total/NA	Prep	3550B			30.05 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.05 g	1.0 mL	120353	11/12/13 22:47	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 16:15	DAW	TAL HOU

Lab Chronicle

Client: ARCADIS U.S., Inc.
Project/Site: HES Transfer Sites, Lea County NM

TestAmerica Job ID: 600-82259-1

Client Sample ID: LPULSABAT-03-02

Lab Sample ID: 600-82259-13

Date Collected: 11/01/13 15:38
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 91.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 14:15	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/14/13 21:50	MHT	TAL HOU
Total/NA	Prep	3550B			30.08 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.08 g	1.0 mL	120353	11/12/13 23:53	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 16:56	DAW	TAL HOU

Client Sample ID: LPULSABAT-03-05

Lab Sample ID: 600-82259-14

Date Collected: 11/01/13 15:42
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 96.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 14:40	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/14/13 22:12	MHT	TAL HOU
Total/NA	Prep	3550B			30.03 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.03 g	1.0 mL	120353	11/13/13 00:26	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 17:10	DAW	TAL HOU

Client Sample ID: LPULSABAT-03-10

Lab Sample ID: 600-82259-15

Date Collected: 11/01/13 15:44
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 93.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 16:15	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/14/13 23:18	MHT	TAL HOU
Total/NA	Prep	3550B			30.00 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.00 g	1.0 mL	120353	11/13/13 00:58	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 17:23	DAW	TAL HOU

Lab Chronicle

Client: ARCADIS U.S., Inc.
Project/Site: HES Transfer Sites, Lea County NM

TestAmerica Job ID: 600-82259-1

Client Sample ID: LPULSABAT-03-15

Lab Sample ID: 600-82259-16

Date Collected: 11/01/13 15:46
Date Received: 11/07/13 07:01

Matrix: Solid
Percent Solids: 90.6

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 16:40	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120602	11/07/13 16:30	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121186	11/14/13 13:51	MHT	TAL HOU
Total/NA	Prep	3550B			30.04 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.04 g	1.0 mL	120353	11/13/13 01:31	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 17:37	DAW	TAL HOU

Client Sample ID: LPULSABAT-03-20

Lab Sample ID: 600-82259-17

Date Collected: 11/01/13 15:48
Date Received: 11/07/13 07:01

Matrix: Solid
Percent Solids: 94.3

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 17:05	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/15/13 00:02	MHT	TAL HOU
Total/NA	Prep	3550B			30.06 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.06 g	1.0 mL	120353	11/13/13 02:04	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 17:50	DAW	TAL HOU

Client Sample ID: LPULSABAT-03-25

Lab Sample ID: 600-82259-18

Date Collected: 11/01/13 15:50
Date Received: 11/07/13 07:01

Matrix: Solid
Percent Solids: 81.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 18:19	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/15/13 07:25	MHT	TAL HOU
Total/NA	Prep	3550B			30.08 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.08 g	1.0 mL	120353	11/13/13 02:36	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 18:04	DAW	TAL HOU

Lab Chronicle

Client: ARCADIS U.S., Inc.
Project/Site: HES Transfer Sites, Lea County NM

TestAmerica Job ID: 600-82259-1

Client Sample ID: LPULSABAT-04-02

Lab Sample ID: 600-82259-19

Date Collected: 11/02/13 10:41
Date Received: 11/07/13 07:01

Matrix: Solid
Percent Solids: 85.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 18:44	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/15/13 07:53	MHT	TAL HOU
Total/NA	Prep	3550B			30.03 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.03 g	1.0 mL	120353	11/13/13 03:09	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 19:38	DAW	TAL HOU

Client Sample ID: LPULSABAT-04-05

Lab Sample ID: 600-82259-20

Date Collected: 11/02/13 10:43
Date Received: 11/07/13 07:01

Matrix: Solid
Percent Solids: 87.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 19:09	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/15/13 11:01	MHT	TAL HOU
Total/NA	Prep	3550B			30.03 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.03 g	1.0 mL	120353	11/13/13 03:41	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 19:52	DAW	TAL HOU

Client Sample ID: LPULSABAT-04-10

Lab Sample ID: 600-82259-21

Date Collected: 11/02/13 10:45
Date Received: 11/07/13 07:01

Matrix: Solid
Percent Solids: 97.4

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 19:34	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/15/13 08:37	MHT	TAL HOU
Total/NA	Prep	3550B			30.04 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.04 g	1.0 mL	120353	11/13/13 04:14	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 20:05	DAW	TAL HOU

Lab Chronicle

Client: ARCADIS U.S., Inc.
Project/Site: HES Transfer Sites, Lea County NM

TestAmerica Job ID: 600-82259-1

Client Sample ID: LPULSABAT-04-15

Lab Sample ID: 600-82259-22

Date Collected: 11/02/13 10:47
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 93.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 19:59	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120588	11/07/13 09:01	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121083	11/15/13 11:23	MHT	TAL HOU
Total/NA	Prep	3550B			30.01 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.01 g	1.0 mL	120353	11/13/13 04:46	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 20:32	DAW	TAL HOU

Client Sample ID: LPULSABAT-04-20

Lab Sample ID: 600-82259-23

Date Collected: 11/02/13 10:49
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 95.7

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 20:24	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120602	11/07/13 16:30	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121186	11/14/13 14:12	MHT	TAL HOU
Total/NA	Prep	3550B			30.03 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.03 g	1.0 mL	120353	11/13/13 05:51	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		2	5 mL	5 mL	120752	11/16/13 20:46	DAW	TAL HOU

Client Sample ID: LPULSABAT-04-25

Lab Sample ID: 600-82259-24

Date Collected: 11/02/13 10:51
Matrix: Solid
Date Received: 11/07/13 07:01
Percent Solids: 96.1

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030B			10 g	200 mL	120592	11/07/13 10:12	MHT	TAL HOU
Total/NA	Analysis	8015B		1	10 g	200 mL	120827	11/11/13 20:49	MHT	TAL HOU
Total/NA	Prep	5030B			10 g	10 mL	120602	11/07/13 16:30	MHT	TAL HOU
Total/NA	Analysis	8021B		1	10 g	10 mL	121186	11/14/13 14:32	MHT	TAL HOU
Total/NA	Prep	3550B			30.04 g	1.0 mL	120114	11/11/13 10:58	EAT	TAL HOU
Total/NA	Analysis	8015B		1	30.04 g	1.0 mL	120353	11/13/13 06:23	JPS	TAL HOU
Total/NA	Analysis	Moisture		1			119895	11/07/13 13:58	AYS	TAL HOU
Soluble	Leach	DI Leach			5 g	50 mL	120661	11/15/13 10:15	KRD	TAL HOU
Soluble	Analysis	9056		1	5 mL	5 mL	120752	11/16/13 21:26	DAW	TAL HOU

Laboratory References:

TAL HOU = TestAmerica Houston, 6310 Rothway Street, Houston, TX 77040, TEL (713)690-4444

Certification Summary

Client: ARCADIS U.S., Inc.
Project/Site: HES Transfer Sites, Lea County NM

TestAmerica Job ID: 600-82259-1

Laboratory: TestAmerica Houston

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arkansas DEQ	State Program	6	88-0759	08-04-14
Louisiana	NELAP	6	30643	06-30-14
Oklahoma	State Program	6	9503	08-31-13 *
Texas	NELAP	6	T104704223	10-31-14
USDA	Federal		P330-08-00217	04-01-14
Utah	NELAP	8	TX00083	10-31-13 *

* Expired certification is currently pending renewal and is considered valid.

TestAmerica Houston
6310 Rothway Street
Houston, TX 77040
Phone (713) 690-4444 Fax (713) 690-5646

Chain of Custody Record

600-82259 Chain of Custody

600-23595-8666.1

Client Information	Sampler: MELISA PHAN	Lab PM: Kudchadkar, Sachin G	Page: Page 1 of 4
Client Contact: Mr. Jonathan Olsen	Phone: 7139534800	E-Mail: sachin.kudchadkar@testamericainc.com	
Company: ARCADIS U.S., Inc.		Analysis Requested	Job #:
Address: 2929 Briarpark Drive Suite 300	Due Date Requested:		Preservation Codes:
City: Houston	TAT Requested (days): STANDARD		A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
State, Zip: TX, 77042			
Phone: 713 953 4800	PO #: Purchase Order Requested		Other:
Email: jonathan.olsen@arcadis-us.com	WO #:		
Project Name: HES Transfer Sites, Lea County NM	Project #: 60004633		
Site: LPU/LSA BATTERIES	SSOW#:		

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015B_DRO	9056_28D - Chloride	8015B_GRO	8021B- BTEX	ASTM-D2216												Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	N													
LPULSABAT-01-02	11/1/13	1237	G	Solid			X	X	X	X	X													HOLD
LPULSABAT-01-05	11/1/13	1241		Solid			X	X	X	X	X													HOLD
LPULSABAT-01-10	11/1/13	1243		Solid			X	X	X	X	X													HOLD
LPULSABAT-01-15	11/1/13	1245		Solid			X	X	X	X	X													HOLD
LPULSABAT-01-20	11/1/13	1247		Solid			X	X	X	X	X													HOLD
LPULSABAT-01-25	11/1/13	1250		Solid			X	X	X	X	X													HOLD
LPULSABAT-02-02	11/1/13	1453		Solid			X	X	X	X	X													DO NOT HOLD
LPULSABAT-02-05	11/1/13	1455		Solid			X	X	X	X	X													
LPULSABAT-02-10	11/1/13	1457		Solid			X	X	X	X	X													
LPULSABAT-02-15	11/1/13	1500		Solid			X	X	X	X	X													
LPULSABAT-02-20	11/1/13	1502		Solid			X	X	X	X	X													

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Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by: Chelsa	Date/Time: 11/5/13 430	Company	Received by:
Relinquished by:	Date/Time:	Company	Received by:
Relinquished by:	Date/Time:	Company	Received by:

Date/Time:	Company	Date/Time:	Company
		11/7/13 701	

Custody Seals Intact: △ Yes △ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

11222013

TestAmerica Houston
6310 Rothway Street
Houston, TX 77040
Phone (713) 690-4444 Fax (713) 690-5646

Chain of Custody Record

Client Information	Sampler: MELISA PHAN	Lab PM: Kudchadkar, Sachin G	Carrier Tracking No(s):	COC No: 600-23595-8666.1
Client Contact: Mr. Jonathan Olsen	Phone: 7139534800	E-Mail: sachin.kudchadkar@testamericainc.com		Page: Page 2 of 4
Company: ARCADIS U.S., Inc.				Job #:
Address: 2929 Briarpark Drive Suite 300	Due Date Requested:			
City: Houston	TAT Requested (days): STANDARD			
State, Zip: TX, 77042				
Phone: 7139534800	PO #: Purchase Order Requested			
Email: jonathan.olsen@arcadis-us.com	WO #:			
Project Name: HES Transfer Sites, Lea County NM	Project #: 60004633			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015B_DRO	9056_28D - Chloride	8015B_GRO	8021B- BTEX	ASTM- D2216	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	N		
LPULSABAT-02-25	11/1/13	1504	G	Solid			X	X	X	X	X		DO NOT HOLD
LPULSABAT-03-02	11/1/13	1538		Solid			X	X	X	X	X		
LPULSABAT-03-05	11/1/13	1542		Solid			X	X	X	X	X		
LPULSABAT-03-10	11/1/13	1544		Solid			X	X	X	X	X		
LPULSABAT-03-15	11/1/13	1546		Solid			X	X	X	X	X		
LPULSABAT-03-20	11/1/13	1548		Solid			X	X	X	X	X		
LPULSABAT-03-25	11/1/13	1550		Solid			X	X	X	X	X		
LPULSABAT-04-02	11/2/13	1041		Solid			X	X	X	X	X		
LPULSABAT-04-05	11/2/13	1043		Solid			X	X	X	X	X		
LPULSABAT-04-10	11/2/13	1045		Solid			X	X	X	X	X		
LPULSABAT-04-15	11/2/13	1047		Solid			X	X	X	X	X		

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: Melissa P	Date/Time: 11/5/13 430	Company	Received by:	Date/Time: 11/7/13 701	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

TestAmerica Houston
6310 Rothway Street
Houston, TX 77040
Phone (713) 690-4444 Fax (713) 690-5646

Chain of Custody Record

Client Information	Sampler: MELISA PHAN	Lab PM: Kudchadkar, Sachin G	Carrier Tracking No(s):	COC No: 600-23595-8666.1
Client Contact: Mr. Jonathan Olsen	Phone: 7139534800	E-Mail: sachin.kudchadkar@testamericainc.com		Page: Page 3 of 4
Company: ARCADIS U.S., Inc.				Job #:
Address: 2929 Briarpark Drive Suite 300	Due Date Requested:			
City: Houston	TAT Requested (days): STANDARD			
State, Zip: TX, 77042				
Phone: LPU/LSA BATTERIES	PO #: Purchase Order Requested			
Email: jonathan.olsen@arcadis-us.com	WO #:			
Project Name: HES Transfer Sites, Lea County NM	Project #: 60004633			
Site: 713 953 4800	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015B_DRO	9056_28D - Chloride	8015B_GRO	8021B- BTEX	Z_ASTM- D2216	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	Z		
LPULSABAT-04-20	11/2/13	1049	G	Solid			X	X	X	X	X		~~HOLD~~ DO NOT HOLD
LPULSABAT-04-25	11/2/13	1051		Solid			X	X	X	X	X		DO NOT HOLD
LPULSABAT-05-02	11/1/13	1152		Solid			X	X	X	X	X		HOLD
LPULSABAT-05-05	11/1/13	1154		Solid			X	X	X	X	X		
LPULSABAT-05-10	11/1/13	1156		Solid			X	X	X	X	X		
LPULSABAT-05-15	11/1/13	1158		Solid			X	X	X	X	X		
LPULSABAT-05-20	11/1/13	1200		Solid			X	X	X	X	X		
LPULSABAT-05-25	11/1/13	1202		Solid			X	X	X	X	X		
LPULSABAT-06-02	11/2/13	1005		Solid			X	X	X	X	X		
LPULSABAT-06-05	11/2/13	1007		Solid			X	X	X	X	X		
LPULSABAT-06-10	11/2/13	1009		Solid			X	X	X	X	X		

Possible Hazard Identification
☒ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For _____ Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		11/5/13 430			11/7/13 701	
2	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: △ Yes △ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

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11/22/2013

TestAmerica Houston
6310 Rothway Street
Houston, TX 77040
Phone (713) 690-4444 Fax (713) 690-5646

Chain of Custody Record

Client Information	Sampler: MELISA PHAN	Lab PM: Kudchadkar, Sachin G	Carrier Tracking No(s):	COC No: 600-23595-8666.1
Client Contact: Mr. Jonathan Olsen	Phone: 713 953 4800	E-Mail: sachin.kudchadkar@testamericainc.com		Page: Page 4 of 4
Company: ARCADIS U.S., Inc.				Job #:
Address: 2929 Briarpark Drive Suite 300	Due Date Requested:			
City: Houston	TAT Requested (days): STANDARD			
State, Zip: TX, 77042				
Phone: 713 953 4800	PO #: Purchase Order Requested			
Email: jonathan.olsen@arcadis-us.com	WO #:			
Project Name: HES Transfer Sites, Lea County NM	Project #: 60004633			
Site: LPU/LSA BATTERIES	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8015B_DRO	9056_28D - Chloride	8015B_GRO	8021B- BTEX	ASTM- D2216										Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	N	N	N	N											
LPULSABAT-06-15	11/2/13	1011	G	Solid			X	X	X	X	X											HOLD
LPULSABAT-06-20	11/2/13	1012		Solid			X	X	X	X	X											
LPULSABAT-06-25	11/2/13	1015		Solid			X	X	X	X	X											
LPULSABAT-07-02	11/1/13	1411		Solid			X	X	X	X	X											
LPULSABAT-07-05	11/1/13	1413		Solid			X	X	X	X	X											
LPULSABAT-07-10	11/1/13	1415		Solid			X	X	X	X	X											
LPULSABAT-07-15	11/1/13	1417		Solid			X	X	X	X	X											
LPULSABAT-07-20	11/1/13	1420		Solid			X	X	X	X	X											
LPULSABAT-07-25	11/1/13	1422	↓	Solid			X	X	X	X	X											↓
				Solid																		
				Solid																		

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

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11/22/2013

Login Sample Receipt Checklist

Client: ARCADIS U.S., Inc.

Job Number: 600-82259-1

Login Number: 82259

List Source: TestAmerica Houston

List Number: 1

Creator: Capps, Dana R

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	1.6/1.7/3.0/3.0/3.7
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	True	

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Attachment 5

Boring Logs (November 2013)

Date Start/Finish: 11/1/13
Drilling Company: Harrison and Cooper Inc./K Cooper

Drilling Method: Air Rotary
Sampling Method: Shovel

Borehole Depth: 25' bgs
Descriptions By: M. Phan

Well/Boring ID: **LPULSABAT-02**

Client: Chevron EMC
Location: Lovington Paddlock Unit/San Andres Batteries

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description
0	0		AK					AIR KNIFE only ~2-3 inches
					1.9			Same as above, Gray (7.5YR6/1), Pinkish Gray (7.5YR6/2) to White (7.5YR8/1), little subrounded, well sorted, 2 mm to 35 mm, hard, dry, organic material
		1	AR	5	0.3			CAPROCK CALICHE, Pinkish Gray (7.5YR6/2) to Light Gray (7.5YR7/1), hard, dry, subangular to subrounded nodules, fractured, well sorted, 2 mm to 23 mm
5	-5							
		2	AR	5	2.7			NODULAR CALICHE, Pink (7.5YR8/3) to White (7.5YR8/1), trace subrounded to rounded nodules, well sorted, 3 mm to 28 mm, medium to hard, dry, chalky
10	-10							
		3	AR	5	3.7			SANDY CALICHE, Pink (7.5YR8/3) to White (7.5YR8/1), trace rounded nodules, poorly sorted, 1 mm to 6mm, medium grained, medium dry, sandy
15	-15							
		4	AR	5	1.0			Same as above, Pink (7.5YR7/3)
20	-20							
		5	AR	5	4.2			SANDSTONE, Pink (7.5YR7/4), fine to very fine grained, trace caliche, moist, medium to soft
25	-25							

Remarks: ags = above ground surface; AK = air knife; amsl = above mean sea level; AR = air rotary; bgs = below ground surface; ppm = parts per million;

Date Start/Finish: 11/1/13
Drilling Company: Harrison and Cooper Inc./K Cooper

Drilling Method: Air Rotary
Sampling Method: Shovel

Borehole Depth: 25' bgs
Descriptions By: M. Phan

Well/Boring ID: **LPULSABAT-03**

Client: Chevron EMC
Location: Lovington Paddlock Unit/San Andres Batteries

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description
0	0		AK					AIR KNIFE only ~2-3 inches
					2.1			CAPROCK CALICHE, Pink (7.5YR7/3), Light Gray (7.5YR7/1) to White (7.5YR8/1), hard, dry, angular nodules, well sorted, 1 mm to 27 mm.
		1	AR	5				Same as above, Pink (7.5YR8/3) to White (7.5YR8/1), hard, dry, little subangular to angular nodules, poorly sorted, 3 mm to 9 mm.
					0.7			
5	-5							
		2	AR	5	0.4			NODULAR CALICHE, Pink (7.5YR8/3) to Pinkish White (7.5YR8/2), medium to hard, some subrounded to rounded nodules, 2 mm to 20 mm, dry, chalky.
10	-10							
		3	AR	5	1.8			SANDY CALICHE, Pink (7.5YR8/3) to Pinkish White (7.5YR8/2), medium, dry, trace rounded, 1 mm to 3 mm, poorly sorted, cohesive, sandy, medium grained.
15	-15							
		4	AR	5	1.9			Same as above, Pink (7.5YR7/3) fine to medium grained, 1 mm to 2 mm, soft, moist.
20	-20							
		5	AR	5	2.1			SANDSTONE, Light Brown (7.5YR6/3), fine grained, soft, moist, trace caliche.
25	-25							

Remarks: ags = above ground surface; AK = air knife; amsl = above mean sea level; AR = air rotary; bgs = below ground surface; ppm = parts per million;

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Date Start/Finish: 11/2/13
Drilling Company: Harrison and Cooper Inc./K Cooper

Drilling Method: Air Rotary
Sampling Method: Shovel

Borehole Depth: 25' bgs
Descriptions By: M. Phan

Well/Boring ID: **LPULSABAT-04**

Client: Chevron EMC
Location: Lovington Paddlock Unit/San Andres Batteries

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Analytical Sample	Geologic Column	Stratigraphic Description
0	0		AK					AIR KNIFE only ~2-3 inches
					0.7			CAPROCK CALICHE, Pink (7.5YR8/3), Pinkish White (7.5YR8/2) to Light Gray (7.5YR7/1), hard, dry, some subangular to angular, well sorted, 1 mm to 18 mm
		1	AR	5	1.2			Same as above, subangular nodules, 1 mm to 9 mm.
5	-5	2	AR	5	3.3			PINKY CALICHE, Pink (7.5YR7/3), to Pinkish White (7.5YR8/2), medium, moist, little subrounded to subangular, well sorted, 1 mm to 6 mm, sandy to chalky.
10	-10	3	AR	5	2.7			SANDY CALICHE, Light Brown (7.5YR6/4) to Pinkish White (7.5YR8/2), medium, moist, medium grained, sandy, cohesive.
15	-15	4	AR	5	1.6			Same as above, Pink (7.5YR7/3)
20	-20	5	AR	5	1.3			SANDSTONE, Lighter brown (7.5YR6/4), fine grained, soft, moist, sandy.
25	25							

Remarks: ags = above ground surface; AK = air knife; amsl = above mean sea level; AR = air rotary; bgs = below ground surface; ppm = parts per million;

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Attachment 6

Chloride Multimedia Exposure Assessment Model Simulated Soil Screening Levels for the Protection of Groundwater Memo

ARCADIS U.S., Inc.
2929 Briarpark Drive
Suite 300
Houston
Texas 77042
Tel 713 953 4800
Fax 713 977 4620

MEMO

To:
Kegan Boyer, Chevron Environmental Management Company

Copies:
Chris Shepherd, ARCADIS
Kathleen Abbott, ARCADIS
David Evans, ARCADIS

From:
Jonathan Olsen

Date:
May 8, 2014

ARCADIS Project No.:
B0048615.0000

Subject:
Chloride Multimedia Exposure Assessment Model Simulated Soil Screening Levels for the Protection of Groundwater
HES Transfer Sites, Lea County, New Mexico

On behalf of Chevron Environmental Management Company, ARCADIS U.S., Inc. (ARCADIS) evaluated chloride remediation action levels for use at the Health Environmental Safety (HES) Transfer Sites near Hobbs, New Mexico. The New Mexico Oil Conservation District (NMOCD) has established soil screening levels (SSLs) for fluid management pits (also known as the "NMOCD PIT RULE" [NMAC 19.15.17]); however, no formal SSLs have been established by the NMOCD or the New Mexico Environmental Department (NMED) for surface releases of production water. The Risk Assessment Guidance for Investigation and Remediation (NMED 2012) states that SSLs should be based on risk to human health and the potential migration to groundwater with respect to the NMED-specific tap water SSL. Chloride is not considered hazardous and the NMED and the United States Environmental Protection Agency (USEPA) have not established tap water screening levels for chloride. However, the NMED has established a chloride standard for groundwater (NMAC 20.6.2.1101) of 250 milligrams per liter (mg/L). Therefore, the SSL for chloride should be based on the soil leaching to groundwater pathway.

To evaluate a chloride SSL for use at the HES Transfer Sites, ARCADIS performed simulations of unsaturated zone flow, transport, and saturated zone mixing of chloride using the Multimedia Exposure Assessment Model Version 2.0 (MULTIMED; USEPA 1996) to evaluate the potential migration of chloride in shallow soil through the unsaturated zone to the underlying groundwater. The initial simulations were intended to estimate a maximum allowable chloride soil concentration (site SSL) to evaluate HES Transfer

Sites in Lea County and eastern Eddy County, New Mexico, and to develop a baseline approach for using the model for potential future evaluations of solute migration at other HES Transfer Sites in New Mexico.

MULTIMED Overview

MULTIMED was originally designed to simulate the movement of solutes leaching from a landfill to various exposure pathways. Due to its general acceptance by the NMOCD and the USEPA and its ability to simulate unsaturated and saturated zone flow and transport, MULTIMED was selected for this evaluation. The model, as designed, simulates one-dimensional vertical transport in the unsaturated zone to the saturated zone based on user-provided input parameters considering vadose zone, saturated zone, and chemical-specific characteristic parameters.

The simulations were performed using both the unsaturated and saturated zone modules available in MULTIMED. The unsaturated zone module performs solutions of the downward flow of infiltrating water to the water table by Darcy's Law:

$$Q = -K_v \cdot K_{rw} \left(\frac{\delta\psi}{\delta z}\right)$$

Where:

ψ is the pressure head (meters [m])

z is the depth (m)

Kv is the saturated hydraulic conductivity (meters per year [m/year])

Krw is the relative hydraulic conductivity

The boundary condition at the water table is:

$$\psi \cdot L = 0$$

Where:

L is the thickness of the unsaturated zone (m)

In the unsaturated zone, it is necessary to specify the relationship between relative hydraulic conductivity, pressure head, and water saturation. This relationship is given by van Genuchten (1976):

$$S_e = \theta r + \frac{\theta s - \theta r}{[1 + (\alpha\psi^{\beta})^{\gamma}]}$$

Where:

θr and θs are the residual water saturation and total water saturation (dimensionless), respectively

β, γ, α are empirical soil-specific parameters (dimensionless)

ψ is the air pressure entry head (m)

S_e is the effective saturation (fraction)

Source area concentrations are input as leachate concentrations, therefore, the soil/water partition equation was used to convert between total soil concentration in milligrams per kilogram (mg/kg) and the leachate concentration in mg/L:

$$C_t = \frac{C_l \cdot R \cdot \theta_w}{\rho_b}$$

Where:

C_t is the concentration of the chemical of interest in soil (mg/kg)

C_l is the concentration of the chemical of interest in leachate (mg/L)

R is the retardation coefficient (dimensionless, assumed 1 for chloride)

ρ_b is the bulk density of the soil (mg/L or grams per cubic centimeter)

The mass of the chemical of interest that reaches the groundwater is expressed by the simplified steady-state equation (Salhotra et al. 1995) that couples the vadose zone to the groundwater:

$$M_L = A_w \cdot Q_f \cdot C_l$$

Where:

M_L is the chemical of interest mass that leaches from site soil (grams per year [g/year])

A_w is the width of the source area (m^2)

Q_f is the percolation rate from the facility/site (m/year)

The mixed groundwater concentration is controlled by the quasi-three-dimensional advection dispersion equations that are evaluated based on the following chemical concentration relationship within the mixing zone (Salhotra et al. 1995):

$$C(x,y,z,t) = \frac{H}{B} C_f(x,y,t) + \Delta C_p(x,y,z,t)$$

Where:

C is the dissolved concentration (mg/L, g/m^3)

x,y,z are the spatial coordinates (m)

t is elapsed time (year)

H is the source zone penetration (m), with a maximum equal to B

B is the thickness of the saturated zone (m)

MULTIMED's output concentration is a centerline concentration based on a calculated dilution attenuation factor. Thus, the output concentration is the maximum concentration of the chemical of interest in groundwater at a reasonable distance downgradient from the source area.

Model Design, Inputs, and Assumptions

The required input parameters for the MULTIMED simulations are summarized in Table 1. Input parameters include model structure, unsaturated and saturated zones, and chemical characteristics. Minimal site-specific data regarding the HES sites are available; therefore, numerous input parameters are based on published reports, default NMED values (2012), default values provided in the modeling code, and ARCADIS's experience, as indicated in Table 1. The model values are considered representative of the Lea County, New Mexico area. Due to the intended use of the SSL at multiple sites, more conservative values were generally selected for the given ranges of input parameters.

The general assumptions used in the MULTIMED model design include:

- The unsaturated and saturated zones are a single, homogeneous material.
- The applied recharge and infiltration are constant throughout the simulation.
- Initial chloride concentrations in soil below the source area and in groundwater are equal to 0.
- The model assumes no chemical transformation or adsorption of chloride to soil materials.

The simulations were performed using the transient model capabilities of MULTIMED. Steady-state simulations were not chosen because MUTLIMED requires the assumption that the source is continuous and constant throughout the simulation, which is not appropriate for these evaluations. Also, the transient model was selected to provide output that simulates the aquifer concentrations versus time and models a finite source.

Model Simulations and Results

Using the input parameters provided, soil concentrations for chloride were iteratively varied to arrive at an appropriate maximum allowable soil concentration that would be protective of groundwater for each of the scenarios. To calculate the maximum concentration that would be observed given the input concentrations and parameters, the simulation period selected was 1,980 years with 20-year time steps.

To ascertain the maximum allowable chloride concentration for more typical chloride concentration distribution and depth to groundwater scenarios, eight MULTIMED simulations were completed. The scenarios are summarized in Table 2. The input values for the simulations were the same, except for the thickness and width of the chloride-affected soil within the soil column. The first four simulations evaluated homogeneous chloride-affected soil 20 meters wide (400 square meters [m^2]) and varied the chloride-affected soil thickness between 1 meter and 3 meters and the depth to groundwater between 20 and 30.5 meters. The remaining four simulations evaluated homogeneous chloride-affected soil 45 meters wide (2,000 m^2) and varied the chloride affected soil thickness between 1 meter and 3 meters and the depth to groundwater between 20 and 30.5 meters

The predicted groundwater concentrations versus time are illustrated on Figures 1 through 8. The peak arrival times varied between 540 and 860 years. The simulations indicate the site SSLs for the protection of groundwater ranged from 8,525 to 266,100 mg/kg (Table 2) depending on the scenario and are protective of the New Mexico chloride groundwater standard of 250 mg/L.

The MULTIMED model, like any model, requires the use of simplifying assumptions regarding subsurface conditions and flow processes that result in inherent limitations and uncertainty compared to an actual flow system. In this case, uncertainty may be related to:

- The model assumes homogeneous unsaturated and saturated zones; the actual conditions at the sites likely contain numerous heterogeneities.

- The applied recharge and infiltration rates are constant. The aquifer hydraulic gradient is also assumed to be constant. These rates likely vary with time, and these variations may influence the solute migration and mixing, resulting in short-term changes in aquifer concentrations

- The model is a theoretical simulation of transport processes and is not verified or calibrated against site-specific data.

Conclusions and Recommendations

The model simulations reasonably represent conditions encountered at most of the Lea County and eastern Eddy County HES Transfer Sites. HES Transfer Sites with chloride-affected soil can be screened

against SSLs in Table 2, assuming they meet the specified conditions (source length, source depth, depth to groundwater, and soil concentration). For calculated SSLs greater than 100,000 mg/kg, a maximum allowable soil concentration of 100,000 mg/kg is recommended in accordance with the NMED risk assessment guidance (NMED 2012). For sites that meet all of these conditions, no further action is recommended. For the sites that do not meet these conditions, site-specific evaluations should be conducted.

Enclosures:

Tables

Table 1 MULTIMED V2.0 Model Inputs

Table 2 Soil Screening Level Matrix

Figures

Figure 1 MULTIMED Simulated Chloride Concentration vs. Time (Source = 20m, Chloride 0-1m, & Depth to Groundwater = 20m)

Figure 2 MULTIMED Simulated Chloride Concentration vs. Time (Source = 20m, Chloride 0-1m, & Depth to Groundwater = 30.5m)

Figure 3 MULTIMED Simulated Chloride Concentration vs. Time (Source = 20m, Chloride 0-3m, & Depth to Groundwater = 20m)

Figure 4 MULTIMED Simulated Chloride Concentration vs. Time (Source = 20m, Chloride 0-3m, & Depth to Groundwater = 30.5m)

Figure 5 MULTIMED Simulated Chloride Concentration vs. Time (Source = 45m, Chloride 0-1m, & Depth to Groundwater = 20m)

Figure 6 MULTIMED Simulated Chloride Concentration vs. Time (Source = 45m, Chloride 0-1m, & Depth to Groundwater = 30.5m)

Figure 7 MULTIMED Simulated Chloride Concentration vs. Time (Source = 45m, Chloride 0-3m, & Depth to Groundwater = 20m)

Figure 8 MULTIMED Simulated Chloride Concentration vs. Time (Source = 45m, Chloride 0-3m, & Depth to Groundwater = 30.5m)

References

New Mexico Environment Department. 2012. Risk Assessment Guidance for Investigations and Remediation, Volume I. February 2012 (updated June 2012).

Salhotra, A.M., P. Mineart, S. Sharp-Hansen, T. Allison, R. Johns, and W.B. Mills. 1995. Multimedia Exposure Assessment Model (MULTIMED 2.0) for Evaluating the Land Disposal of Wastes--Model Theory. United States Environmental Protection Agency, Athens, GA. Unpublished Report.

United States Environmental Protection Agency. 1996. A Subtitle D Landfill Application Manual for the Multimedia Exposure Assessment Model (MULTIMED 2.0). Final Report.

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Tables

Table 1
MULTIMED V2.0 Model Inputs
Chevron HES Transfer Sites
Lea County, New Mexico

Parameters		Value(s)	Units	*Notes*
Unsaturated Zone Flow Parameters:				
Depth of Unsaturated Zone		20.0	m	Local water levels (20m & 30.5m)
Hydraulic Conductivity		0.06	cm/hr	Texas (2011)
Unsaturated Zone Porosity		0.44	fraction	NMED (2012) Default
Residual Water Content		0.260	fraction	NMED (2012) Default
Unsaturated Zone Transport Parameters:				
Thickness of Layer		20 & 30.5	m	Regional water levels
Percent of Organic Matter		1.5%		NMED (2012) Default (not used)
Bulk Density		1.5	g/cm^3	NMED (2012) Default
Biological Decay Coefficient		0	1/yr	(not used)
Aquifer Parameters:				
Aquifer Porosity		0.43	fraction	NMED (2012) Default
Bulk Density		1.5	g/cm^3	NMED (2012) Default
Aquifer Thickness		12.0	m	NMED (2012) Default
Hydraulic Conductivity		542	m/yr	Texas (2011), Velocity ~ 1/2 NMED Default
Hydraulic Gradient		0.010	m/m	NMED (2012) Default
Organic Carbon Content		0.020	fraction	NMED (2012) Default (not used)
Temperature of Aquifer		15.0	°C	NMED (2012) Default (not used)
pH		6.2		(not used)
x-distance Radial Distance from Site to Receptor		12	m	equal to aquifer thickness
Source Parameters:				
Infiltration Rate		0.013	m/yr	~0.5 in/yr, Texas (2011)
Area of Waste		400 & 2000	m^2	NMED (2012) Default (~45m x45m)
Recharge Rate		0.013	m/yr	Texas (2011)
Duration of Pulse		540 to 840	yr	Varied, set equal to peak arrival time
Discharge Concentrations		0	mg/L	
Initial Soil Concentrations:				
	Depth (m)			
Chloride leachate concentration	*0*	varied	mg/L	Calculated for each scenario[1]
Chloride leachate concentration	*1 & 3*	0	mg/L	
Chloride leachate concentration	*20 & 30.5*	0	mg/L	
Additional Parameters:				
Method		Gaussian		
New Mexico Environment Department. 2012. Risk		Chloride		
Chemical Parameters:				
Normalized Distribution Coefficient		0.00	mL/g	Model Derived
Van Genuchten Parameters:				
Alpha Van Genuchten coefficient		0.38	unitless	NCSS Soil Characterization Data[2]
Beta Van Genuchten coefficient		1.2	unitless	NCSS Soil Characterization Data[2]

Notes:

°C - degrees celcius
cm - centimeters
cm^3 - cubic centimeters
g - grams
hr - hour
L - liters
m - meters
m^2 - meter squared
mg - milligrams
mL - milliliters
yr - year

1 - calculated using the soil-water partitioning equation
2 - van Genutchen transport parameters are typical values for caliche-like material

References:

NMED - New Mexico Environmental Department Risk Assessment Guidance for Site Investigations and Remediation. February 2012.
NCSS - National Cooperative Soil Survey, National Cooperative Soil Characterization Database
Texas - Texas Water Development Board 2011. Update of the Groundwater Availability Model for the Edwards-Trinity (Plateau) and Pecos Valley Aquifers of Texas. January 21, 2011

Table 2
Soil Screening Level Matrix
Chevron HES Transfer Sites
Lea County, New Mexico

Scenario	Source Length (m)	Source Area (m)	Source Depth (m)	Depth to Groundwater (m)	SSL_{gw} (mg/Kg)	Notes
1	20	400	0-1	20.0	108,000	1
2	20	400	0-1	30.5	266,100	1
3	20	400	0-3	20.0	23,750	
4	20	400	0-3	30.5	45,000	
5	45	2,000	0-1	20.0	38,800	
6	45	2,000	0-1	30.5	95,500	
7	45	2,000	0-3	20.0	8,525	
8	45	2,000	0-3	30.5	16,100	

NMED SSL Ceiling = 100,000 mg/Kg

Notes:

m - meters

mg/Kg - milligrams per Kilogram

NMED - New Mexico Environmental Department

SSL_{gw} - Site soil screening levels for the migration to groundwater pathway

SSL Ceiling - Soil Screening Level Ceiling (NMED 2012)

1 - the NMED SSL ceiling should be used

References:

New Mexico Environment Department. 2012. Risk Assessment Guidance for Investigations and Remediation, Volume I. February 2012 (updated June 2012).

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Figures

Figure 1
MULTIMED Simulated Chloride Concentration Vs Time in Groundwater
(Source = 20m, Chloride 0-1m, & Depth to Groundwater = 20m)

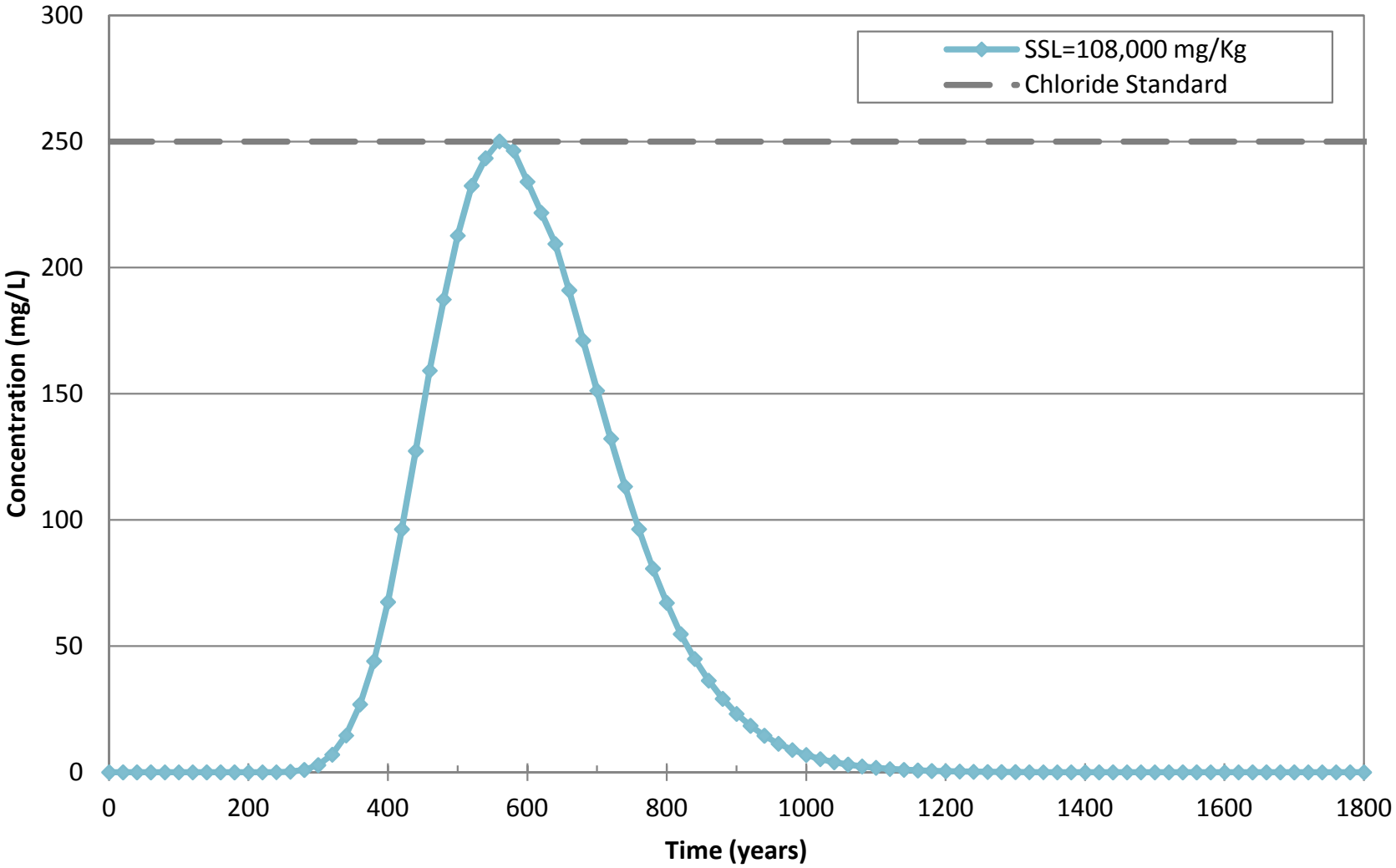

Figure 2
MULTIMED Simulated Chloride Concentration Vs Time in Groundwater
(Source = 20m, Chloride 0-1m, & Depth to Groundwater = 30.5m)

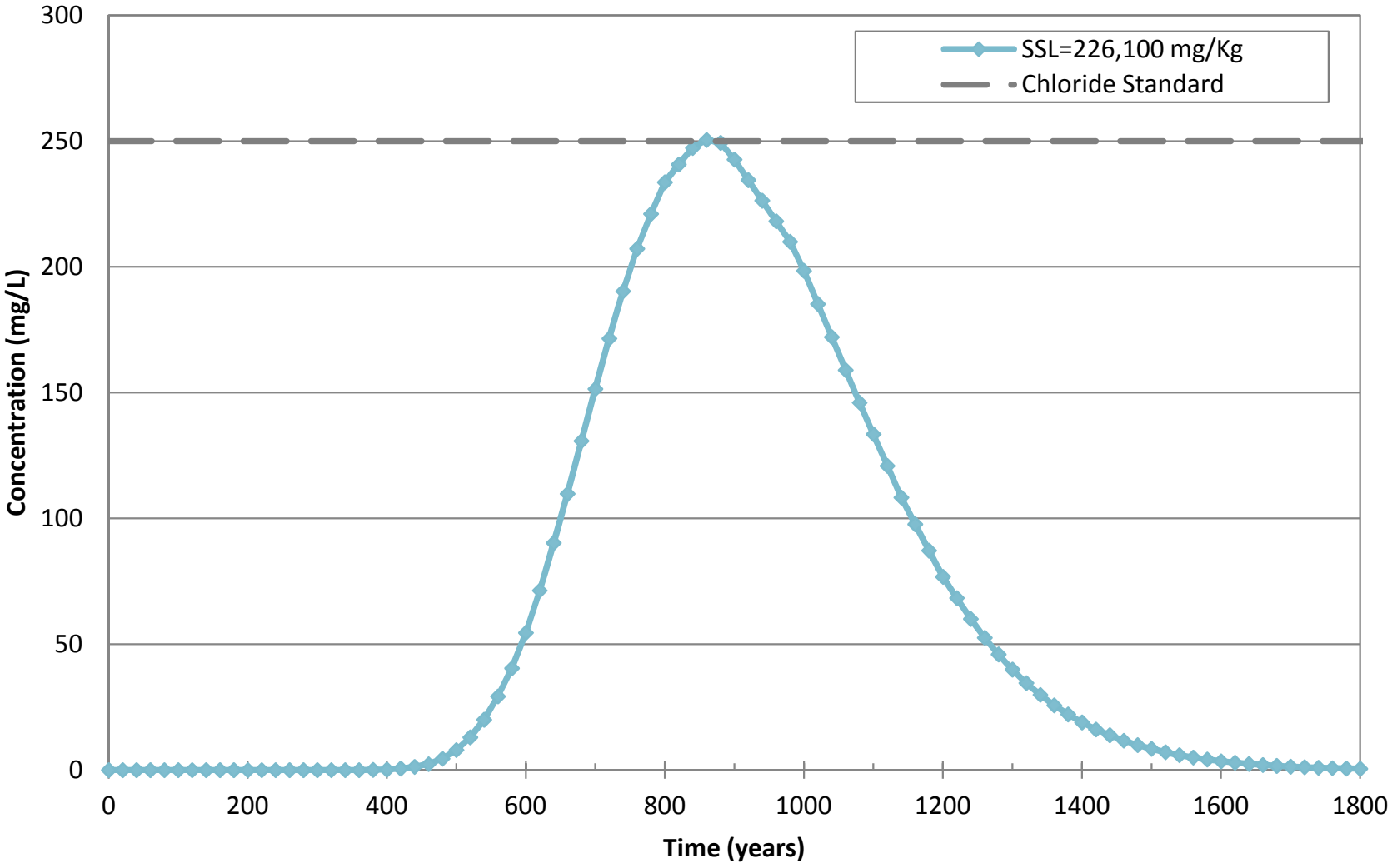

Figure 3
MULTIMED Simulated Chloride Concentration Vs Time in Groundwater
(Source = 20m, Chloride 0-3m, & Depth to Groundwater = 20m)

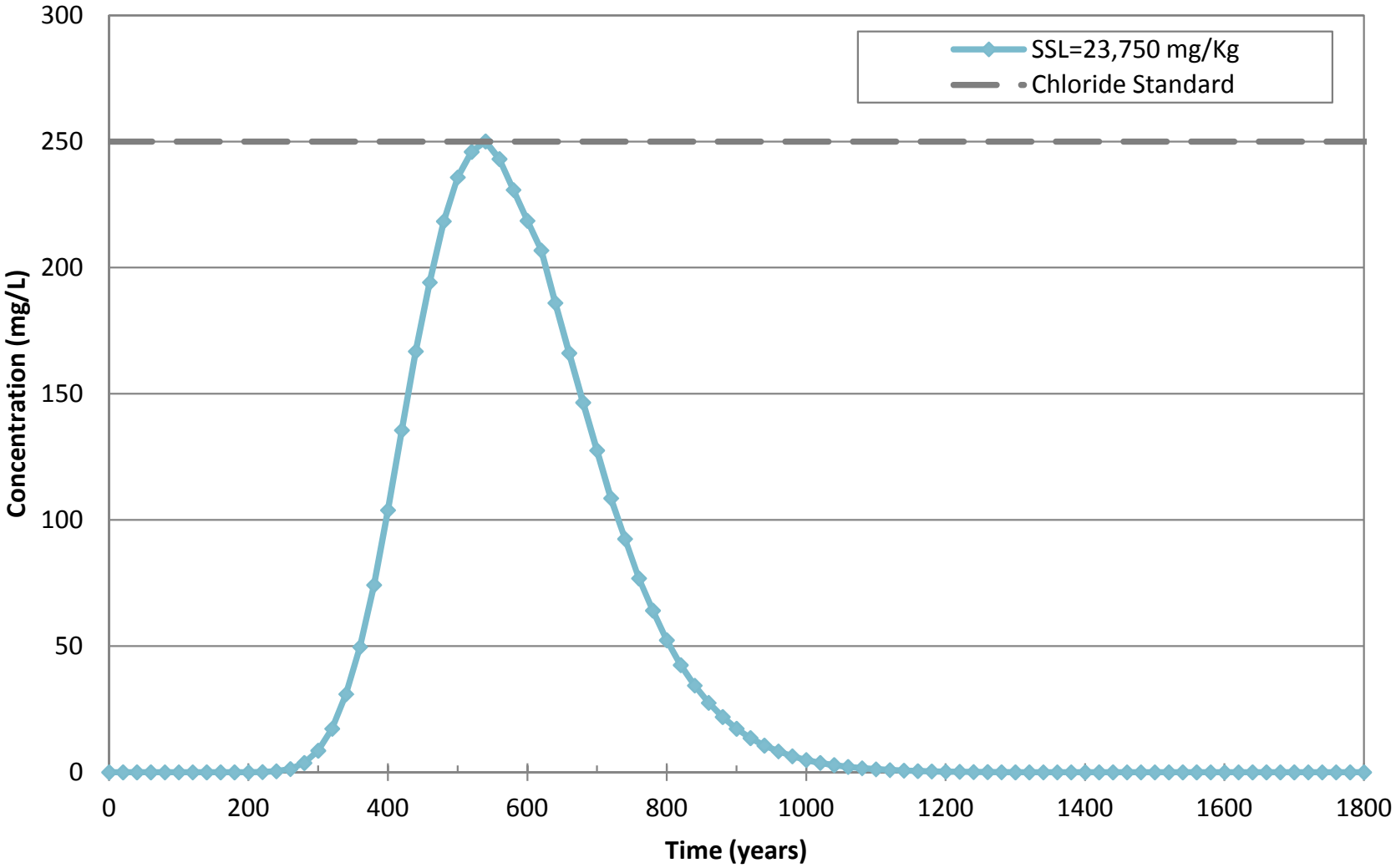

Figure 4
MULTIMED Simulated Chloride Concentration Vs Time in Groundwater
(Source = 20m, Chloride 0-3m, & Depth to Groundwater = 30.5m)

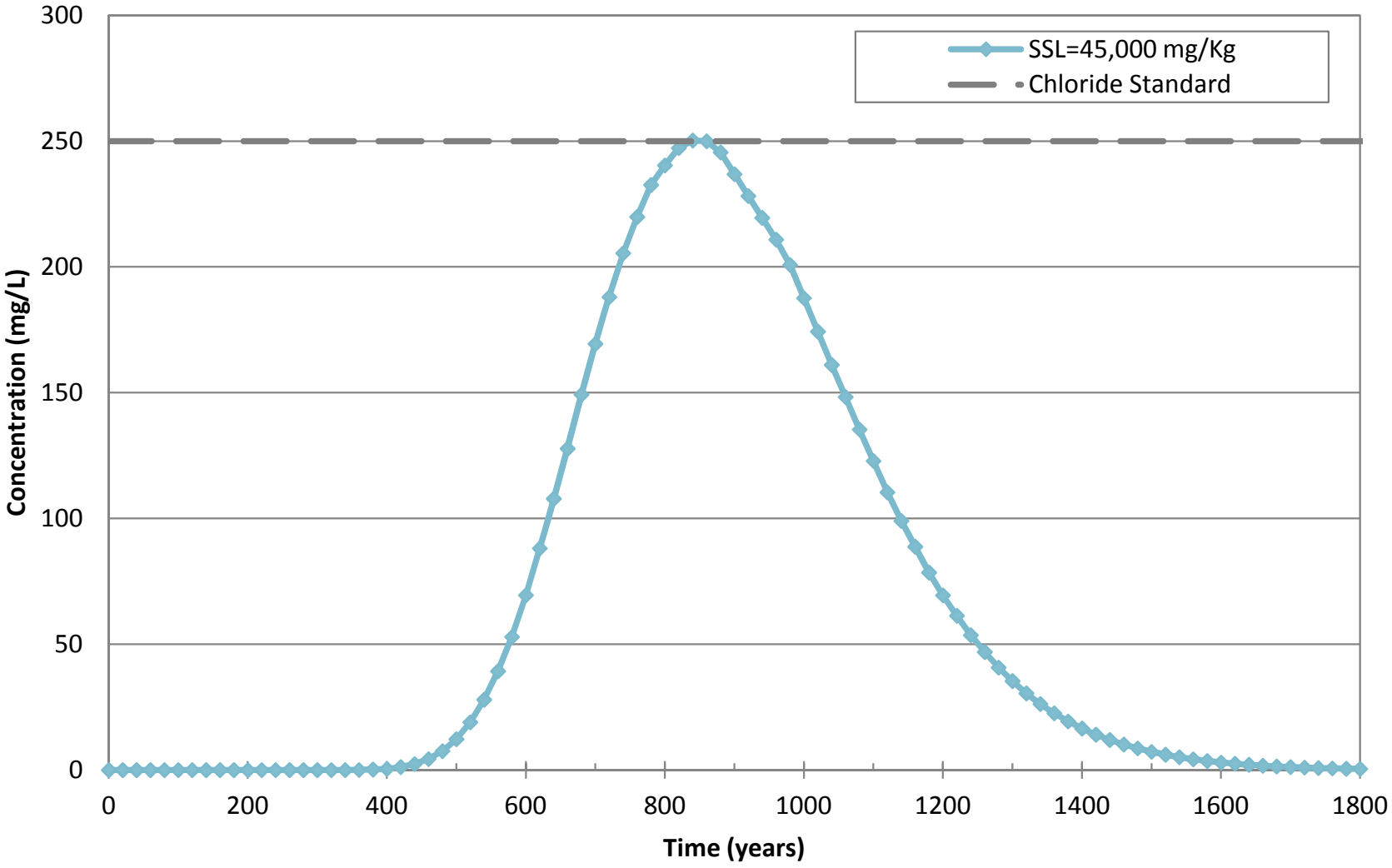

Figure 5
MULTIMED Simulated Chloride Concentration Vs Time in Groundwater
(Source = 45m, Chloride 0-1m, & Depth to Groundwater = 20m)

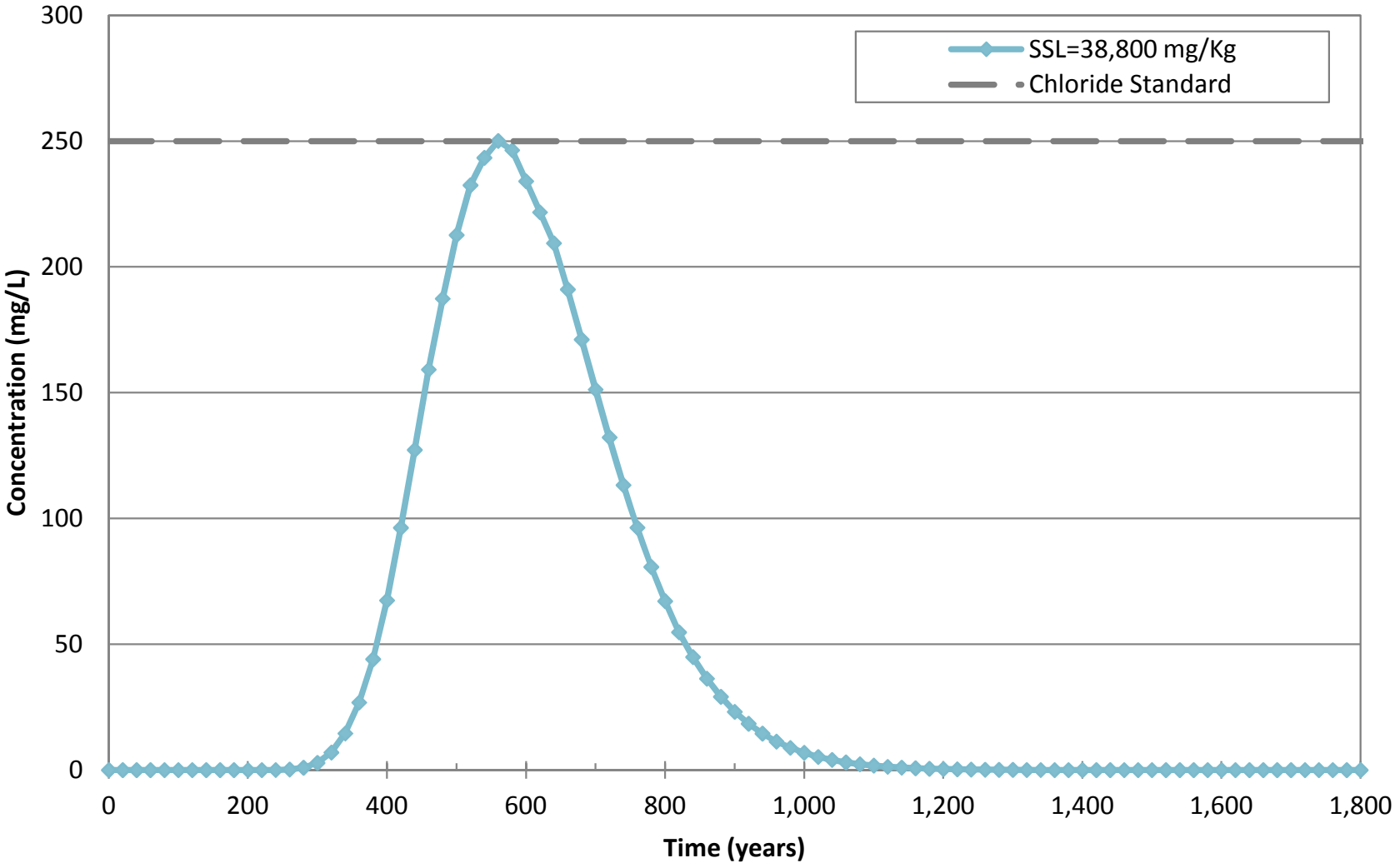

Figure 6
MULTIMED Simulated Chloride Concentration Vs Time in Groundwater
(Source = 45m, Chloride 0-1m, & Depth to Groundwater = 30.5m)

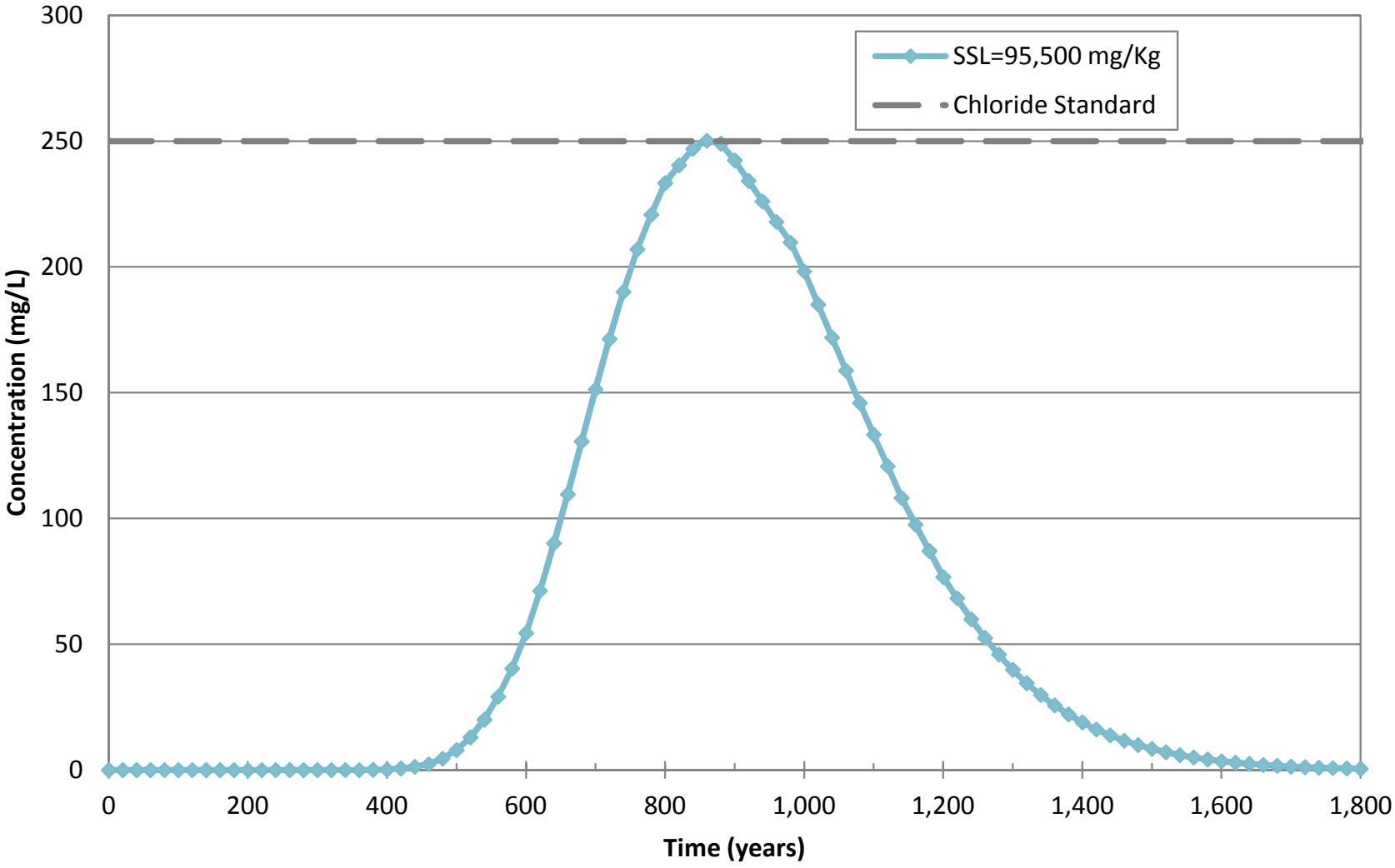

Figure 7
MULTIMED Simulated Chloride Concentration Vs Time in Groundwater
(Source = 45m, Chloride 0-3m, & Depth to Groundwater = 20m)

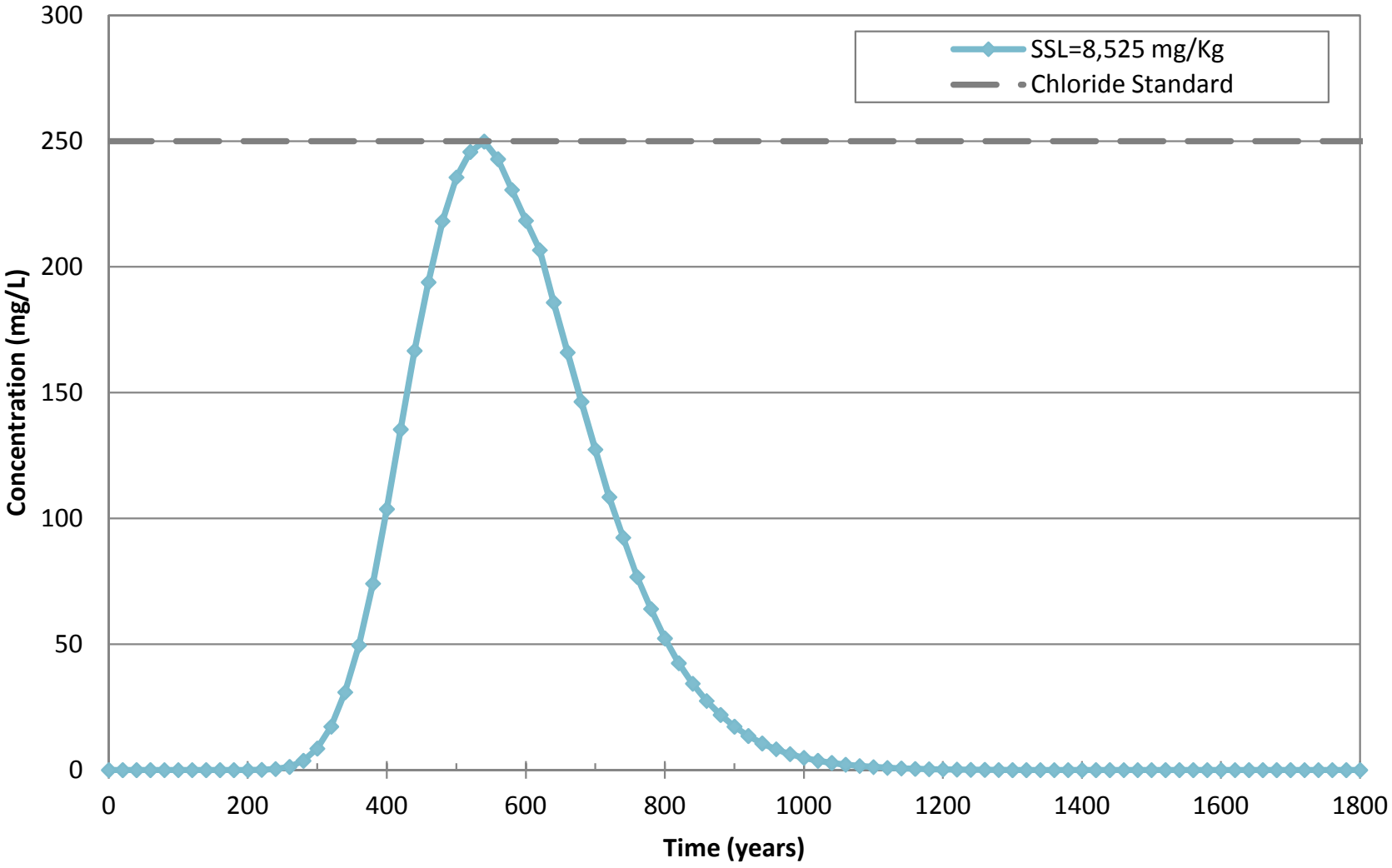

Figure 8
MULTIMED Simulated Chloride Concentration Vs Time in Groundwater
(Source = 45m, Chloride 0-3m, & Depth to Groundwater = 30.5m)