



SW429  
Div of Waste Management  
and Radiation Control

NOV - 5 2018

DSHW-2018-011035

**SUBJECT:** Notice of Intent for a Class IVb Landfill

**DATE:** October 16, 2018

**ATTN:**

Utah Department of Environmental Quality  
Utah Division of Solid and Hazardous Waste  
PO Box 144880  
Salt Lake City, UT 84114-4880

**Operator/Claimant Information**

LISBON VALLEY MINING CO., LLC (LVMC)  
P.O. Box 400  
Moab, Utah 84532  
435 686 9950

Contact: Alysen Tarrant  
LVMC Environmental Manager  
PO Box 400  
Moab, Utah 84532  
435 686 9950 ext 126

\* Filing fee of \$750 is being mailed separately.

Alysen Tarrant



Two Whom it May Concern,

Please find enclosed LVMC's Notice of Intent for a new Class IVb Landfill. This Class IVb Landfill will be located at LVMC's Lisbon Valley Copper Project located in San Juan County, Utah. The purpose of this landfill is to allow LVMC to store non-hazardous waste on-site in a safe and environmentally effective manner.

Please review the information provided. If you have any questions, please do not hesitate to contact LVMC's Environmental Manager, Alysén Tarrant. You can contact her either by phone at (435) 686-9950 x126 or by e-mail at [atarrant@lisbonmine.com](mailto:atarrant@lisbonmine.com)

Best Regards,

Alysén D. Tarrant  
Environmental Manager - LVMC





## Utah Division of Solid and Hazardous Waste Solid Waste Management Program

Mailing Address  
P O Box 144880  
Salt Lake City, Utah 84114-4880

Office Location  
195 North 1950 West  
Salt Lake City, Utah 84116

Phone (801) 536-0200  
Fax (801) 536-0222  
[www.deq.utah.gov](http://www.deq.utah.gov)

### APPLICATION FOR A PERMIT TO OPERATE A CLASS IV OR VI LANDFILL

Please read the instructions that are found in the document, INSTRUCTIONS FOR APPLICATION FOR A PERMIT TO OPERATE A CLASS IV or VI LANDFILL. This application form shall be used for all Class IV or VI solid waste disposal facility permits and modifications. Part I, GENERAL INFORMATION, must accompany a permit application. Part II, APPLICATION CHECKLIST, is provided to assist applicants and, if included with the application, will assist review. Part II is provided to assist in preparation and review of a permit application; it is not required by rule. The text of the rule governs all permit application contents and should be consulted when questions arise.

**Please note** the version date of this form found on the lower right of the page; if you have received this form more than six months after this date it is recommended you contact our office at (801) 536-0200 to determine if this form is still current. When completed, please return this form and support documents, forms, drawings, and maps to:

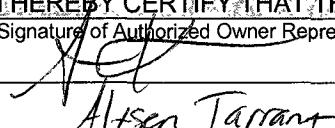
Scott T. Anderson, Director  
Division of Solid and Hazardous Waste  
Utah Department of Environmental Quality  
PO Box 144880  
Salt Lake City, Utah 84114-4880

(Note: When the Director has determined that the application is complete, two clean copies of the application as determined complete must be submitted to the Director. One copy is to be available at the Division offices and one copy will be available at a site near the facility for public viewing during the public comment period.)

# Utah Class IV and VI Landfill Permit Application Form

<b>Part I General Information</b> APPLICANT: PLEASE COMPLETE ALL SECTIONS.									
<b>I. Landfill Type</b>		<input type="checkbox"/> Class IVa <input checked="" type="checkbox"/> Class IVb		<b>II. Application Type</b>		<input checked="" type="checkbox"/> New Application <input type="checkbox"/> Renewal Application		<input type="checkbox"/> Facility Expansion <input type="checkbox"/> Modification	
For Renewal Applications, Facility Expansion Applications and Modifications Enter Current Permit Number _____									
<b>III. Facility Name and Location</b>									
Name of Facility Lisbon Valley Copper Mine									
Site Address (street or directions to site) 920 South County Road 313						County San Juan			
City La Sal				Zip Code 84532		Telephone (435) 686-9950 x 126			
Township 30S		Range 25E		Section(s) 36		Quarter/Quarter Section		Quarter Section SW 1/4	
Main Gate Latitude		degrees 38		minutes 7		seconds 51.783		Longitude degrees -109 minutes 8 seconds 8.1456	
<b>IV. Facility Owner(s) Information</b>									
Name of Facility Owner Lisbon Valley Mining Company									
Address (mailing) PO Box 400									
City Moab			State UT		Zip Code 84532		Telephone (435) 686-9950 x 126		
<b>V. Facility Operator(s) Information</b>									
Name of Facility Operator Lisbon Valley Mining Company									
Address (mailing) PO Box 400									
City Moab			State UT		Zip Code 84532		Telephone (435) 686-9950 x 126		
<b>VI. Property Owner(s) Information</b>									
Name of Property Owner State of Utah, School and Institutional Trust Lands Administration (SITLA)									
Address (mailing) 675 East 500 South, Suite 500									
City Salt Lake City			State UT		Zip Code 84102		Telephone (801) 538-5100		
<b>VII. Contact Information</b>									
Owner Contact Alysén Tarrant					Title Environmental Manager				
Address (mailing) PO Box 400									
City Moab			State UT		Zip Code 84532		Telephone (435) 686-9950 x 126		
Email Address atarrant@lisbonmine.com					Alternative Telephone (cell or other)				
Operator Contact Alysén Tarrant					Title Environmental Manager				
Address (mailing) PO Box 400									
City Moab			State UT		Zip Code 84532		Telephone (435) 686-9950 x 126		
Email Address atarrant@lisbonmine.com					Alternative Telephone (cell or other)				
Property Owner Contact Jerry Mansfield					Title Resource Specialist				
Address (mailing) 675 East 500 South, Suite 500									
City Salt Lake City			State UT		Zip Code 84102		Telephone (801) 538-5100		
Email Address jmansfield@utah.gov					Alternative Telephone (cell or other)				

# Utah Class IV and VI Landfill Permit Application Form

<b>Part I General Information (Continued)</b>			
<b>VIII. Waste Types</b> (check all that apply)		<b>IX. Facility Area</b>	
<input type="checkbox"/> Landfill will accept all wastes allowed in Class IV or VI landfills <b>Or</b> landfill will accept only the following wastes Waste Type                      Combined Disposal Unit                      Monofill Unit		Facility Area..... <u>4.8</u> acres Disposal Area..... <u>4.8</u> acres Design Capacity Years ..... <u>7</u> Cubic Yards.. ..... <u>57,000</u> Tons ... .. <u>5,000</u>	
<input checked="" type="checkbox"/> Construction & Demolition <input type="checkbox"/> <input checked="" type="checkbox"/> Tires <input type="checkbox"/> <input checked="" type="checkbox"/> Yard Waste <input type="checkbox"/> <input type="checkbox"/> Animals <input type="checkbox"/> <input checked="" type="checkbox"/> Contaminated Soil <input type="checkbox"/> <input type="checkbox"/> Other _____ <input type="checkbox"/>	Note: Disposal of dead animals must be approved by the Director		
<b>X. Fee and Application Documents</b>			
Indicate Documents Attached To This Application <input checked="" type="checkbox"/> Facility Map or Maps <input checked="" type="checkbox"/> Facility Legal Description <input checked="" type="checkbox"/> Plan of Operation <input checked="" type="checkbox"/> Waste Description <input type="checkbox"/> Ground Water Report <input checked="" type="checkbox"/> Closure Design <input checked="" type="checkbox"/> Cost Estimates <input checked="" type="checkbox"/> Financial Assurance		<input type="checkbox"/> Application Fee: Amount \$ _____ Class VI Special Requirements <input type="checkbox"/> Documents required by UCA 19-6-108(9) and (10)	
<b>I HEREBY CERTIFY THAT THIS INFORMATION AND ALL ATTACHED PAGES ARE CORRECT AND COMPLETE.</b>			
Signature of Authorized Owner Representative  _____ Name typed or printed		Title <u>Environmental Manager</u> Address <u>PO Box 400 Maab, UT 84532</u>	
Email Address _____		Alternative Telephone (cell or other) _____	
Signature of Authorized Land Owner Representative (if applicable) _____ _____ Name typed or printed		Title _____ Date _____ Address _____	
Email Address _____		Alternative Telephone (cell or other) _____	
Signature of Authorized Operator Representative (if applicable) _____ _____ Name typed or printed		Title _____ Date _____ Address _____	
Email Address _____		Alternative Telephone (cell or other) _____	

## Utah Class IV and VI Landfill Permit Application Checklist

**Important Note:** The following checklist is for the permit application and addresses only the requirements of the Division of Solid and Hazardous Waste. Other federal, state, or local agencies may have requirements that the facility must meet. The applicant is responsible to be informed of, and meet, any applicable requirements. Examples of these requirements may include obtaining a conditional use permit, a business license, or a storm water permit. The applicant is reminded that obtaining a permit under the *Solid Waste Permitting and Management Rules* does not exempt the facility from these other requirements. Please take note of the heading of each section for the facilities that the section applies to.

An application for a permit to construct and operate a landfill is the documentation that the landfill will be located, designed, constructed, operated, and closed in compliance with the requirements of Utah Administrative Code R315-301 through 320 (*Utah Solid Waste Permitting and Management Rules*) and Utah Code Annotated 19-6-101 through 123 (*Utah Solid and Hazardous Waste Act*). The application should be written to be understandable by regulatory agencies, landfill operators, and the general public. The application should also be written so that the landfill operator, after reading it, will be able to operate the landfill according to the requirements with a minimum of additional training.

Copies of the *Solid Waste Permitting and Management Rules*, the *Utah Solid and Hazardous Waste Act*, along with many other useful guidance documents can be obtained by contacting the Division of Solid and Hazardous Waste at 801-536-0200. Most of these documents are available on the Division's web page at [www.hazardouswaste.utah.gov](http://www.hazardouswaste.utah.gov). Guidance documents can be found at the solid waste section portion of the web page.

When the Director has determined that the application is complete, submit two paper copies of the application as determined complete by the Director, and an electronic copy of the application.

### **Part II      Application Checklist**

<b>I. Facility General Information</b>	
Description of Item	Location In Document
<b>/a. General Information for All Facilities</b>	
Completed Part I General information form above	Page 5
General description of the facility (R315-310-3(1)(b))	Page 6
Legal description of property (R315-310-3(1)(c))	Page 7
Proof of ownership, lease agreement, or other mechanism (R315-310-3(1)(c))	Appendix B
If the permit application is for a Class IV landfill, a demonstration that the landfill is not a commercial facility (see Utah Code Annotated 19-6-102(3) for definition of Commercial)	Page 6
Waste type and anticipated daily volume (R315-310-3(1)(d))	Pages 7-9
Intended schedule of construction (R315-302-2(2)(a))	Page 8
<b>/b. General Information for All New Or Laterally Expanding Facilities</b>	
Documentation that the Historical Survey requirements of R315-302-1(2)(f) have been met (R315-305-4(1)(b)(vi))	Page 10
Name and address of all property owners within 1000 feet of the facility boundary (R315-310-3(2)(i))	Page 10
Documentation that a notice of intent to apply for a permit has been sent to all property owners listed above (R315-310-3(2)(ii))	Page 10 Appendix B

## Utah Class IV and VI Landfill Permit Application Checklist

<b>I. Facility General Information</b>	
Description of Item	Location In Document
Name of the local government with jurisdiction over the facility site (R315-310-3(2)(iii))	Page 10
<b>/c. Location Standards for New Or Laterally Expanding Class IVa Landfills (R315-305-4(1)(a))</b>	
Land use compatibility	
Maps showing the existing land use, topography, residences, parks, monuments, recreation areas or wilderness areas within 1000 feet of the site boundary	
Certifications that no ecologically or scientifically significant areas or endangered species are present in site area	
Maps showing the location of dwellings, residential areas, other structures, and historic structures.	
List of airports within five miles of facility and distance to each	
Geology	
Geologic maps showing significant geologic features, faults, and unstable areas	
Maps showing site soils	
Surface water	
Magnitude of 24 hour 25 year and 100 year storm events	
Average annual rainfall	
Maximum elevation of flood waters proximate to the facility	
Maximum elevation of flood water from 100 year flood for waters proximate to the facility	
Wetlands	
Ground water	
<b>/d. Location Standards for New Or Laterally Expanding Class IVb and VI Landfills</b>	
Floodplains as specified in R315-302-1(2)(c)(ii) (R315-305-4(1)(b)(i))	Page 11, Figure 6
Wetlands as specified in R315-302-1(2)(d) (R315-305-4(1)(b)(ii))	Page 11, Figure 7
The landfill is located so that the lowest level of waste is at least ten feet above the historical high level of ground water (R315-305-4(1)(b)(iii))	Page 11, Appendix B
Geology as specified in R315-302-1(2)(b)(i) and (iv) (R315-305-4(1)(b)(iv))	Page 12, Figure 11
Demonstration that the lowest level of waste will be ten feet above the historic high ground water elevation	Appendix B
<b>/e. Additional Location Standards for New Or Laterally Expanding Class IVb and VI Landfills Or Landfills Requesting That Dead Animals Be Added As A New Waste Stream (R315-305-4(1)(a)(v))</b>	
Maps showing the existing land use, topography, residences, parks, monuments, recreation areas or wilderness areas within 1000 feet of the site boundary	Figures 1-5

## Utah Class IV and VI Landfill Permit Application Checklist

<b>I. Facility General Information</b>	
Description of Item	Location In Document
Certifications that no ecologically or scientifically significant areas or endangered species are present in site area	Page 13
Maps showing the location of dwellings, residential areas, other structures, and historic structures.	N/A
List of airports within five miles of facility and distance to each	N/A
<b>If. Plan Of Operations for All Facilities (R315-310-3(1)(e) and R315-302-2(2))</b>	
Description of on-site waste handling procedures and an example of the form that will be used to record the weights or volumes of waste received (R315-302-2(2)(b) And R315-310-3(1)(f))	Page 13, Appendix C
Schedule for conducting inspections and monitoring, and examples of the forms that will be used to record the results of the inspections and monitoring (R315-302-2(2)(c), R315-302-2(5)(a), and R315-310-3(1)(g))	Page 13, Appendix C
Contingency plans in the event of a fire or explosion (R315-302-2(2)(d))	Page 13
Plan to control fugitive dust generated from roads, construction, general operations, and covering the waste (R315-302-2(2)(g))	Page 14
Plan for litter control and collection (R315-302-2(2)(h))	Page 14
Procedures for excluding the receipt of prohibited hazardous or PCB containing waste (R315-302-2(2)(j))	Page 14
Procedures for controlling disease vectors (R315-302-2(2)(k))	Page 14
A plan for alternative waste handling (R315-302-2(2)(l))	Page 14
A general training plan for site operations (R315-302-2(2)(o))	Page 14
Any recycling programs planned at the facility (R315-303-4(6))	Page 14
Any other site-specific information pertaining to the plan of operation required by the Director (R315-302-2(2)(p))	Page 14
<b>Ig. Additional Plan Of Operation Requirements for Class IVa Facilities</b>	
Corrective action programs to be initiated if ground water is contaminated (R315-302-2(2)(e))	
<b>II. Facility Technical Information</b>	
<b>Ila. Maps for All Facilities</b>	
Topographic map drawn to the required scale with contours showing the boundaries of the landfill unit, ground water monitoring well locations, gas monitoring points, and the borrow and fill areas (R315-310-4(2)(a)(i))	Figure 15
Most recent U.S. Geological Survey topographic map, 7-1/2 minute series, showing the waste facility boundary; the property boundary; surface drainage channels; any existing utilities and structures within one-fourth mile of the site; and the direction of the prevailing winds (R315-310-4(2)(a)(ii))	Figure 16

## Utah Class IV and VI Landfill Permit Application Checklist

<b>I. Facility General Information</b>	
Description of Item	Location In Document
<b>//b. Geohydrological Assessment for Class IVa Landfills (R315-310-4(2)(b))</b>	
Local and regional geology and hydrology including faults, unstable slopes and subsidence areas on site (R315-310-4(2)(b)(i))	
Evaluation of bedrock and soil types and properties including permeability rates (R315-310-4(2)(b)(ii))	
Depth to ground water (R315-310-4(2)(b)(iii))	
Quantity, location, and construction of any private or public wells on-site or within 2,000 feet of the facility boundary (R315-310-4(2)(b)(v))	
Tabulation of all water rights for ground water and surface water on-site and within 2,000 feet of the facility boundary (R315-310-4(2)(b)(vi))	
Identification and description of all surface waters on-site and within one mile of the facility boundary (R315-310-4(2)(b)(vii))	
For an existing facility, identification of impacts upon the ground water and surface water from leachate discharges (R315-310-4(2)(b)(viii))	
Calculation of site water balance (R315-310-4(2)(b)(ix))	
<b>//c. Engineering Report, Plans, Specifications, And Calculations for All Facilities</b>	
Unit design to include cover design; fill methods; and elevation of final cover including plans and drawings signed and sealed by a professional engineer registered in the State of Utah, when required (R315-310-3(1)(b) and R315-310-4(2)(c)(iii))	Page 15
Design and location of run-on and run-off control systems (R315-310-4(2)(c)(viii))	Page 15
Anticipated facility life and the basis for calculating the facility's life (R315-310-4(2)(c)(ii))	Page 16
Engineering reports required to meet the location standards of R315-305-4 including documentation of any demonstration or exemption made for any location standard (R315-310-4(2)(c)(i))	Page 16
Identification of borrow sources for final cover (R315-310-4(2)(c)(iv))	Page 16
Run-off collection, treatment, and disposal and documentation to show that any treatment system is being or has been reviewed by the Division of Water Quality (R315-310-4(2)(c)(v) and R315-310-3(1)(i))	Page 16
<b>//d. Closure Requirements for All Facilities</b>	
CLOSURE PLAN (R315-310-3(1)(h))	Page 17
Closure schedule (R315-310-4(2)(d)(i))	Page 18
Design of final cover (R315-310-4(2)(c)(iii))	Page 18

## Utah Class IV and VI Landfill Permit Application Checklist

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Description of Item	Location In Document
Capacity of site in volume and tonnage (R315-310-4(2)(d)(ii))	Page 18
Final inspection by regulatory agencies (R315-310-4(2)(d)(iii))	Page 18
<b>IIe. Post-Closure Requirements for All Facilities</b>	
POST-CLOSURE CARE PLAN (R315-310-3(1)(h))	Page 19
Changes to record of title, land use, and zoning restrictions (R315-310-4(2)(e)(v))	Page 19
Maintenance activities to maintain cover and run-on/run-off control systems (R315-310-4(2)(e)(iii))	Page 19
List the name, address, and telephone number of the person or office to contact about the facility during the post-closure care period (R315-310-4(2)(e)(vi))	Page 19
<b>IIIf. Financial Assurance for All Facilities (R315-310-3(1)(j))</b>	
Identification of closure costs including cost calculations (R315-310-4(2)(d)(iv))	Page 20
Identification of post-closure care costs including cost calculations (R315-310-4(2)(e)(iv))	Page 20
Identification of the financial assurance mechanism that meets the requirements of Rule R315-309 and the date that the mechanism will become effective (R315-309-1(1) and R315-310-3(1)(j))	Page 20

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**Lisbon Valley Mining Company, LLC  
Lisbon Valley Copper Mine**

Notice of Intent  
For a Class IVb Landfill

**October 16, 2018**

**Submitted to:**

**Utah Division of Solid and Hazardous Waste**

PO Box 144880  
Salt Lake City, UT 84114-4880

**Submitted By:**

**Lisbon Valley Mining Company, LLC**

PO Box 400  
Moab, UT 84532  
[p] (435) 686-9950 ext 126  
[e] atarrant@lisbonmine.com

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Figure 18	Utilities Map for the Project

# Part 1: General Information

## 1.1 Introduction (Figure 1)

Lisbon Valley Mining Company (LVMC) is a privately-owned company in the business of mining and beneficiation of copper-bearing ore. LVMC owns and operates a copper mine and associated process facilities in San Juan County, Utah. LVMC obtained ownership of the Lisbon Valley Copper Project (the Project) in 2009. Prior to that, the Project was operated by Constellation Copper Corporation, who declared bankruptcy in 2008.

LVMC owns and controls over 10,000 acres of surface and mineral rights associated with the Project. The land status consists of a mixture of private land leased and/or owned by LVMC, public land administered by the Federal Bureau of Land Management (BLM), and Utah State lands administered by the School and Institutional Trust Lands Administration (SITLA).

### 1.1.1 General Facility Information (Figure 2)

LVMC has operated the Project since it obtained ownership in 2009. Operations include the creation of open pits and/or the expansion of existing open pits to extract copper-bearing ore. The construction of open pits involves blasting of the ore and waste material. The waste material is hauled to existing waste dumps, or is used to backfill existing pits. The ore is crushed to minus six-inches then is hauled to the existing heap leach facility where it is stacked in lifts and treated with an acidic solution. The copper is extracted from the host rock by use of acid leach. The resultant copper-bearing solution is then sent to the process facilities where it undergoes solvent extraction and electrowinning (SX/EW) processing. The final product is copper cathode of a 99.999% purity. Detailed information about the mining and beneficiation processes can be found in LVMC's Notice of Intent (NOI) for Large Mining Operations (LMO) filed with the Utah Division of Oil, Gas and Mining (DOGM).

### 1.1.2 Purpose and Need

The purpose of this NOI for a Class IVb landfill is to allow LVMC to effectively handle and store waste produced by the operation during normal activities. LVMC has in the past received a burn permit with San Juan County, Utah to burn approved waste types. However due to the increased number of fires over the past several years, and the projected continuation of less than desirable air quality conditions as a result of climate change, there has been a County-wide fire ban enacted. Because of this fire ban, LVMC has been forced to export their trash to local landfill facilities in Grand County, Utah.

The following factors are driving the decision to apply for a Class IVb landfill for the LVMC Project:

- 1 Cost of hauling and disposal of trash in the offsite landfill facilities;
- 2 Cost of renting the roll-offs and trash dumpsters from the monopolized contracting company;
- 3 The consideration that waste material going to the local landfill facilities decreases those facilities' operational life;
- 4 The consideration that there are ample storage areas within the LVMC Project area to incorporate a Class IVb landfill without diminishing surrounding environment;
- 5 The elimination of burning approved waste during burn-approved seasons, and therefore decreasing emissions produced by the Project.

## 1.2 Landfill Application Type

LVMC is seeking a Class IVb landfill. Utah Administrative Code (UAC) R315-305-3(2) provides the definition of a Class IVb landfill as: "A Class IV Landfill that receives, based on an annual average, 20 tons, or less, of waste per day or demonstrates that no waste from a very small quantity generator of hazardous waste, as defined by Section R315-260-10 is accepted." This will not be a commercial landfill.

As a point of clarification, this NOI is for a Class IVb landfill that does **not** accept dead animals.

## 1.3 Facility Information (Figure 3)

### 1.3.1 Facility Name & Contact Information

**Name:** Lisbon Valley Copper Project  
**Contact Information:** Attn: Alysen Tarrant, Environmental Manager  
Lisbon Valley Mining Company, LLC  
**Physical Address:** 920 South County Road 313  
La Sal, Utah 84532  
**Mailing Address:** PO Box 400  
Moab, UT 84532  
**Phone:** (435) 686-9950 ext. 126  
**E-mail:** atarrant@lisbonmine.com

### 1.3.2 Facility Owner & Operator Information

#### 1.3.2.1 Facility Owner & Operator

**Name:** Lisbon Valley Mining Company, LLC  
**Contact Information:** Attn: Alysen Tarrant, Environmental Manager  
Lisbon Valley Mining Company, LLC  
**Physical Address:** 920 South County Road 313  
La Sal, Utah 84532  
**Mailing Address:** PO Box 400  
Moab, UT 84532  
**Phone:** (435) 686-9950 ext. 126  
**E-mail:** atarrant@lisbonmine.com

#### 1.3.2.2 Registered Utah Agent & LVMC Officer with Delegation of Authority

**Name:** Lisbon Valley Mining Company, LLC  
**Registered Utah Agent:** Ken Garnett, Corporate CFO & Officer with Delegation of Authority  
11 Edgewater Drive  
Old Greenwich, CT 06870  
**Phone:** (203) 249-4125  
**E-mail:** [ken.garnett@gmail.com](mailto:ken.garnett@gmail.com)

### 1.3.3 Class IVb Landfill Property Owner Information

#### 1.3.3.1 Surface Landowners

- **Lisbon Valley Mining Company, LLC (LVMC)**  
PO Box 400  
Moab, UT 84532  
435-686-9950
- **State of Utah, School and Institutional Trust Lands Administration (SITLA)**  
675 East 500 South, Suite 500  
Salt Lake City, UT 84102  
801-538-5100

#### 1.3.3.2 Mineral Owners:

- **Lisbon Valley Mining Company LLC**  
PO Box 400  
Moab, UT 84532  
435-686-9950
- **State of Utah, School and Institutional Trust Lands Administration (SITLA)**  
675 East 500 South, Suite 500  
Salt Lake City, UT 84102  
801-538-5100

#### 1.3.4 Class IVb Landfill Size and Location

- Size = 4.8 acres
- Capacity = 57,000 cubic yards (~5,000 tons)
- Location = SW ¼ of Section 36, Township 30 South, Range 25 East, SLBM
- Location = Latitude: 38° 7' 51.783" Longitude: -109° 8' 8.1456"
- Starting Elevation = 6600 feet above mean sea level (amsl)
- Ending Cap Elevation = 6620 feet amsl

## 1.3 Waste Types & Characteristics (Appendix A)

LVMC anticipates storing within the Class IVb landfill the following waste types:

Construction/demolition debris: wood, metal, HDPE and plastic piping, HDPE and plastic liner material, and other components associated with the onsite facilities. The production of this type of waste would be from general maintenance activities, facility upgrades, and final demolition during post-mining reclamation.

Yard waste: trees and shrubs cleared away during site preparation and which are unsuitable for placement in the topsoil stockpile for use during post-mining reclamation. The production of this type of waste would be during the clearing and grubbing of areas prior to disturbance and construction of additional facilities.

Inert waste: concrete and cement materials. The production of this type of waste would be during general maintenance activities, facility upgrades, and final demolition during post-mining reclamation.

Waste tires: Most of the tires used for heavy equipment onsite are recycled and/or sold. However, in some instances the tires have been damaged or are unfit for sale. These tires would be placed in the

landfill. Production of such type of waste would be minimal. The acceptance of waste tires would meet the following criterion: **UAC R325-320-3(2)(b) and (c)**:

- *UAC R315-320-3(2): Landfilling of Whole Tires. A landfill may not receive whole waste tires for disposal except as follows:*
  - a) Waste tires delivered to a landfill no more than four whole tires at one time by an individual, including a waste tire transporter; or*
  - b) Waste tires from devices moved exclusively by human power; or*
  - c) Waste tires with a rim diameter greater than 24.5 inches.*

LVMC does not anticipate receiving and/or dispose of any materials derived from waste tires.

Petroleum contaminated soils: soil contaminated by minor spills and/or entrainment of hydrocarbons in clay used during the beneficiation process; primarily diesel fuel, gasoline, and diluent (see **Appendix A**, SDS for petroleum products). Production of such type of waste would be from accidental spills outside of containment, and which are covered under LVMC's Spill Prevention Control and Countermeasures (SPCC) Permit. Production of such type of waste would also be as a byproduct of the solvent extraction process in which clay is used as a filtration method. The clay is replaced monthly once it becomes ineffective. The resultant is a clay with a low-level saturation of diluent.

The Petroleum contaminated soils expected to be stored within the Class IVb landfill would not be classified as hazardous waste, nor would the soils contain levels of benzene, ethylbenzene, toluene, or xylenes at or above the acceptable quantities as stated in UAC R315-315-8(3).

### 1.3.1 Proposed Maximum Annual Quantity by Waste Type

During the life of the operations, the following quantities of waste are expected to be produced on an annual basis:

**Table 1: Annual Not-to-Exceed Quantity of Waste Type for the Life of the Operations (in cubic yards (CY))**

Waste Type (reported in CY)	2019	2020	2021	2022	2023	2024	2025
Construction/demolition debris	624	624	624	624	624	624	9,284
Yard Waste	5,000	5,000	5,000	5,000	2,500	2,500	2,500
Inert Waste	20	20	20	20	20	20	10
Waste Tires	10	10	10	10	10	10	20
Petroleum-contaminated soils	27	27	27	27	27	27	67
<b>TOTAL CY PER YEAR</b>	<b>5,681</b>	<b>5,681</b>	<b>5,681</b>	<b>5,681</b>	<b>3,181</b>	<b>3,181</b>	<b>11,881</b>
<b>TOTAL REMAINING CAPACITY*</b>	<b>37,069</b>	<b>31,388</b>	<b>25,707</b>	<b>20,026</b>	<b>16,845</b>	<b>13,664</b>	<b>1,784</b>

\*Starting capacity of the landfill = 57,000 CY. Of that, 75% will be landfilled material, and 25% will be inert rock encapsulation material

For conversion from cubic yards to tons of material, LVMC is using the United States (US) Environmental Protection Agency (EPA) "Volume-to-Weight Conversion Factors; Office of Resource Conservation and Recovery" published April 2016. This publication is included in **Appendix A** of this report.



**Table 2: Annual Not-to-Exceed Quantity of Waste Type for the Life of the Operations (in tons)**

Waste Type (reported in tons)	2019	2020	2021	2022	2023	2024	2025
Construction/demolition debris	200	200	200	200	200	200	1,304
Yard Waste	318	318	318	318	159	159	159
Inert Waste	5	5	5	5	5	5	4
Waste Tires	3	3	3	3	3	3	5
Petroleum-contaminated soils	12	12	12	12	12	12	31
<b>TOTAL TONS PER YEAR</b>	<b>537</b>	<b>537</b>	<b>537</b>	<b>537</b>	<b>379</b>	<b>379</b>	<b>1,503</b>

## 1.5 Facility Location (Figure 4)

### 1.5.1 Facility Location

The Class IVb landfill will be located on top of an existing waste dump (Waste Dump 'A'). The waste dump is composed of waste rock hauled from the open pits during active mining. As part of LVMC's LMO permit with DOGM, annual waste rock characterization reports are produced, summarizing the type and nature of the waste removed from the open pits and stored within the active waste dumps. As seen in the waste rock characterization reports, the waste dumps are designed to encapsulate the 'Uncertain' waste rock within the acid-neutralizing waste rock.

The area chosen for the location of the Class IVb landfill is situated on acid-neutralizing waste rock ranging from 40 to 80 feet in thickness from the original top layer of earth.

### 1.5.2 Facility Area

The Class IVb landfill will be located within the Mine Project Boundary as defined by the 1997 Record of Decision (ROD) for the Environmental Impact Statement (EIS) of the Lisbon Valley Copper Project, as well as the NOI for LMO with DOGM. This Project Boundary represents an area of 1,103 acres on a mixture of private, SITLA, and BLM land. The Waste Dump 'A' is located within the southeast portion of the Project Boundary. At maximum capacity, Waste Dump 'A' will cover an area of approximately 85 acres. The Class IVb landfill will represent less than five acres of the 85-acre Waste Dump 'A', or approximately six percent of the total surface area.

### 1.5.3 Disposal Area

The disposal area will be on a lower terrace of Waste Dump 'A' (**Figure 5**). At final construction, the Class IVb landfill will fill in that lower terrace and blend the area with the surrounding contour of Waste Dump 'A'.

### 1.5.4 Design Capacity

**Number of Operational Years:** Seven (7)

**Capacity (CY):** 57,000

**Tons:** 5,000 (approx.)

## 1.6 General Information for All New or Laterally Expanding Facilities

### **Historical Survey Requirements**

The area proposed for the Class IVb landfill is on top of an existing Waste Dump 'A'. The area was surveyed for cultural artifacts during the initial Environmental Impact Statement analysis. Any cultural resources found were mitigated appropriately prior to commencement of disturbance operations. Since the Waste Dump 'A' is less than 50 years old, LVMC asserts that a cultural resource inventory is not required for this project.

### **Property Owners within 1,000 feet of the Facility Boundary**

There are no property owners within 1000 feet of the proposed Class IVb landfill.

### **Documentation that a notice of intent to apply for a permit has been sent to all property owners listed above**

SITLA has been notified of the proposed application for a Class IVb landfill. See Appendix B for more information.

### **Name of the local government with jurisdiction over the facility site**

Southeast Utah Health Department  
575 Z. Kane Creek Blvd  
Moab, UT 84532  
(435) 259-5602

# Part 2: Facility Information

## 2.1 Environmental Permits

The Project is located in San Juan County, Utah. The San Juan County offices are headquartered in Monticello, Utah. LVMC operates under a number of environmental permits related to the Project. These permits are issued through local, State, and Federal regulatory agencies:

**Table 3: Environmental Permits held by LVMC for the Project**

AGENCY	Project/Permit Number	Description
BLM	UTU-72499	1997 ROD for the Lisbon Valley Copper Project
BLM	DOI-BLM-UTY010-2012-0213EA	2012 Water Well Installation for the Lisbon Valley Copper Mine, San Juan County, Utah
BLM	DOI-BLM-UT-Y010-2014-0018EA	2015 Centennial Pit Backfilling Mine Plan Modification for the Lisbon Valley Copper Mine, San Juan County, Utah
DAQ	DAQE-AN114620014-14	2014 Approval Order with the Utah Division of Air Quality (DAQ) to Emit Criteria Pollutants
DWQ	UGW370005	2015 Utah Division of Water Quality (DWQ) Ground Water Discharge Permit
DOGM	M/037/008	DOGM Notice of Intent for Large Mining Operations (amended 2018)
SITLA	ML17667	Lease for land and mineral use, Southwest corner, Section 36, Township 30 South, Range 25 East
County		San Juan County Conditional Use Permit
EPA		Storm Water Pollution Prevention Plan (SWPPP)
EPA		Spill Prevention Control & Countermeasures (SPCC)

## 2.2 Location Standards for New Class IVb Landfills (Appendix B)

### 2.2.1 Floodplains (Figure 6)

The Class IVb landfill will not be located within any floodplains.

### 2.2.2 Wetlands (Figure 7)

There are no wetlands within a 1-mile buffer of the proposed location of the Class IVb landfill.

### 2.2.3 Depth to Ground Water (Figure 8)

LVMC has seven production wells within their land holdings. Per the GWDP with DWQ, LVMC also has six monitor wells within their land holdings. The monitor wells are sampled quarterly, and the production wells are sampled annually. Reports summarizing the quarterly and annual ground water monitoring are on file with DWQ.

Well data over the last ten years indicates that the depth to ground water within the Project area ranges from 150 feet below natural surface to over 700 feet below natural surface. Using this information, as well as information obtained during exploration drilling within the vicinity of Waste Dump 'A', the depth

to ground water beneath the proposed location of the Class IVb landfill ranges between 200 and 600 feet below the native surface.

#### 2.2.4 Surface Water (Figure 9)

There are no major drainages within the vicinity of the proposed location of the Class IVb landfill. The closest ephemeral drainage occurs two miles the proposed location.

The Project is located in the Colorado Plateau physiographic province, notable for its low precipitation and high evaporation. Storm events and flood information for the Project include:

Magnitude of a 24-hour 25-year storm event: 2.40 inches

Magnitude of a 24-hour 100-year storm event: 3.08 inches

Average Annual Rainfall (WRCC, 2018): 13.19 inches

Maximum Elevation of flood waters proximate to the facility: Not Applicable; the Project is not located within a floodplain.

Maximum elevation of flood water from a 100 year flood for waters proximate to the facility: Not Applicable; the Project is not located within a floodplain.

#### 2.2.5 Water Rights & Usage (Figure 10)

LVMC owns three water rights for use within the Project. Table 4 provides information regarding the water right annual usage approved by the Utah Division of Water Rights.

**Table 4: LVMC Water Rights Information**

<b>Water Right Number</b>	<b>Annual Usage (acre-feet)</b>
05-762	179.255
05-2593	2,419.95
05-407	65.35412

All points of diversion within the Project belong to water rights owned and/or controlled by LVMC. No other water rights have points of diversion within the vicinity of the Project.

#### 2.2.6 Geology & Soils (Figures 11, 12)

The geology of the Project area is comprised of sedimentary units ranging in age from Quaternary to upper Jurassic. The Waste Dump 'A' overlies Quaternary sediments comprised of mixed eolian and alluvial deposits (Doelling, 2004). Underlying the Quaternary unit is the Cretaceous Mancos Shale Formation, which is highly impermeable. The location of the Class IVb landfill is within the boundaries of two inferred fault planes related to the collapsed anticline feature of the Central Paradox Basin paleotectonic depression.

The soil of the Project area is dominated by Unit 19-Cahona fine sandy loam, two to eight percent slopes. This soil is well drained, with medium runoff class. The depth to the water table for this type of soil is more than 80 inches, with no frequency of flooding or ponding.

#### 2.2.7 Land Use Compatibility (Figures 13, 14)

The location of the Class IVb landfill is within the southeast quarter of the SITLA parcel ML17661, Township

30 South, Range 25 East, Section 36. The lease between SITLA and LVMC grants LVMC use of the surface *“to the extent reasonably necessary and expedient for the economic operation of the leasehold.”*

#### 2.2.7.1 Facilities within 1,000 Feet of Project Boundary

There are no airports, residences, parks, monuments, recreation areas, or wilderness areas within 1,000 feet of the Project boundary.

#### 2.2.7.2 Threatened, Endangered, or Candidate Species

There are no threatened, endangered, or candidate species within the Project Area. There are also no ecologically or scientifically significant areas within the Project Area.

## 2.3 Plan of Operations

### 2.3.1 Description of Waste Handling Procedures (Appendix C – Waste Handling Form)

The waste materials will be gathered onsite as the waste types are generated. The waste types will be stored separately by type (see **Tables 1 and 2**) in trash receptacles suitable for each waste type. The receptacles will be hauled to the landfill location monthly, where they will be emptied in 4-6 foot lifts, followed by 24 inches of covering using local waste rock from the Waste Dump ‘A’. The waste rock will be placed over the top of the waste materials to stabilize the surface and prevent wind-scattering of the debris. Covering will occur the same day the waste receptacles are emptied. The rock will help hold the waste materials in place and stabilize the surface for the next vertical lift.

### 2.3.2 Inspection & Monitoring Schedule (Appendix – Inspection & Monitoring Forms)

Inspections of the Class IVb landfill will be as follows:

**Table 5: Inspection Schedule**

Landfill Status	Inspection Frequency
Active	Every other week
Inactive for more than three months	Every month
Inactive for more than one year	Every quarter

The monitoring identifies any problems or potential problems to human health or the environment. Inspections are designed to prevent malfunction or deterioration, operator errors, and discharge monitoring. A copy of the inspection log sheet is located in **Appendix C**.

### 2.3.3 Contingency Plan – Fire/explosion

A contingency plan in the event of a fire would be to use the 15 lb type handheld annual type ABC fire extinguisher available on all mine heavy equipment and mine vehicles for initial fire response. In the event the fire is larger than the initial fire response team can handle, the onsite water tanker truck would be dispatched using the mine radio system. The San Juan fire department would also be called immediately. The mine water truck will have 4,000 gallons of water with a fire turret and multiple sprays that can dispatch 4,000 gallons in less than 10 minutes. In addition, a cleared fire break will be graded completely around the outer perimeter of the Project area to assure that a very large fire or explosion will be contained.

#### 2.3.4 Plan to Control Fugitive Dust

Fugitive dust will be controlled by the same 4,000 gallon water truck as climate and dust dictate. At closure, the dump will be capped with 12-inches of topsoil and reseeded with native plants, according to the DOGM and BLM mine reclamation requirements.

#### 2.3.5 Plan for Litter Control and Collection

All LVMC personnel and contractors will be trained to dispose of all litter in the appropriate containers onsite. These containers will accept only those waste types for which they are designated. Wind-blown litter will be kept to a minimum by using covered containers, and covering the Class IVb landfill the same day the waste material is dumped. Mine personnel will collect any litter that escapes the containers. A daily inspection of the containers will ensure that there is no wind-blown litter.

#### 2.3.6 Procedures for excluding the receipt of prohibited hazardous or PCB waste

Hazardous waste will be handled in accordance with all federal, state, and local laws and transported for disposal offsite to approved, permitted facilities. Employees will be trained to identify and classify waste according to its hazard class. An active hazardous waste management plan is in place. Currently there are no PCB containing equipment or materials at the LVMC Project. If any PCB containing equipment or materials are brought onsite, they will be disposed of offsite to approved, permitted facilities.

#### 2.3.7 Procedures for controlling disease vectors (not applicable)

The waste materials in the Class IVb landfill will not be attractive to disease vectors or support vector habitats; therefore, no special method to control them is necessary. However, the cover of 24 inches is sufficient to control disease vectors.

#### 2.3.8 Alternative Waste Handling Plan

In the event the Class IVb landfill is unable to accept waste material, any non-hazardous waste can be deposited into a large waste receptacle until the onsite landfill is either, able to accept the waste, or until another location is determined. Alternative locations would include the offsite local landfills.

#### 2.3.9 General Training Plan for Site Operations

Operators of equipment used in the operation of the Class IVb landfill facility are trained specifically in each piece of equipment as required by Mine Safety and Health Administration (MSHA) regulations. All LVMC employees and contractors receive training as part of annual training required by MSHA including aspects pertaining to landfill operation. Training manuals can be found in **Appendix C** of this NOI.

#### 2.3.10 Recycling Programs

LVMC will continue to utilize recycling as a method of disposal of such waste types as tires and cardboard. LVMC will also continue to recycle batteries and other materials used and/or generated by the Project. Records of recycled materials will be kept on site. Where applicable, the quantities of recycled materials will be reported annually during LVMC's annual Toxic Release Inventory (TRI) reporting.

# Part 3: Facility Technical Information

## 3.1 Maps

**Figure 15:** Topographic Map of the Class IVb Landfill Location

**Figure 16:** Most Recent USGS topo map showing boundary

**Figure 17:** Surface Water Map

**Figure 18:** Utilities Map

## 3.2 Engineering Report – Plans, Specifications, & Calculations

### 3.2.1 Unit Design

The waste material that will be contained within the Class IVb landfill will be covered in place and leveled periodically. This practice will continue as long as the Class IVb landfill is in use and at the time for closure. The final filled area will be covered with at least the minimum required cap consisting of 24-inches of waste rock and 12 inches of topsoil. The final cap will be contoured to blend with the surrounding Waste Dump 'A'. As stated in LVMC's NOI for LMO with DOGM, the final sloped edge will be a 2.5H:1V. The top will be blended and contoured such that the grade is greater than 2 percent and no ponding will occur on the surface.

As stated previously, the Class IVb landfill will be located on an existing waste rock dump. The elevation of the native earth underlying the Waste Dump 'A' was approximately 6550-6560 feet above mean sea level (amsl). The elevation of the Waste Dump 'A' lift upon which the Class IVb landfill will be situated is 6600 feet amsl. The final elevation of the capped surface of the Class IVb landfill will be no greater than 6620 feet amsl.

### 3.2.2 Design and Location of run-on and run-off control systems

Run-off from the Class IVb landfill is not expected to occur due to the design of the landfill, which will include berming the perimeter of the Class IVb landfill area. The Class IVb landfill will be designed so that all run-on and run-off will be redirected with diversion ditches into detention basins, where the water will be evaporated. After closure, the absorption and evapotranspiration by the vegetation layer and the absence of any appreciable run-on will ensure the control of run-off. Once the vegetation layer growth is established, most storm events will not result in significant direct run-off from the landfill surface area. Nonetheless, significant percolation through the cover layer is unlikely, thus leachate or seepage from the heap is minimal.

The 25-year 24-hour storm event was determined using NOAA Point Precipitation Frequency Estimates calculated from the NOAA Precipitation Frequency Data Server (PFDS), accessed online at [https://hdsc.nws.noaa.gov/hdsc/pfds/pfds\\_map\\_cont.html](https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html). The program determined that the storm event would produce 2.40 inches of precipitation at latitude 38.1312° and longitude -109.1367° and an elevation of 6600.61 feet amsl.

Because the Waste Dump 'A' provides an elevated platform upon which the Class IVb landfill will be constructed, there is no intercepting watershed.

### 3.2.3 Anticipated Facility Life and basis for calculation

The estimated life of use for the Class IVb landfill is based upon the current reserve estimate for the LVMC Project. At the time of this application, the life of mine for the Project is approximately five to six years. LVMC anticipates performing final demolition and reclamation of the site in 2024 and 2025. For this reason, the waste quantities reported in **Tables 1 and 2** reflect a larger amount of expected disposal of waste materials in the year 2025. Upon final reclamation, the site will be closed and closure/post-closure inspections and mitigation will start to occur.

### 3.2.4 Engineering Reports (Not applicable)

Because this application is for a Class IVb landfill, stamped engineering reports are not required. See UAC R315-310-3(1)(b).

### 3.2.5 Identification of borrow sources for final cover

Within the LVMC Project Area are numerous topsoil stockpiles. These stockpiles were created during the initial disturbance activities related to the open pit mining operations. The purpose of the topsoil stockpiles is to use during final reclamation. The topsoil that will be used for the reclamation of Waste Dump 'A', which will include the Class IVb landfill, is located directly north of Waste Dump 'A' as seen on **Figure 4**.

### 3.2.6 Run-off collection, treatment, and disposal and documentation (if necessary)

As described in Section 3.2.2 above, run-off is not anticipated to occur. If run-off does occur, the run-off will be diverted to a retention basin where it will infiltrate or evaporate. Documentation of run-off controls and quarterly storm water monitoring is included in LVMC's SWPPP. Monthly monitoring of the site for storm water pollutants and run-off controls will include the Class IVb landfill.



# Part 4: Closure Requirements

## 4.1 Closure Plan

LVMC will, within 30 days after certification of closure, notify the San Juan County Recorder to file proof of closure. All materials disposed of within the proposed Class IVb landfill will be within the acceptable waste constituents for a Class IVb non-hazardous landfill. The landfill will only accept non-hazardous waste that is generated at the LVMC Project. No waste will be transported into the site from offsite locations. The waste will consist of that described in detail in Section 1.3 above.

### 4.1.1 Maintenance and Control

Access to the Class IVb landfill will be restricted through mine security and gates/fencing. Signs are posted indicating authorized personnel only are allowed on the access roads leading into the LVMC Project. Wind dispersal of the landfill litter will be minimized by the application of cover.

After cessation of operations at the Project, the Class IVb landfill will be closed with an application of the acid-neutralizing waste rock from the Waste Dump 'A' and a complete inspection of the surface will be performed. Cleanup of the site will be performed concurrently. All remaining visible litter and debris in the immediate vicinity will be placed in the final lift of the landfill unit. At this time, the final cover will be applied. A thorough closure inspection shall consist of observations for erosion, sloping, drainage, surface leachate, and run-on. Areas requiring repairs/modifications will be documented on the Landfill Inspection Form (Appendix C). Necessary modifications will be made using appropriate materials and compacted, as necessary.

### 4.1.2 Escape of Air Pollutants/Gases

The contents of a Class IVb landfill have no amounts of putrescible materials and the decomposition of organic wastes such as trees/forbs will be minimal. The US EPA reports that methane is generated from "municipal" solid waste only when the moisture content exceeds 40% (US EPA, 1994). Due to the limited moisture at the site and the absence of putrescible wastes to be contained, methane gas generation is not anticipated. Vector, dust, and odors will be effectively controlled so they are not a nuisance or hazard to health, safety or property. None of the waste will be flammable, and a fire or explosion in the landfill area is highly unlikely. The LVMC Project is served by the local fire department, and equipment is located onsite to move soil and waste rock for fire suppression, if necessary.

### 4.1.3 Control of Run-off

Run-off from the Class IVb landfill is not expected to occur due to the design and location of the landfill. The landfill will be designed so that all run-on and run-off will be redirected with diversion ditches into sediment pond, where the water will be evaporated. After closure, the absorption and evapotranspiration by the vegetation layer and the absence of any appreciable run-on will ensure the control of run-off. Once the vegetation layer growth is established, most storm events will not result in significant direct run-off from the landfill surface area. Nonetheless, significant percolation through the cover layer is unlikely, thus leachate or seepage from the landfill will be minimal. Moreover, the use of acid-neutralizing waste rock as encapsulation material will further assist in the prevention of leachate from forming.

#### 4.1.4 Repairs

During landfill inspections, if any settlements, subsidence or erosion areas are found on the cover, they will be promptly backfilled with onsite waste rock from the surrounding Waste Dump 'A', and re-capped with remaining topsoil. After final re-grading, the area will be re-vegetated with the prescribed native seed mix. If there are areas of inherent erosion it will be documented on the Landfill Inspection Form and addressed by re-grading and placement of appropriate cover material. To prevent integrity breaks in the cover due to mechanical agitation, notices will be posted and access will be limited to inspection, maintenance, and monitoring personnel. Repairs will be made promptly with the appropriate soil, rip rap, or other necessary materials that will be compatible to the immediate environmental factors that cause breaches in the cover integrity.

#### 4.2 Closure Schedule

It is intended that the usefulness of the landfill will end on or before the year 2026.

#### 4.3 Design and Final Cover

When the operational life of the landfill facility has ended, final capping will be accomplished using acid neutralizing waste rock from the surrounding Waste Dump 'A'. The final cover will be no less than 24-inches in thickness. Following the final capping, topsoil will be spread to a depth of no less than 12-inches on top of the capped landfill. The topsoil will be taken from the topsoil stockpile located north of Waste Dump 'A' (**Figure 4**).

Topsoil placement will likely occur in fall of the reclamation year. This will be done to allow for re-seeding of the area in late fall, which is the preferred re-seeding season. The seed mixture to be used will be approved by DOGM and SITLA.

#### 4.4 Capacity of Site in Volume and Tonnage

The volume of the Class IVb landfill, as calculated by LVMC personnel, totals 57,000 CY; 75 percent of which will be comprised of actual waste material, and 25 percent of which will be comprised of encapsulation/cover material. Therefore, the total amount of waste material that can be placed within the Class IVb landfill will not exceed 42,750 CY.

#### 4.5 Final Inspection

Upon closure of the LVMC Class IVb landfill, a final inspection by the Utah Division of Solid and Hazardous Waste will take place to approve the final cover and release the site for closure. DOGM and SITLA will also perform a subsequent inspection in order to finalize the site for closure. This inspection will examine soil and slope stability, drainage, and vegetation success.

# Part 5: Post-Closure Requirements

## 5.1 Post-Closure Care Plan

LVMC will provide post closure activities that will include, at a minimum, monitoring of land and water, for a period of 15 years, or as long as the Director determines is necessary for the facility or unit to become stabilized and to protect human health and environment.

## 5.2 Changes to Record of Title, Land Use, and Zoning Restrictions

The title to the property on which the landfill will be situated is held by the State of Utah through its SITLA program. LVMC has a 10-year automatically renewable lease for use of the property that was initiated in 2016. It is estimated that the LVMC Property contains 5-7 years of mineable reserves. Therefore, operations at the LVMC Project will cease prior to the 10-year renewal date of the SITLA lease. LVMC will continue monitoring the site through continued lease terms with SITLA, which would be done for the project per associated State and Federal requirements.

## 5.3 Maintenance Activities to Maintain cover and run-on/run-off control systems

Post-closure monitoring of the landfill site will be conducted periodically for several years following closure. The site will be monitored to ensure slope and erosional stability. Run-on/run-off structures will also be inspected to ensure proper functioning and stability. As required by DOGM regulations regarding reclamation, inspection of vegetative success will be performed for at least three years following reclamation. After the third year, success of revegetation will be determined.

## 5.4 Facility Contact Post-Closure

Facility Contact for Post-Closure Activities:

<b>Name:</b>	Lisbon Valley Mining Company, LLC
<b>Contact Information:</b>	Attn: Alysén Tarrant, Environmental Manager Lisbon Valley Mining Company, LLC
<b>Physical Address:</b>	920 South County Road 313 La Sal, Utah 84532
<b>Mailing Address:</b>	PO Box 400 Moab, UT 84532
<b>Phone:</b>	(435) 686-9950 ext. 126
<b>E-mail:</b>	atarrant@lisbonmine.com

# Part 6: Financial Assurance

## 6.1 Closure Costs

A mining reclamation surety of \$6.2 million held by DOGM currently exists for the LVMC Project, including the location of the Class IVb landfill.

## 6.2 Post-Closure Costs

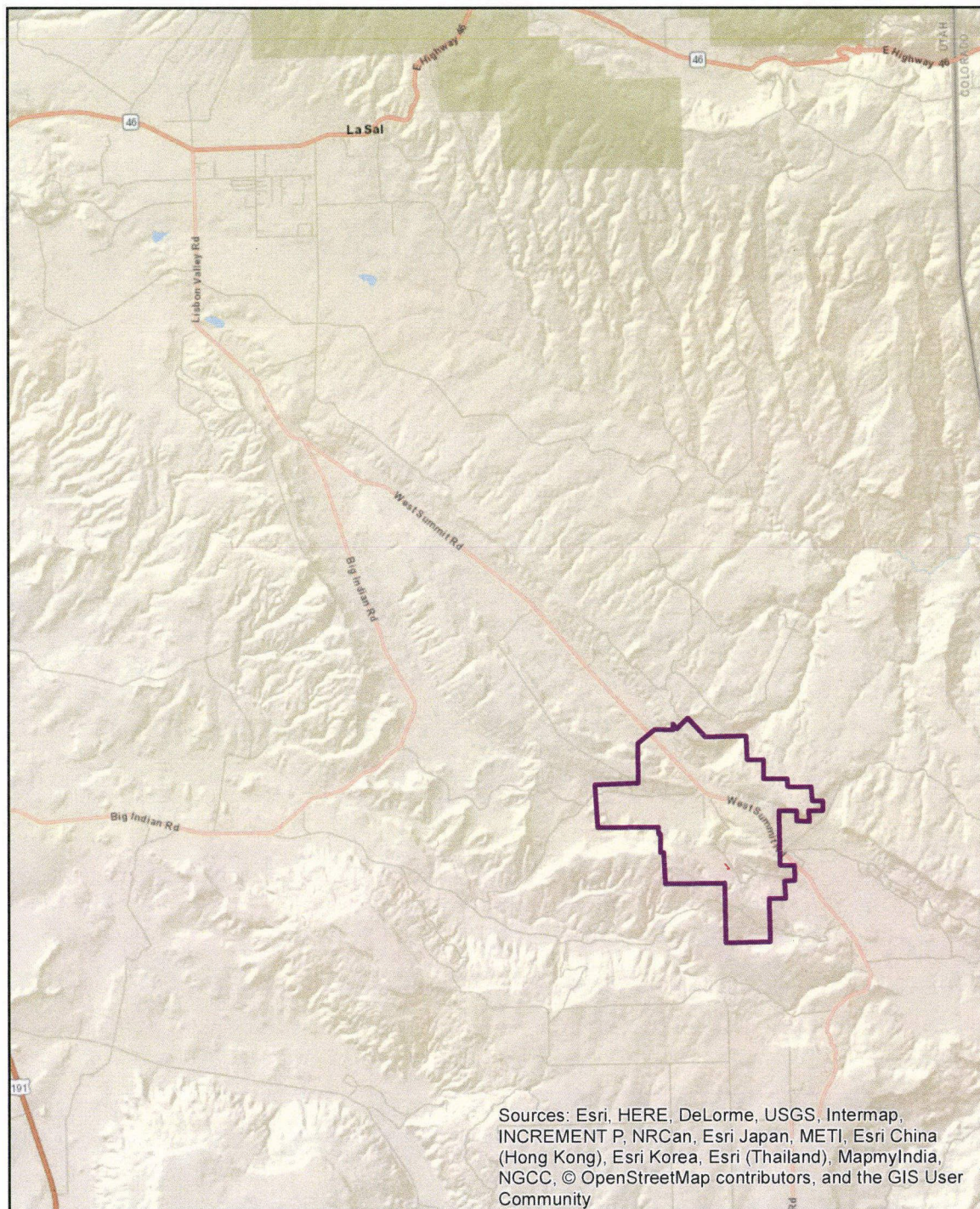
A mining reclamation surety of \$6.2 million held by DOGM currently exists for the LVMC Project, including the location of the Class IVb landfill.

## 6.3 Financial Assurance Mechanism

A mining reclamation surety of \$6.2 million held by DOGM currently exists for the LVMC Project, including the location of the Class IVb landfill. LVMC proposes that this surety cover the financial assurance mechanism required under R315-309. This surety amount more than exceeds any closure or post-closure for the landfill facility.

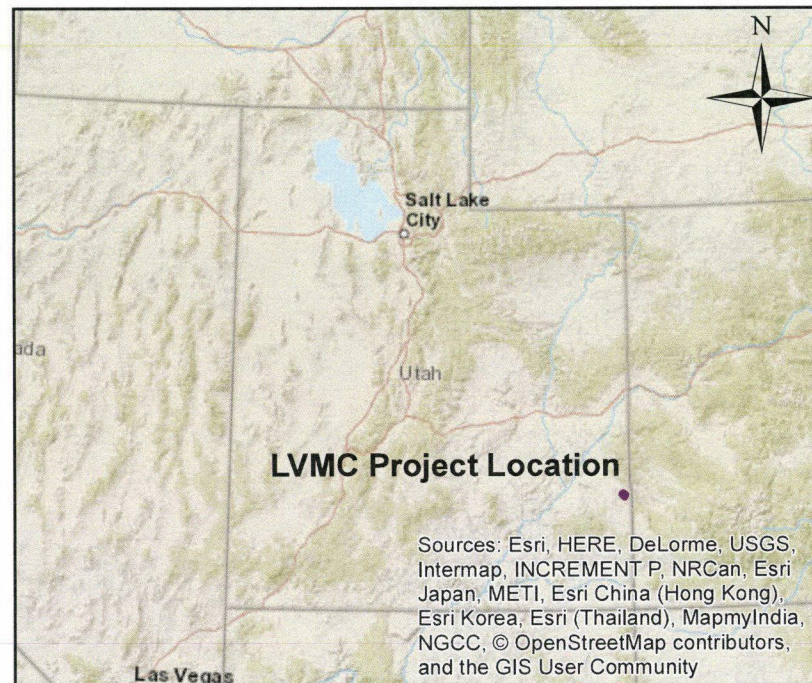
# FIGURES





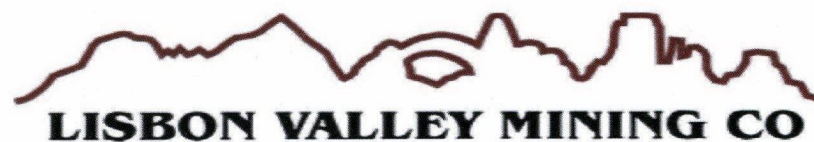
Drawn By: ADT  
Date: September 8, 2018

2.5 1.25 0 2.5 Miles

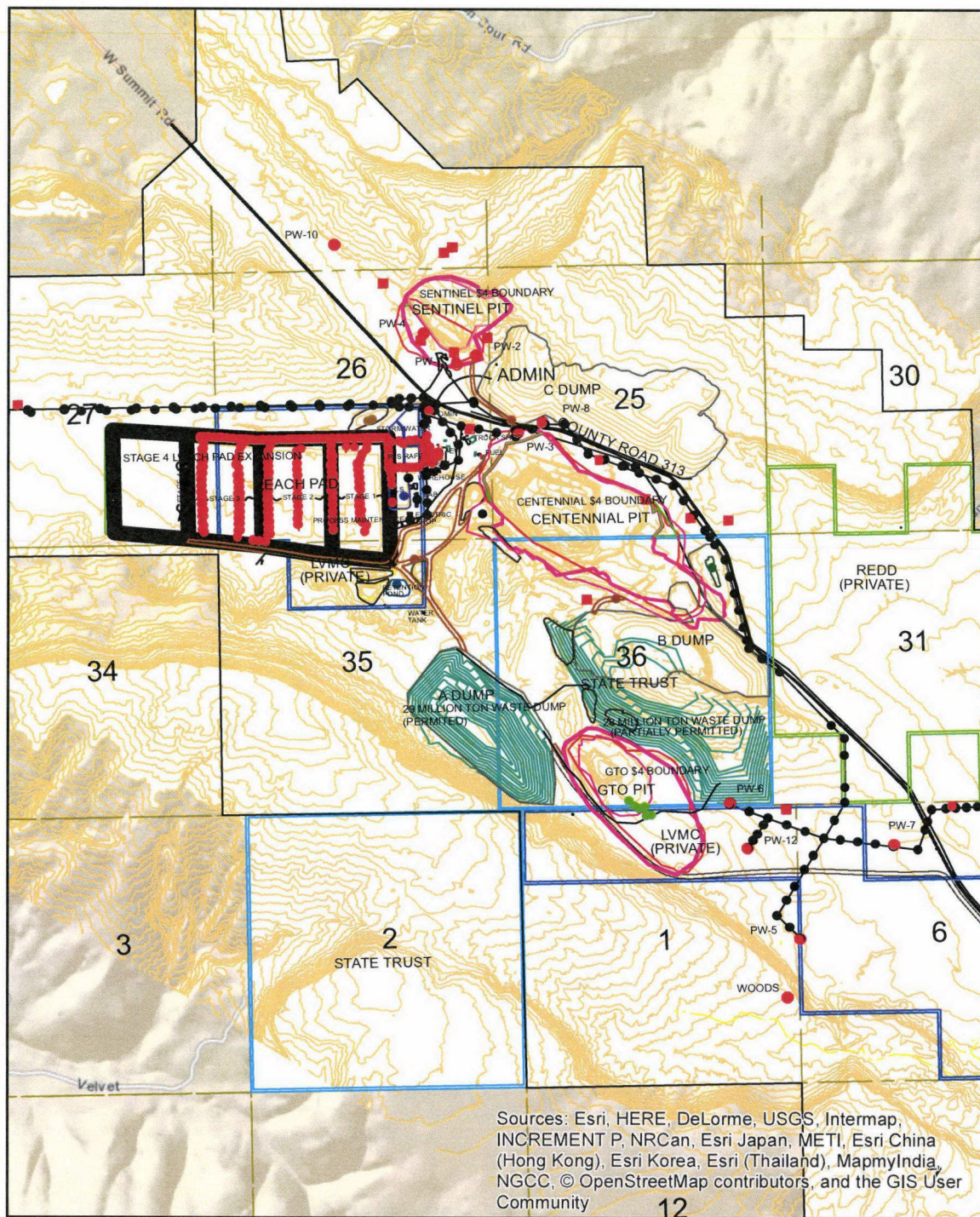


**FIGURE 1**  
**LVMC General Location Map**

— LVMC\_Project\_Boundary(4,464ac)

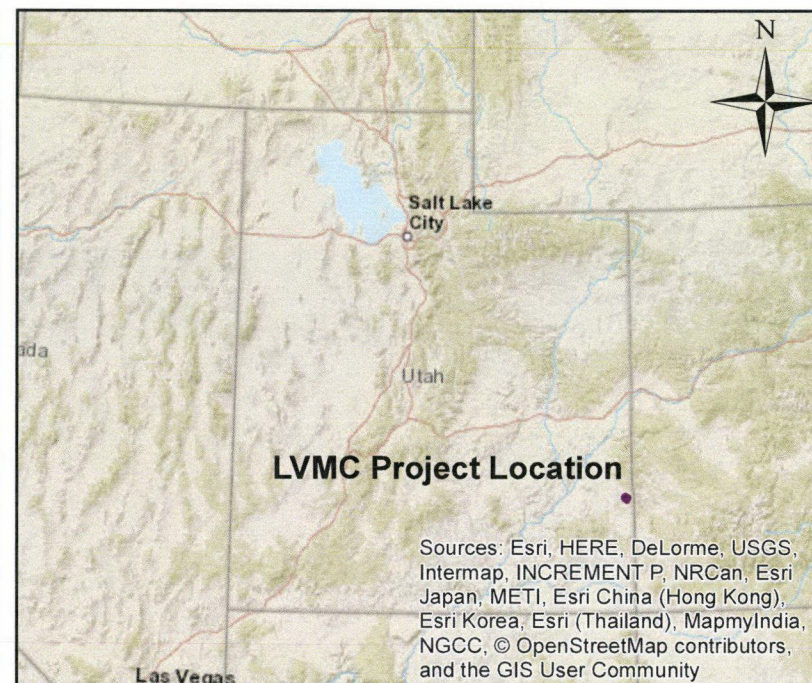






Drawn By: ADT  
Date: September 18

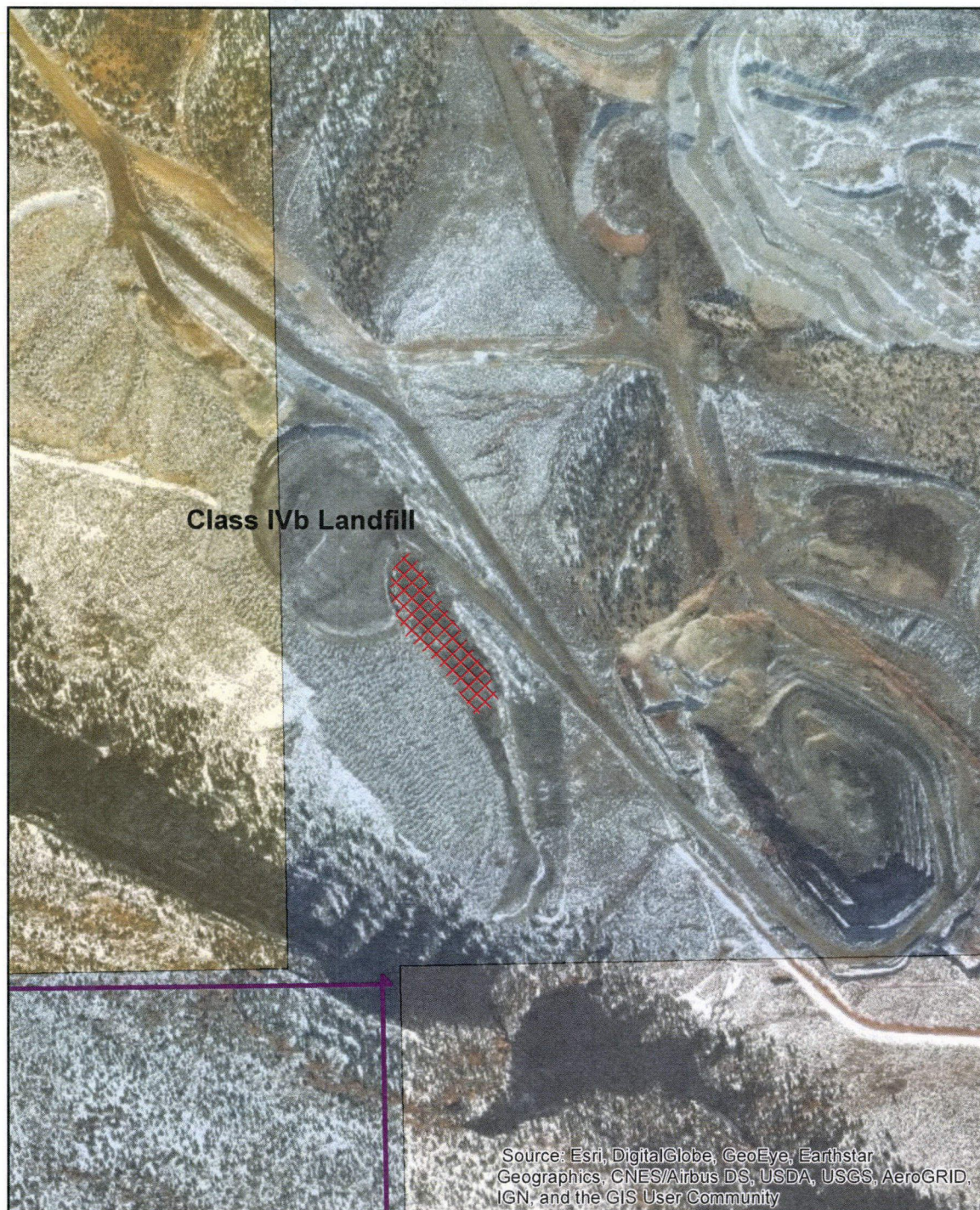
2,800 1,400 0 2,800 Feet



**FIGURE 2**  
**LVMC Project Map**

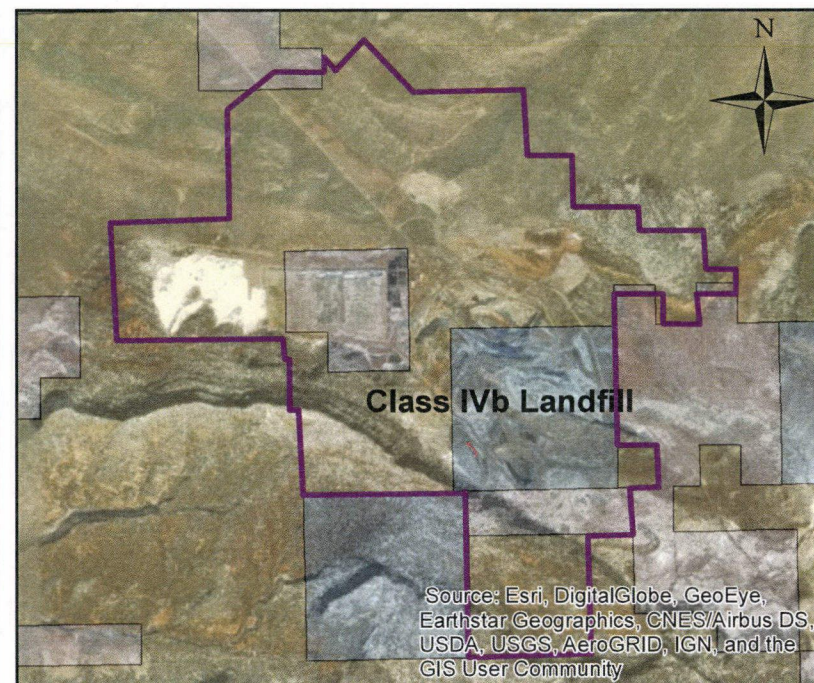
**LISBON VALLEY MINING CO**





Drawn By: ADT  
Date: September 8

625 312.5 0 625 Feet



**FIGURE 3**  
**Land Status for the LVMC Project**

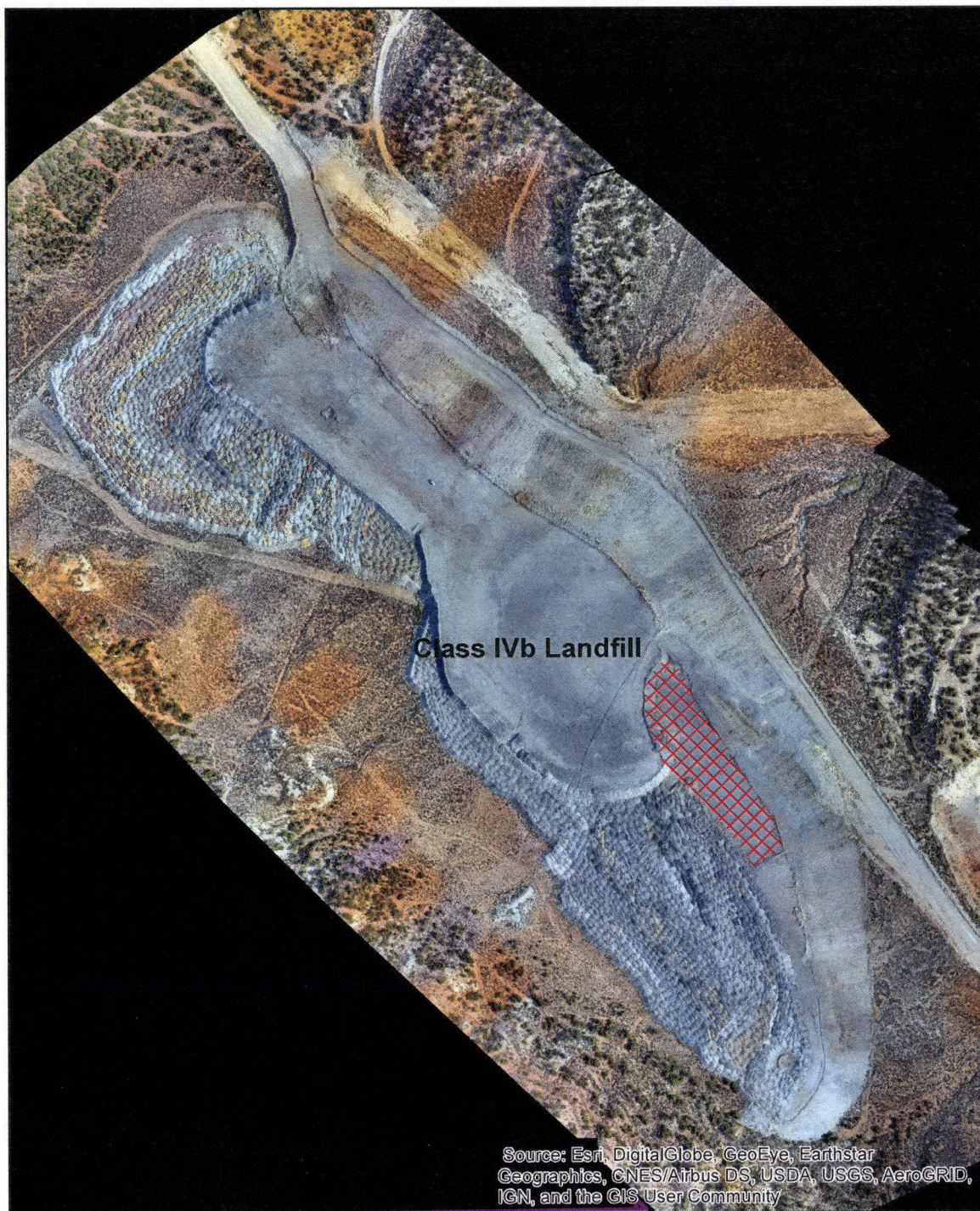
### LandOwnership

#### OWNER

- Federal
- Private
- State





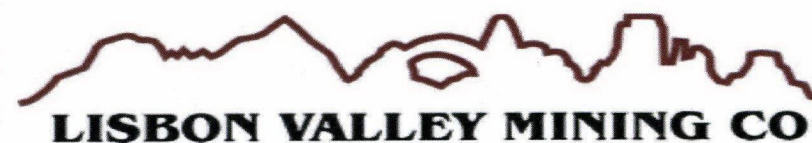


Drawn By: ADT  
Date: September 18



## FIGURE 4 Location of Proposed Class IVb Landfill

Class IVb Landfill to be located on top of existing Waste Dump 'A'. Image on the left was taken on August 16, 2018. No changes to the surface of the landfill have occurred or will occur until construction of the Class IVb Landfill is approved.

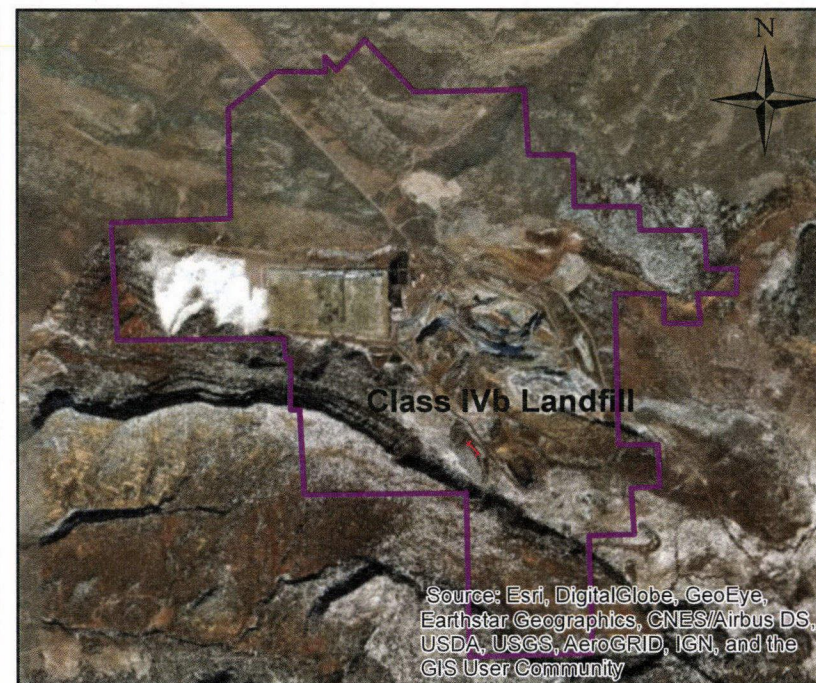






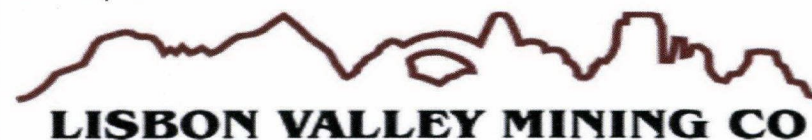
Drawn By: ADT  
Date: September 2018

220 110 0 220 Feet

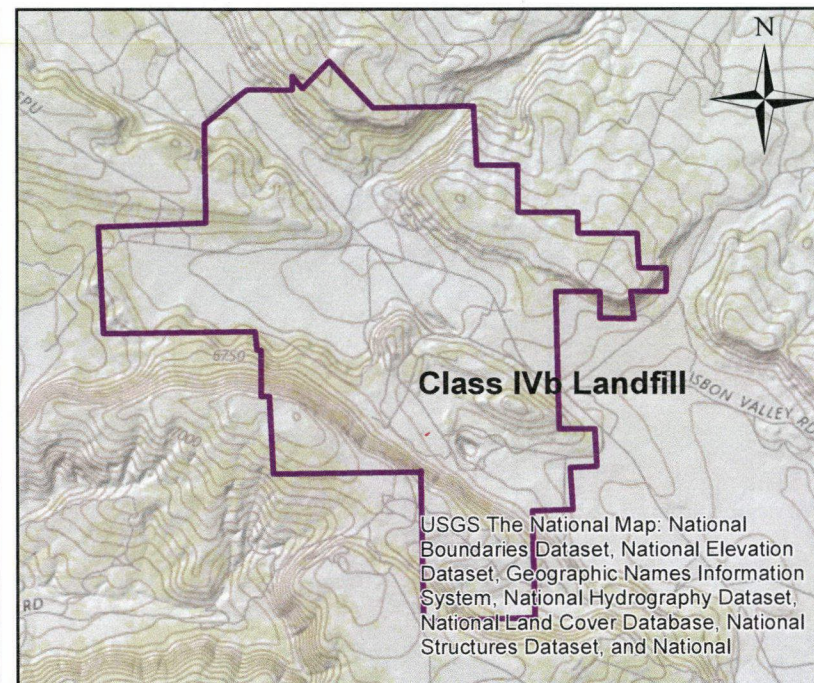


**FIGURE 5**  
**Zoomed-in view of the Class IVb Landfill**

**Class IVb Landfill:**  
 Size = 4.8 acres (approximately)  
 Capacity (cubic yards) = 57,000  
 Capacity of waste material (75%) = 42,750 cy  
 Starting Landfill elevation = 6600 feet amsl  
 Ending cap Landfill elevation = 6620 feet amsl  
 Encapsulation Design: The waste types will be stored separately by type in trash receptacles suitable for each waste type. The receptacles will be hauled to the landfill location monthly, where they will be emptied in 4-6 foot lifts, followed by 24 inches of covering using local waste rock from the surrounding Waste Dump 'A'. The waste rock will be placed over the top of the waste materials to stabilize the surface and prevent wind-scattering of the debris. Covering will occur the same day the waste receptacles are emptied.

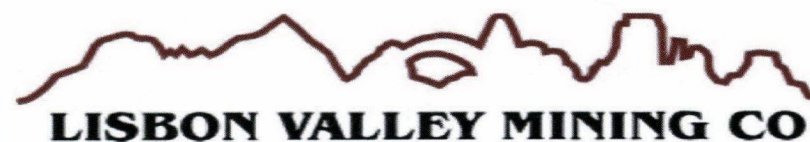




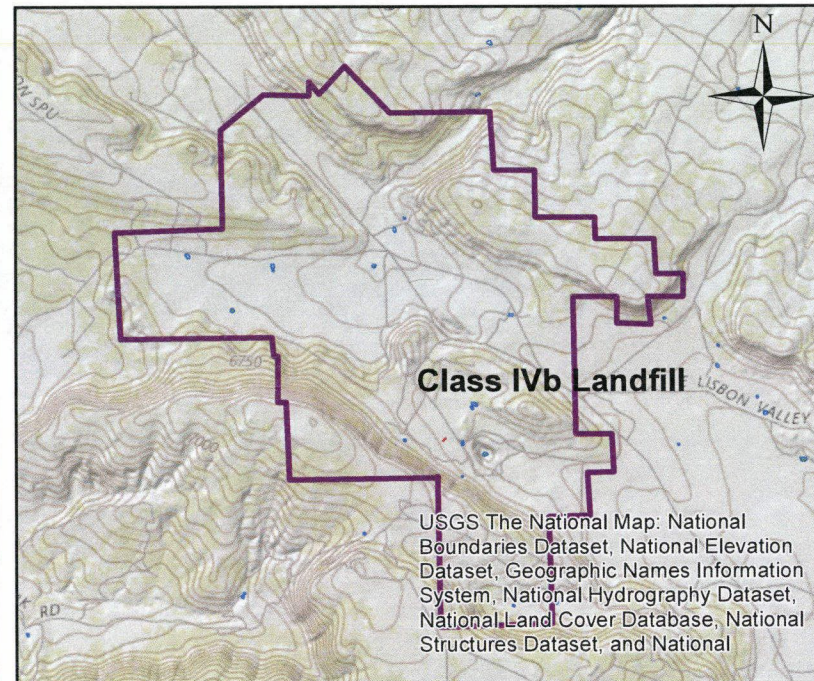
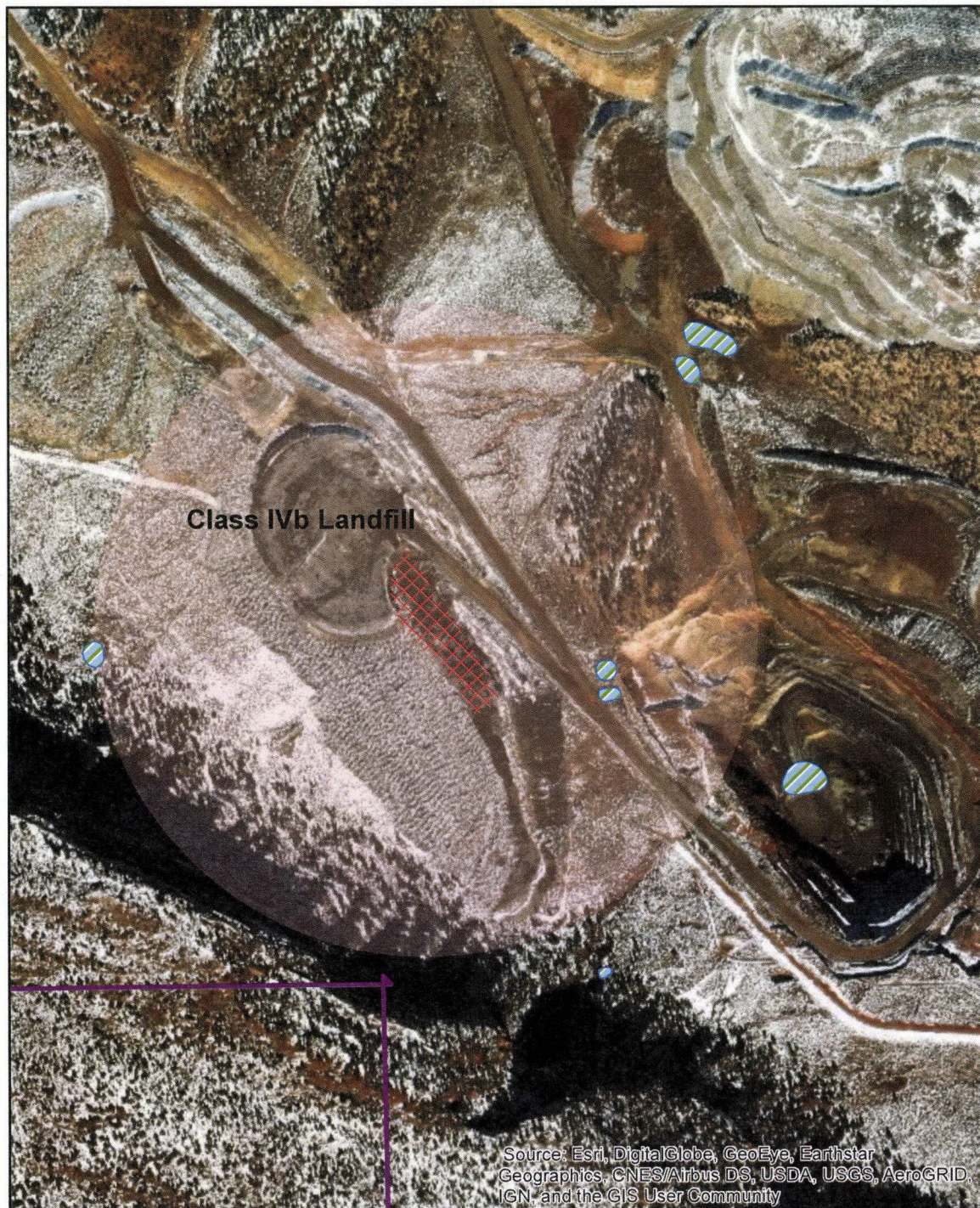


**FIGURE 6**  
**Floodplains Map for the Project**

There are no floodplains within the vicinity of the proposed Class IVb landfill

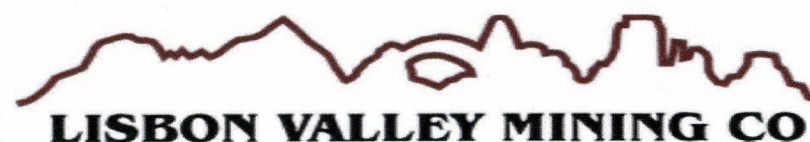




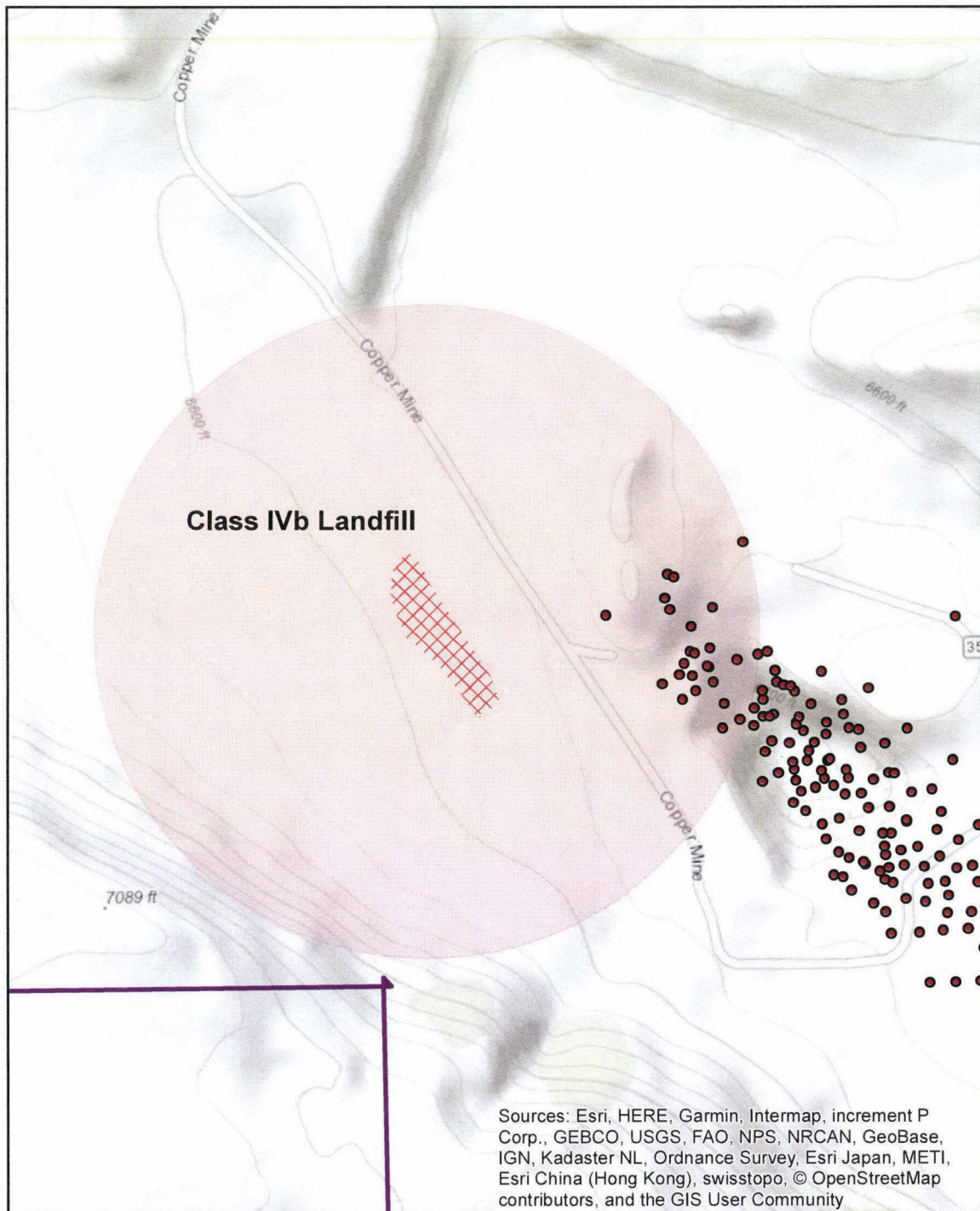


**FIGURE 7**  
**Wetlands Map for the Project**

Wetlands seen within the 1/4-mile buffer are man made detention basins designed to retain run-off from areas within the Project Area.

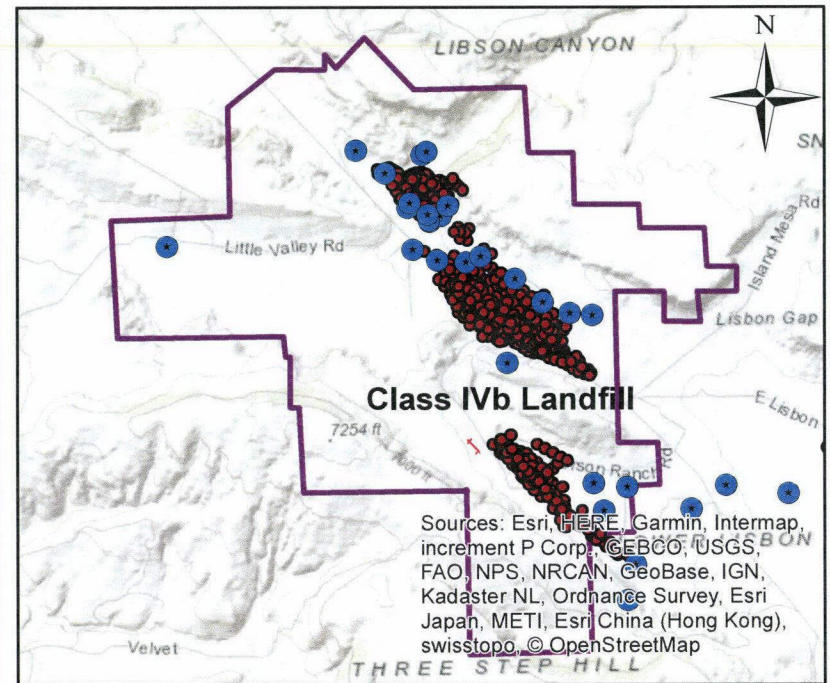






Drawn By: ADT  
Date: September 2018

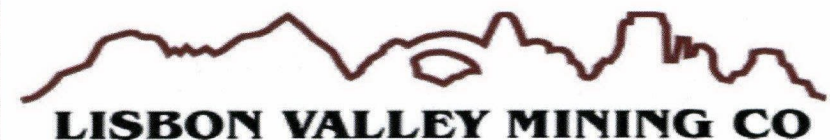
625 312.5 0 625 Feet



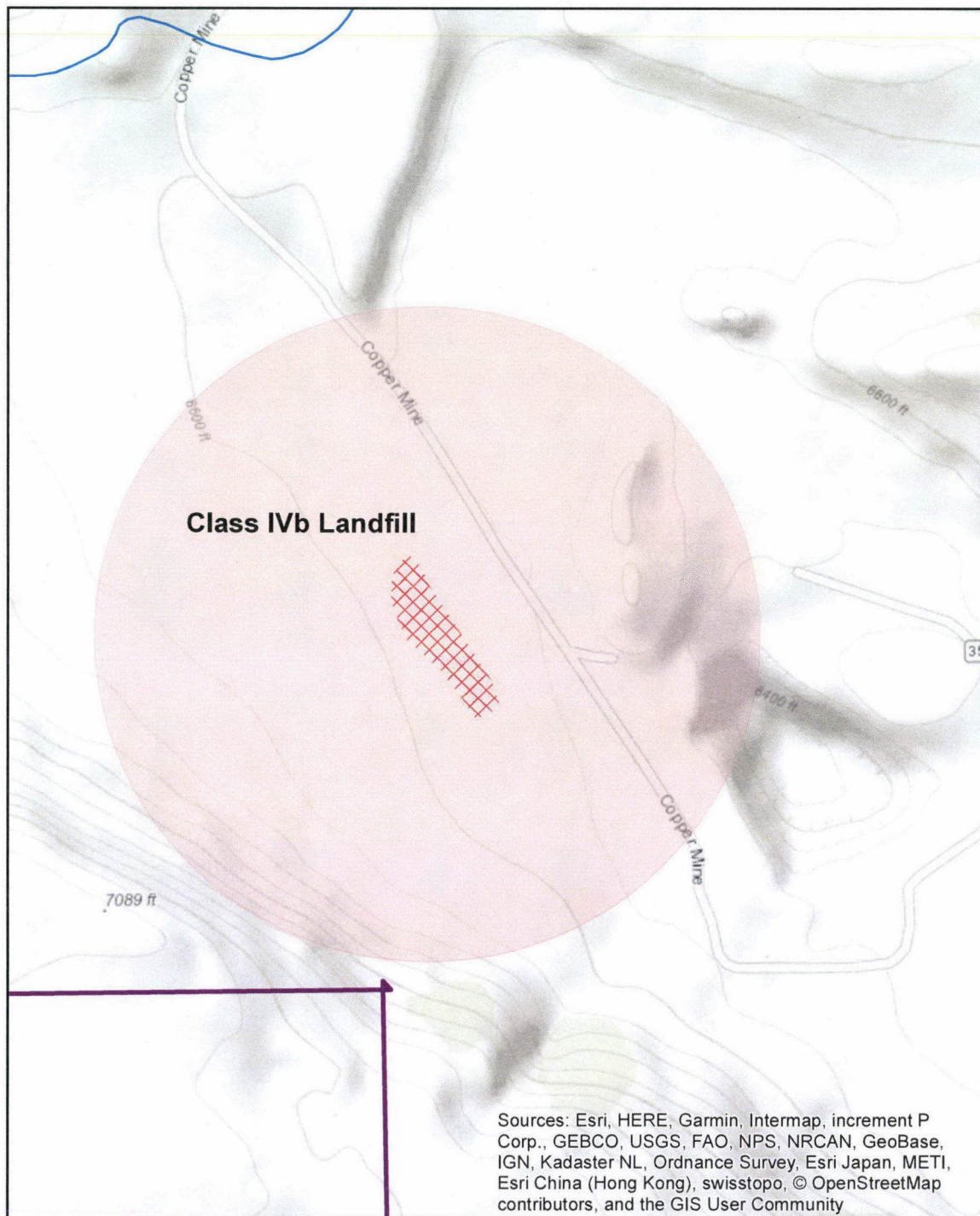
**FIGURE 8**  
**Water Well & Exploration Hole Locations**

All water wells within the Project and surrounding the Project are owned and monitored by LVMC.

- LVMC\_Water\_Wells
- Exploration Drill Holes
- 1/4 mile buffer

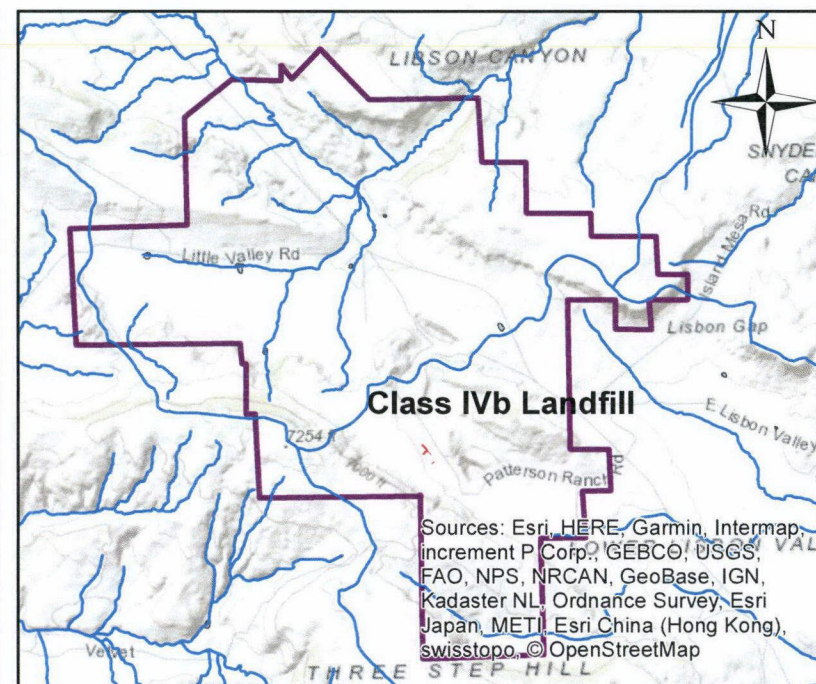






Drawn By: ADT  
Date: September 2018

625 312.5 0 625 Feet



**FIGURE 9**  
**Surface Hydrology Map of the Project**

As seen, no surface hydrologic features within a 1/4 mile buffer of the proposed location for the Class IVb landfill.

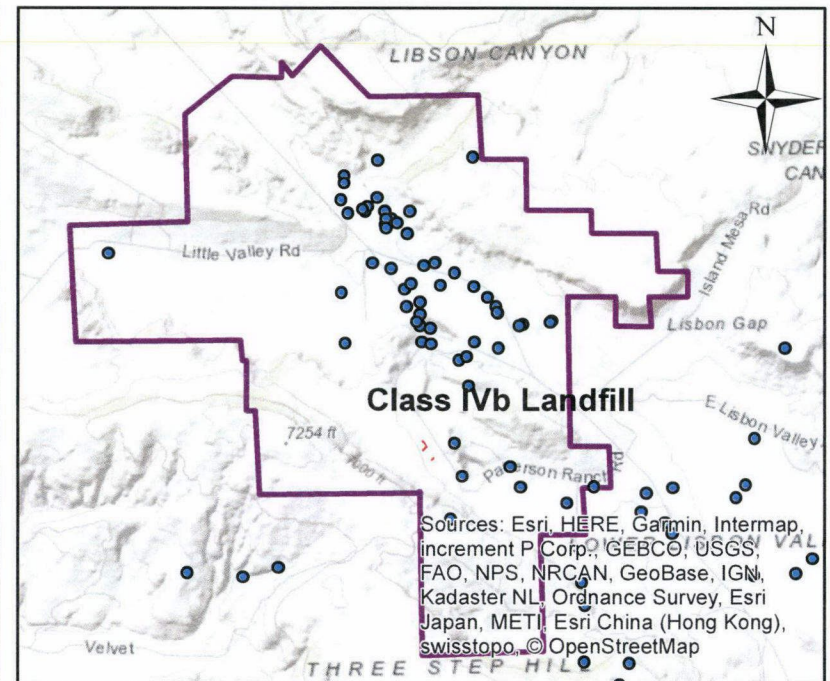
— NHDFlowline  
— 1/4 mile buffer

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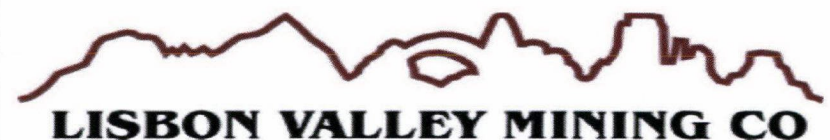
Drawn By: ADT  
Date: September 2018



**FIGURE 10**  
**Water Rights and Usage Map**

Water Right 05-2593 is owned by LVMC. All Points of Diversion within the Project are associated with water rights owned by LVMC.

- Water Rights Points of Diversion
- 1/4 mile buffer

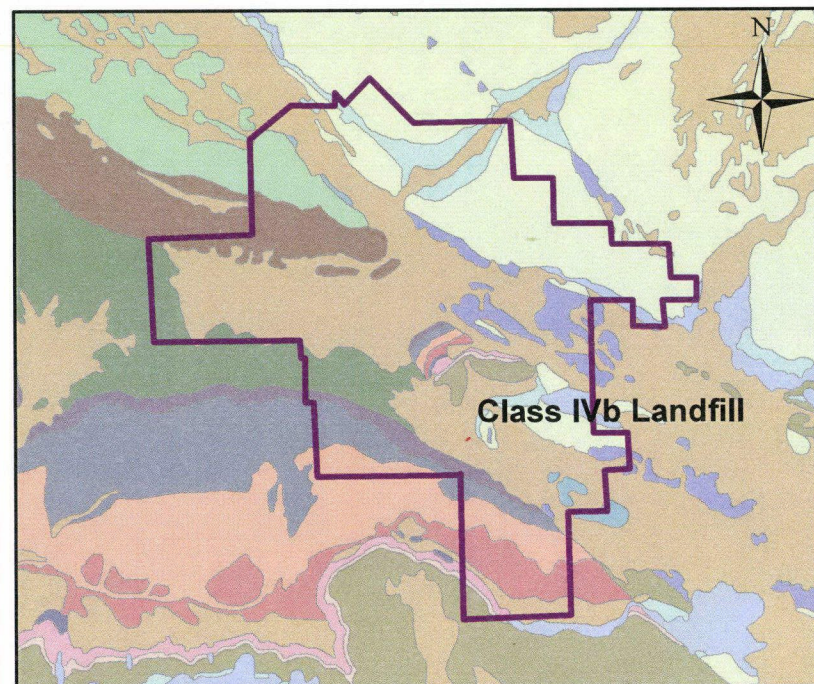






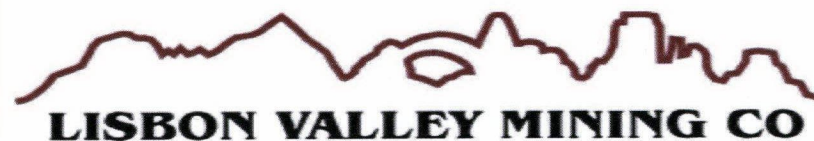
Drawn By: ADT  
Date: September 2018

490 245 0 490 Feet



**FIGURE 11**  
**Geologic Map of the Project**

Geologic Map of the area for the proposed Class IVb Landfill. Geology underlying the Waste Dump 'A' is Quaternary mixed eolian and alluvial deposits.

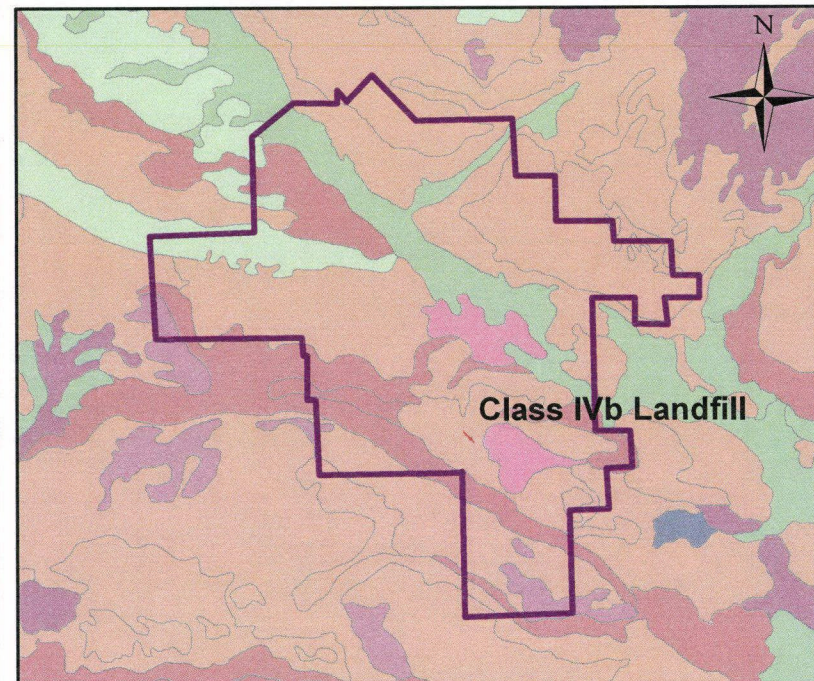






Drawn By: ADT  
Date: September 2018

490 245 0 490 Feet

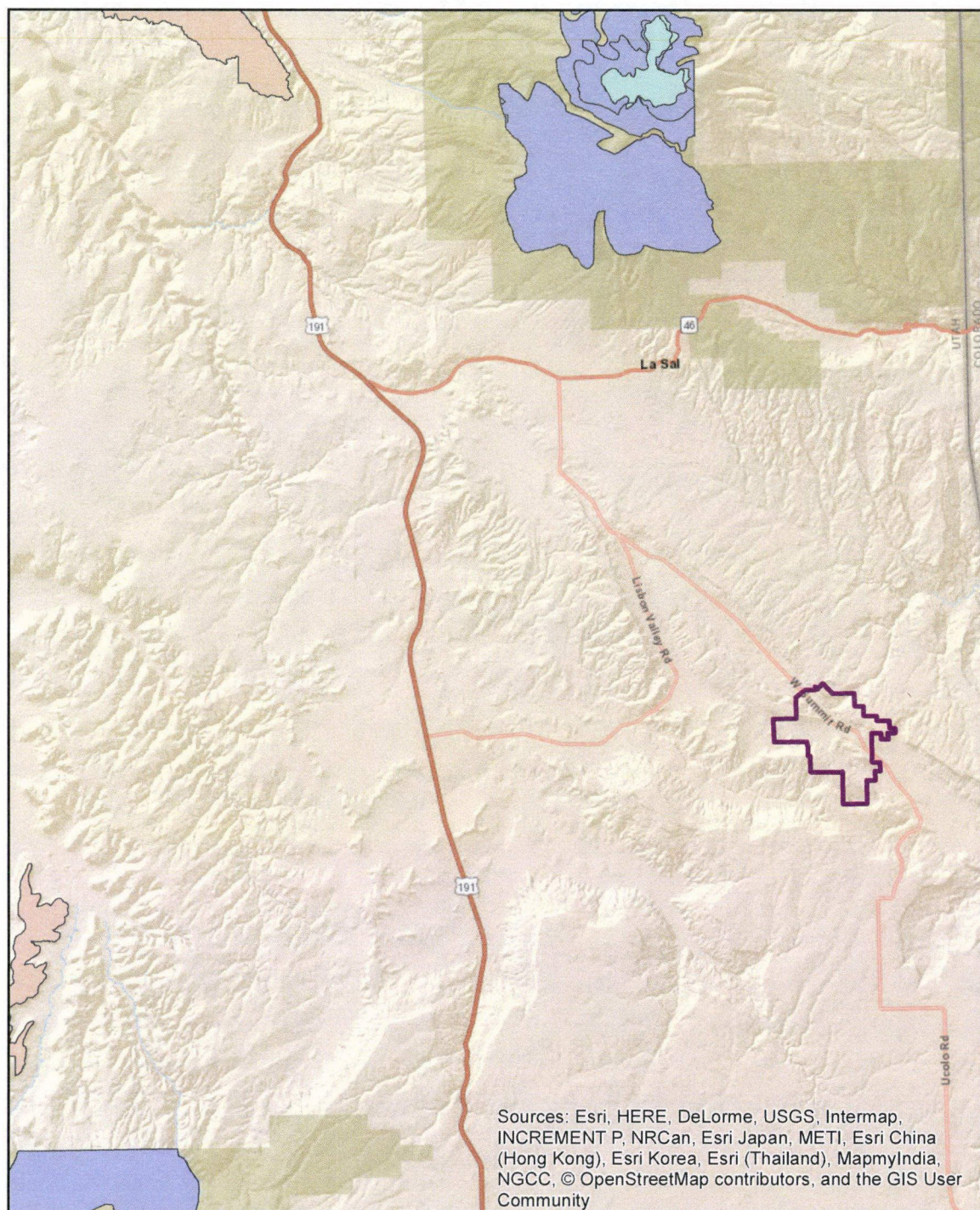


**FIGURE 12**  
**Soils Map of the Project**

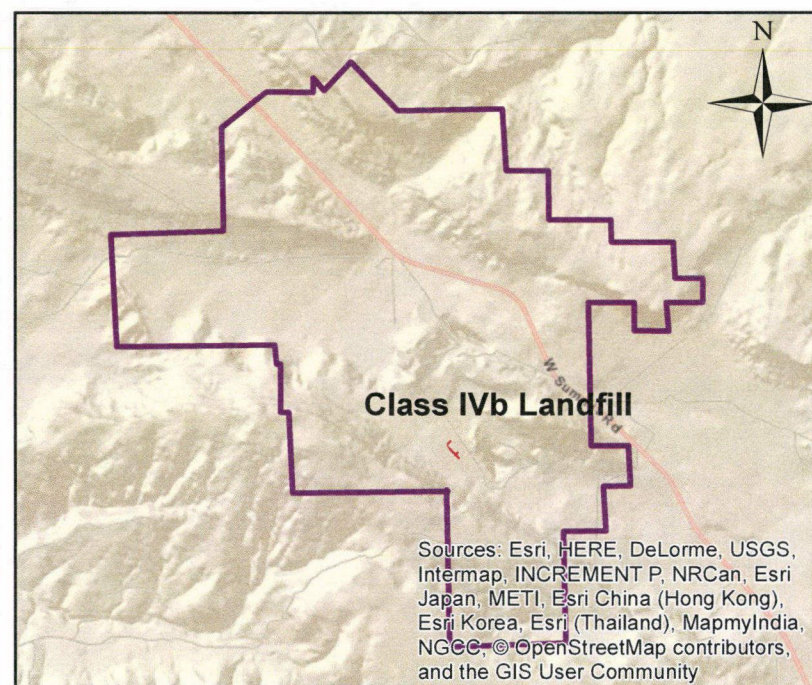
Soil Unit within the vicinity of the Class IVb Landfill:  
Unit 19 - Cahona fine sandy loam, 2 to 8 percent slopes  
Drainage Class: Well Drained  
Runoff Class: Medium  
Depth to water table: More than 80 inches  
Frequency of flooding: None  
Frequency of ponding: None







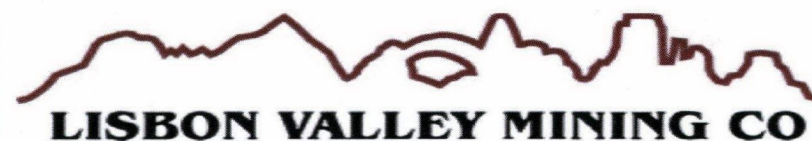
Drawn By: ADT  
Date: September 2018



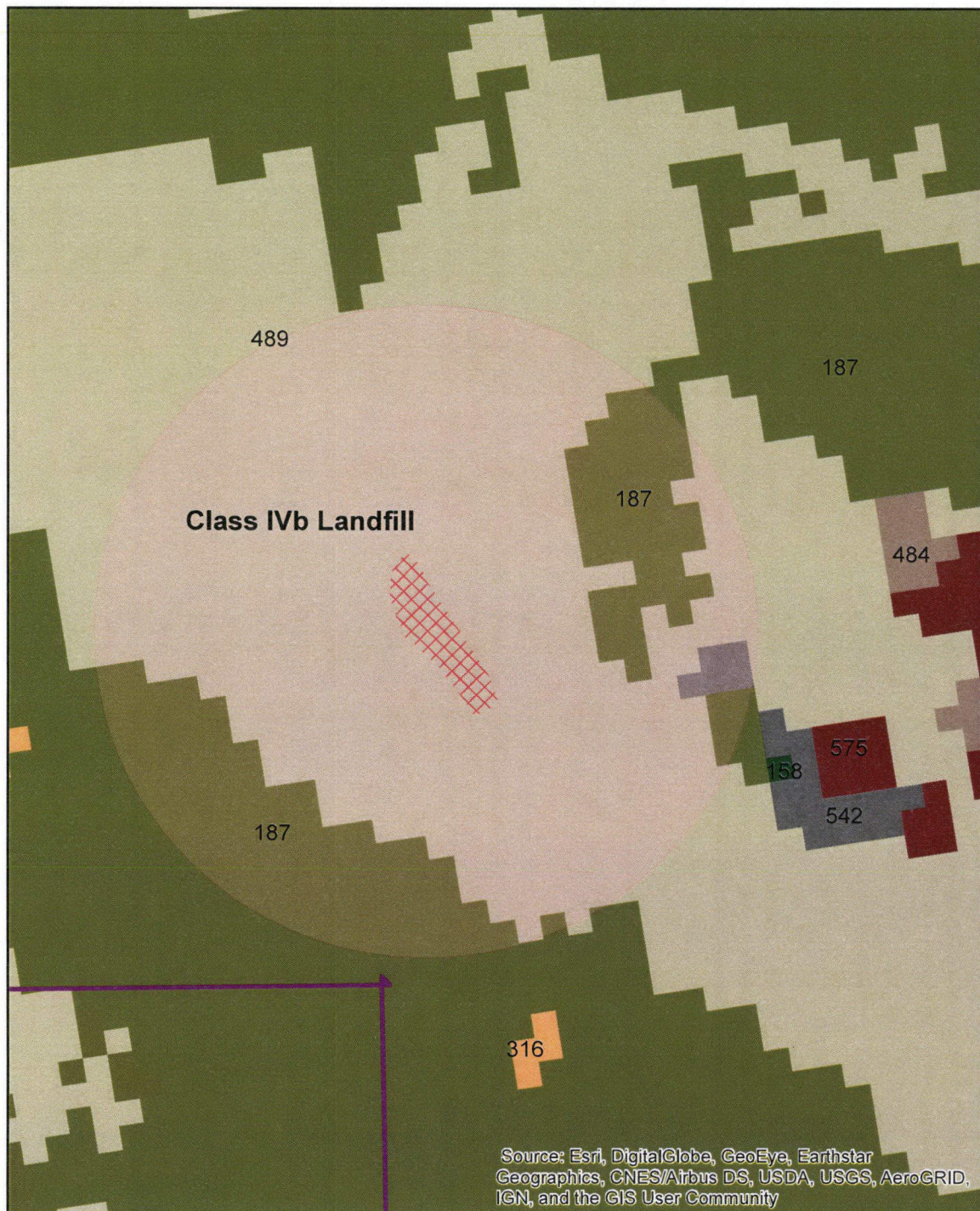
**FIGURE 13**  
**Land Use Map**

The Project Area has no specific land use other than what is designated in the 1997 Record of Decision for the Lisbon Valley Copper Project. There are no parks, monuments, etc. within a 20-mile radius of the Project.

- Wilderness\_BLMWSAs
- Wilderness\_BLMSuitability
- USFSWildernessAreas
- USFSRoadlessInventory

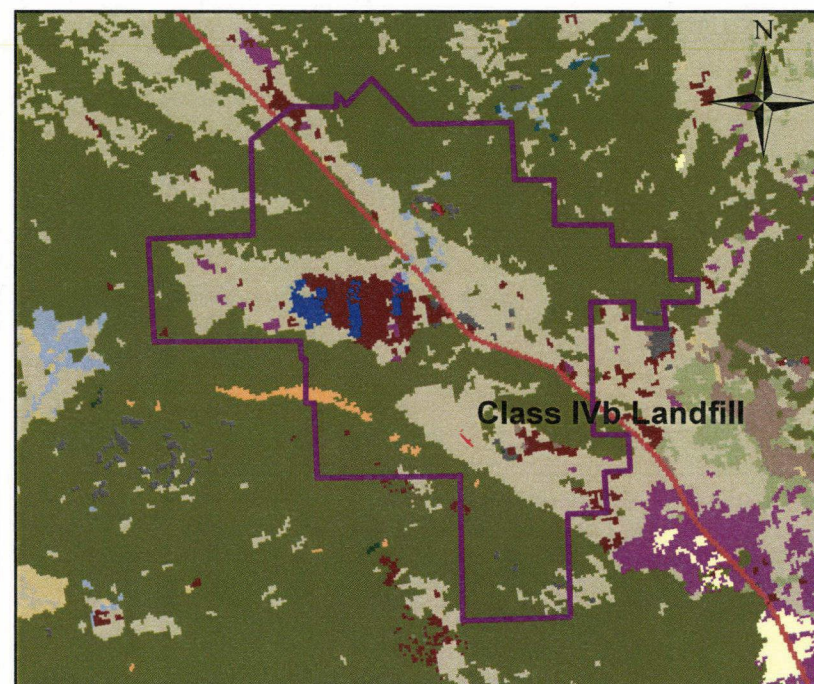






Drawn By: ADT  
Date: September 2018


620 310 0 620 Feet



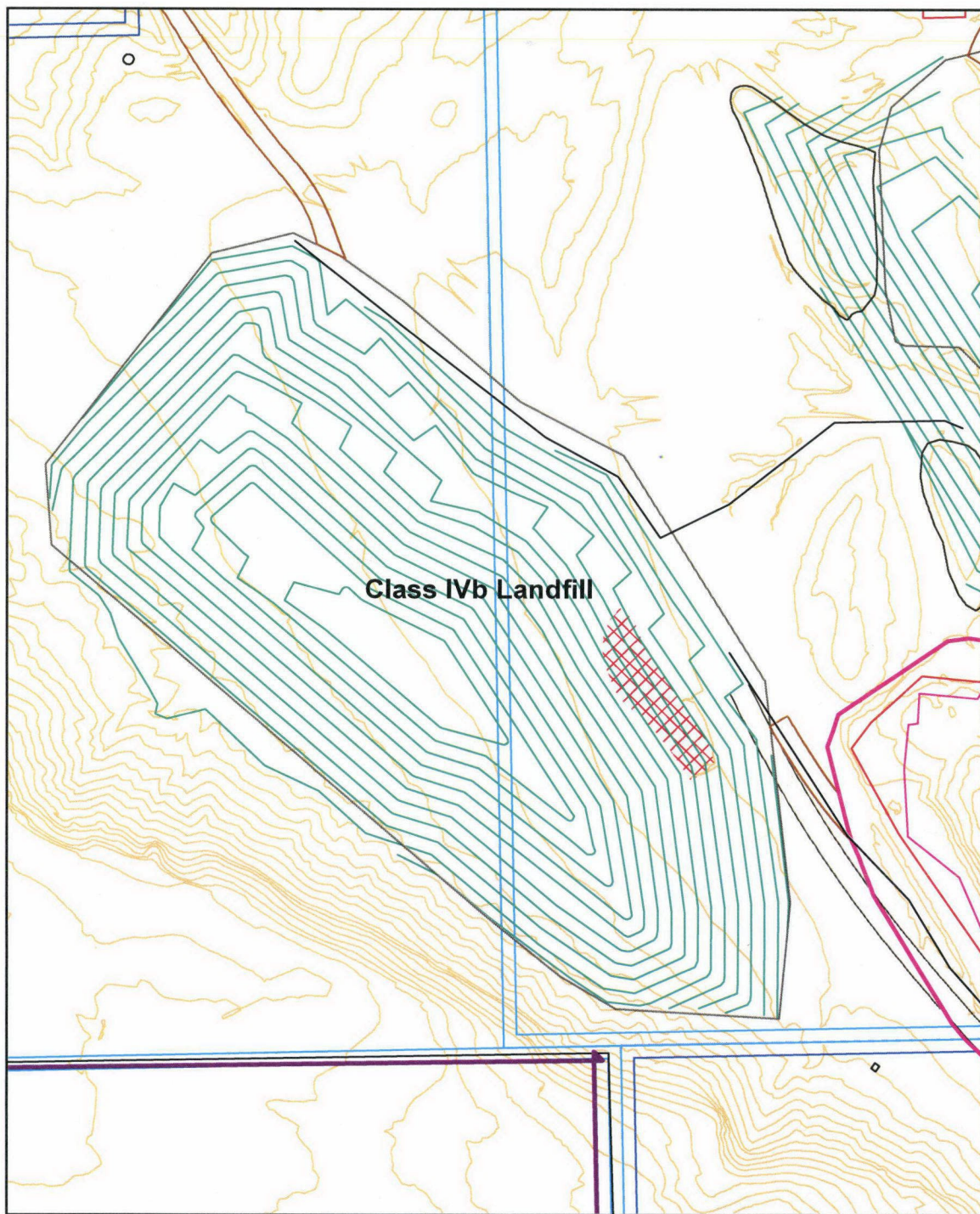
**FIGURE 14**  
**Habitat Map of the Project**

Ecosystem Classification within the vicinity of the Class IVb Landfill:  
Unit 489 - Inter-Mountain Basins Big Sagebrush Shrubland  
Unit 187 - Colorado Plateau Pinyon-Juniper Woodland  
Unit 158 - Southern Rocky Mountain Ponderosa Pine Woodland  
Unit 542 - Colorado Plateau Mixed Bedrock Canyon and Tableland  
Unit 575 - Disturbed/Successional - Shrub Regeneration  
Unit 316 - Rocky Mountain Gambel Oak-Mixed Montane Shrubland  
Unit 484 - Inter-Mountain Basins Mat Saltbrush Shrubland

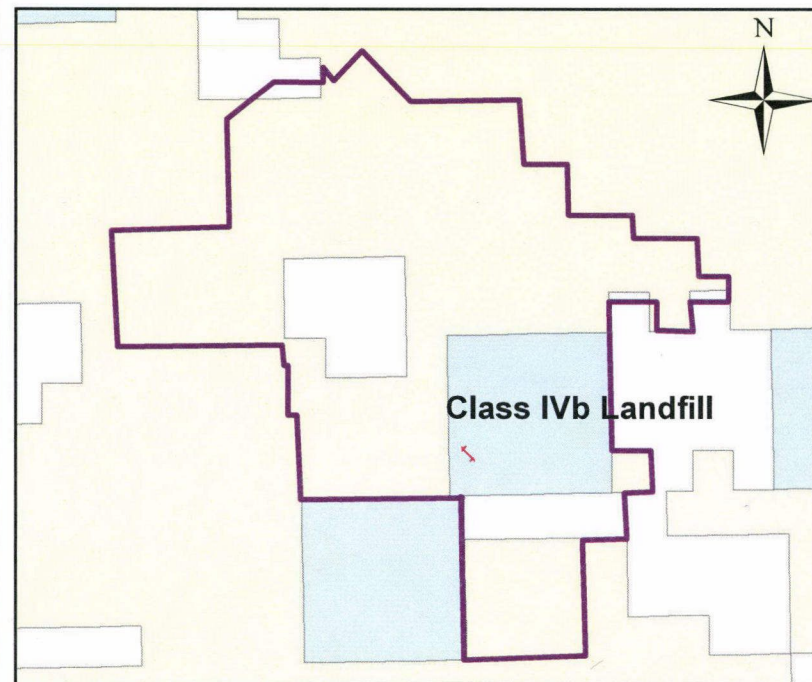
 1/4 mile buffer

  
**LISBON VALLEY MINING CO**





Drawn By: ADT  
Date: September 1, 2018



**FIGURE 15**  
**Topographic Map of the Location of the Class IVb Landfill**

Yellow topographic lines indicate original contour.  
Green topographic lines indicate post-closure contour.  
Both topographic lines represent 5-ft contour.

— LVMC\_Project\_Boundary(4,464ac)

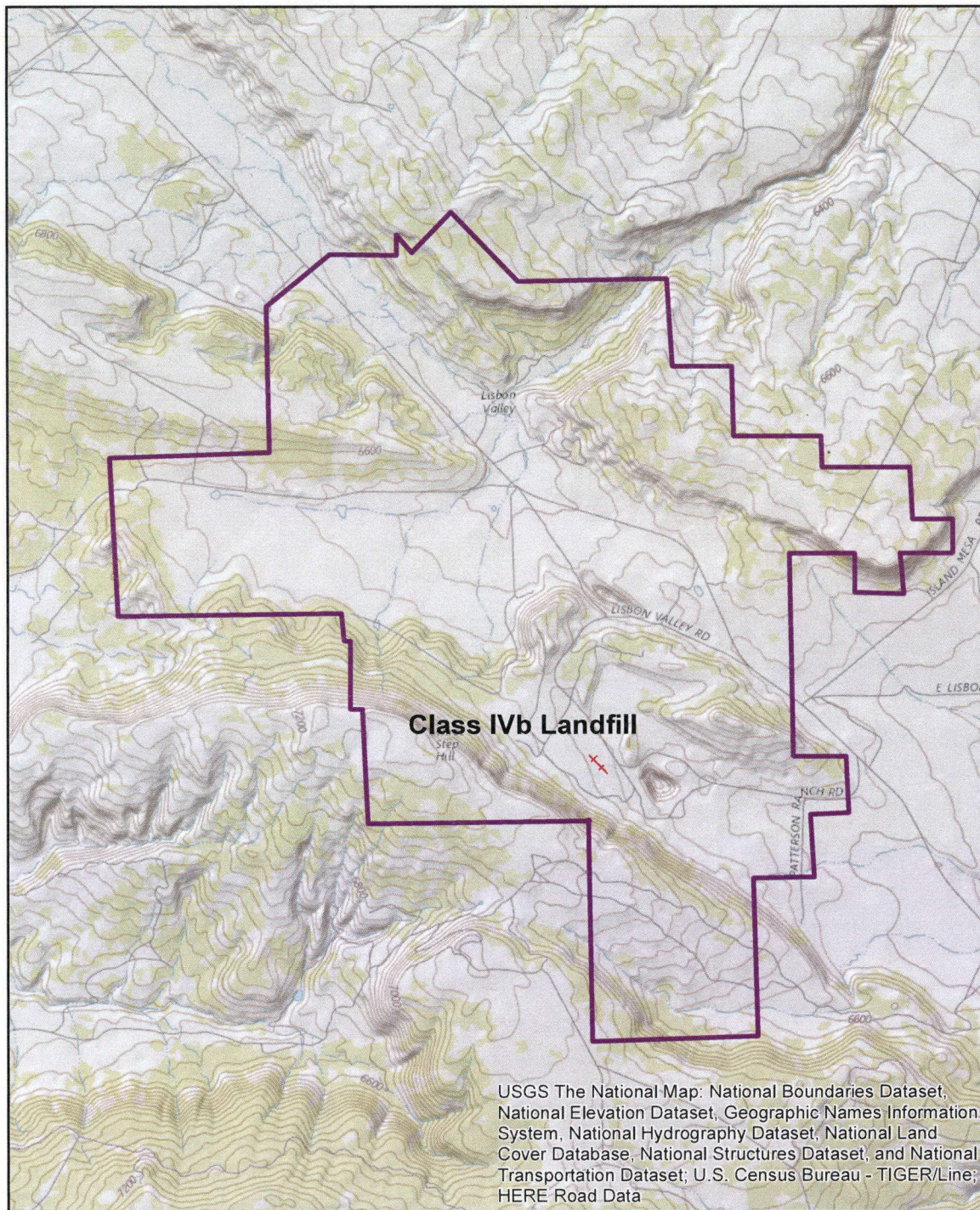
### LandOwnership

#### OWNER

- Federal
- Private
- State

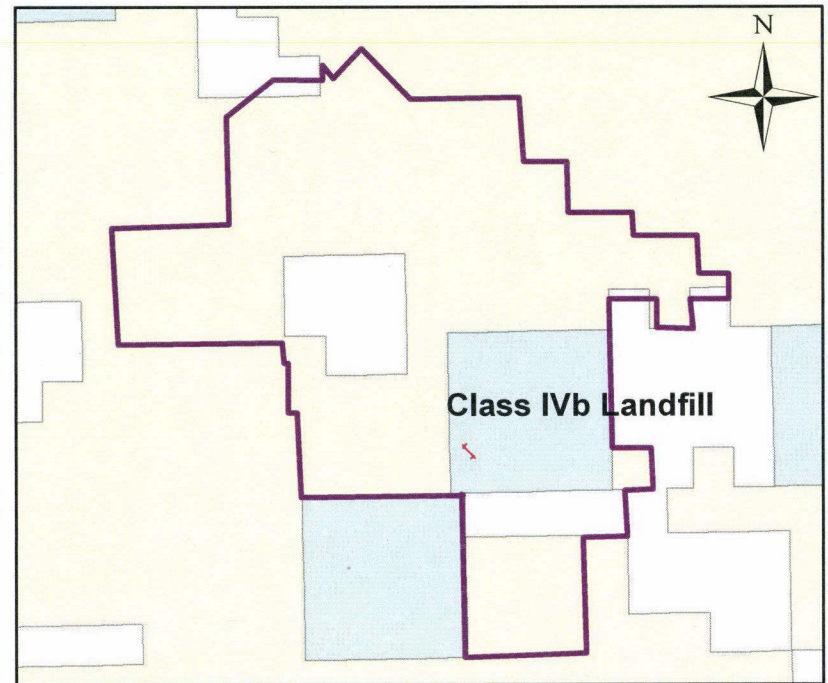






Drawn By: ADT  
Date: September 2018

3,500 1,750 0 3,500 Feet



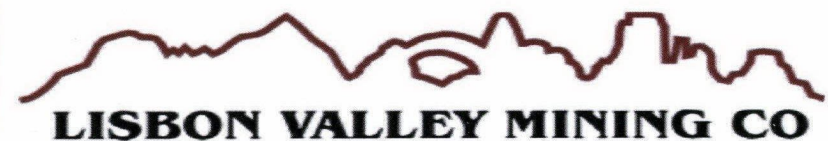
**FIGURE 16**  
**USGS Topographic Map of the Project**

— LVMC\_Project\_Boundary(4,464ac)

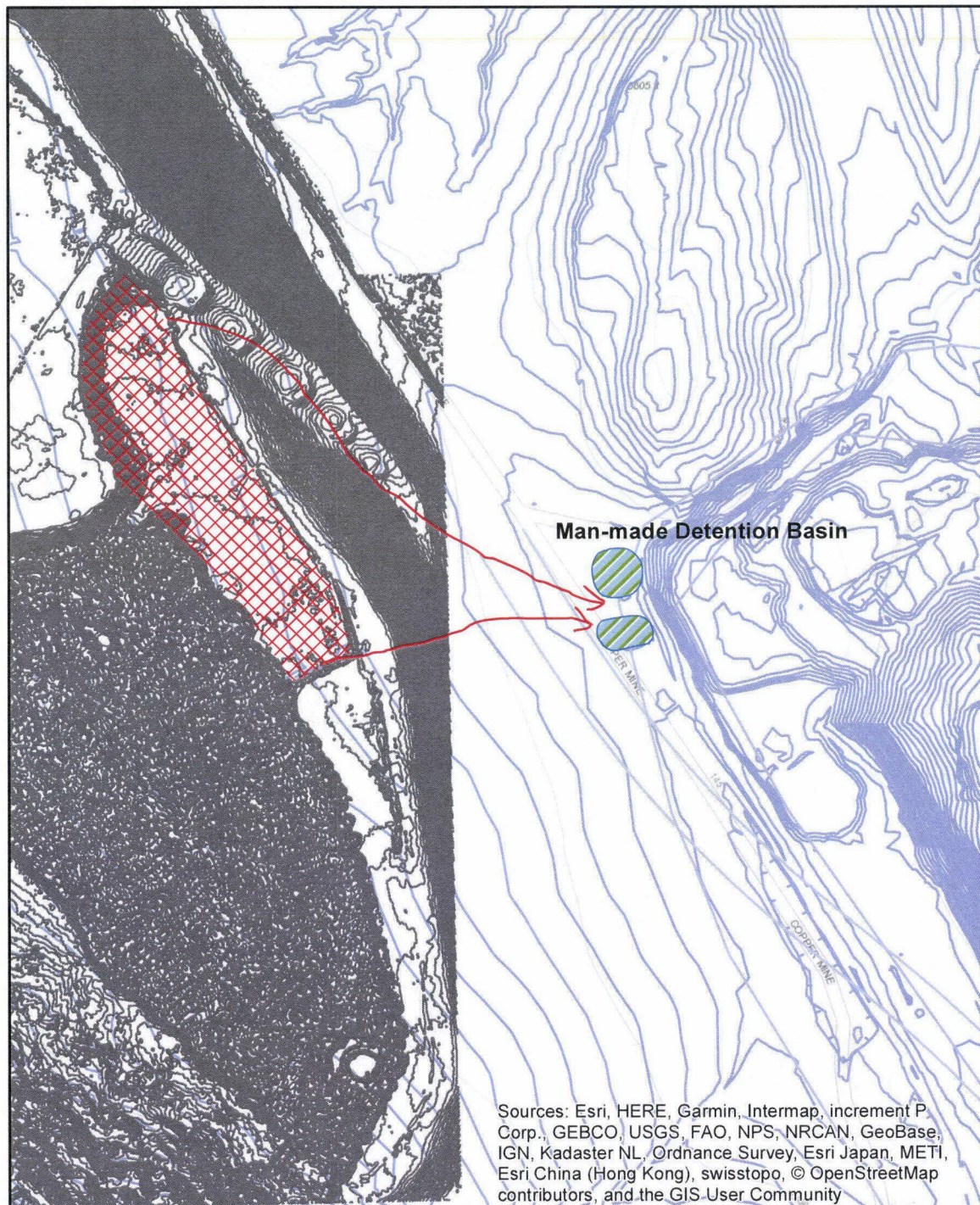
### LandOwnership

#### OWNER

- Federal
- Private
- State

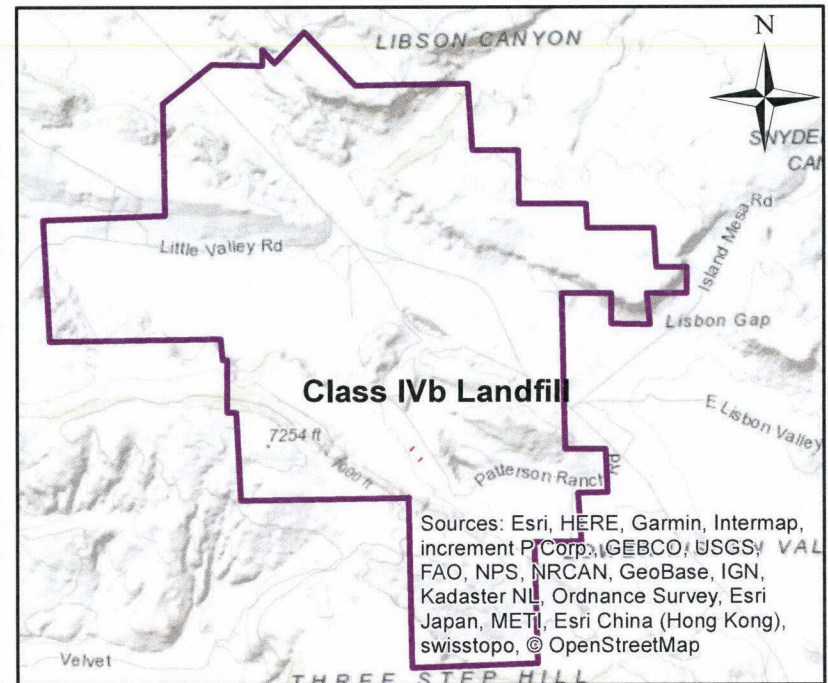






Drawn By: ADT  
Date: September 1, 2018

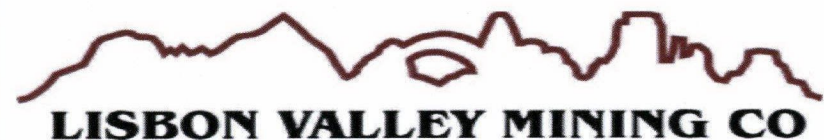
0.045 0.0225 0 0.045 Miles



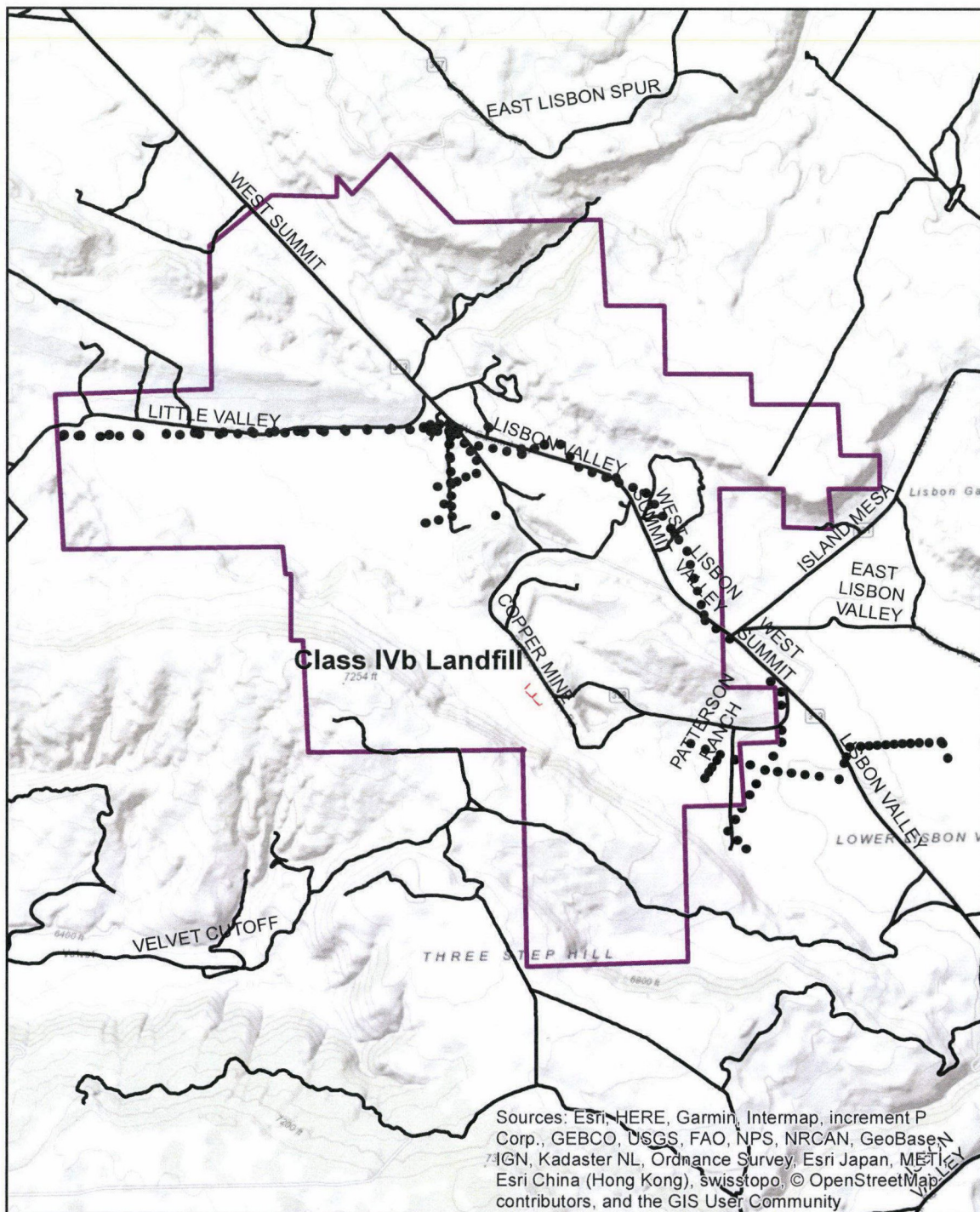
**FIGURE 17**  
**Surface Drainage Map for the Project**

Surface drainage off of the Class IVb landfill will be minimal due to the location of the landfill on the raised surface of the Waste Dump A. Any potential surface drainage that could occur will flow southeast to a detention basin located east of the existing access road.

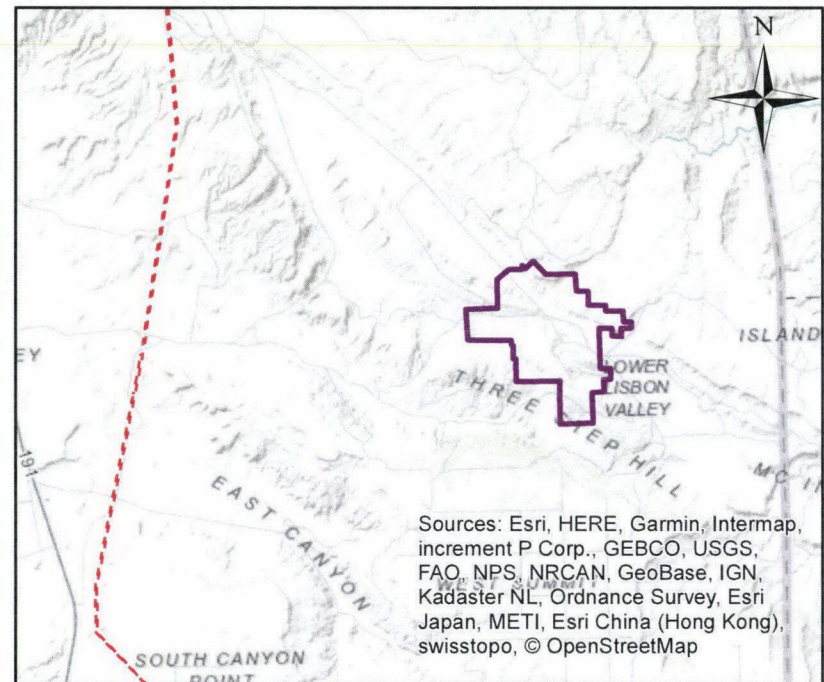
Water collected in the detention basin will infiltrate or evaporate.







Drawn By: ADT  
Date: September 11, 2018



**FIGURE 18**  
**Utilities Map for the Project**

- LVMC Power Poles
- Electrical Lines
- Roads
- LVMC\_Project\_Boundary(4,464ac)



# APPENDIX A

## Waste Types & Characteristics - Supporting Information



# Volume-to-Weight Conversion Factors

## U.S. Environmental Protection Agency

### Office of Resource Conservation and Recovery

April 2016

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EPA's 1997 report, "Measuring Recycling: A Guide for State and Local Governments", was a guide to facilitate standardization of MSW data collection at the local level, which included volume-to-weight conversion factors for comparing recovery efforts between municipalities, regions and states. The factors are also valuable when planners work with the national recovery data presented in EPA's sustainable materials management report series.

This document provides updates to the volume-to-weight conversion factors found in the 1997 report Appendix B.

The goal of this update is to identify more current secondary data measurements of the various products. Of particular interest are products known to have been source reduced through light weighting since the early nineties such as plastic, glass and metal packaging. Some factors included on the original table are excluded from the revised table due to lack of updated data. Primary data collection was not performed.

The original Appendix B table included 12 materials categories; the updated table provides factors for 15 material categories, including the following.

- |                          |  |
|--------------------------|--|
| • Appliances             | • Municipal Solid Waste                  |
| • Automotive             | • Paper                                  |
| • Carpeting              | • Plastic                                |
| • Commingled Recyclables | • Textiles                               |
| • Electronics            | • Wood                                   |
| • Food                   | • Yard Trimmings                         |
| • Glass                  | • Construction & Demolition Debris (C&D) |
| • Metals                 |  |

All of the categories include multiple products and/or density measurements. Four product categories—carpeting, commingled recyclable material, electronics and construction and demolition debris—are new. Previously lead-acid batteries and scrap tires were separate categories but are combined into the single category "Automotive" in the updated table.

Other differences include the removal/addition of products within some of the categories to better reflect the current recycling industry. For example, eliminating "Tab Card" and adding "Mixed Paper" to the paper category reflects the move toward commingled recyclables collection. The addition of "Electronics" reflects the growth in these products since the original table was published.

The updated factors are shown in the table below.

### Standard Volume-to-Weight Conversion Factors

Category	Recyclable Materials	Volume	Estimated Weight (lbs)	Source
Appliances	Major Appliances			
	Dishwasher	1 unit	125	1
	Clothes Dryer	1 unit	125	1
	Stove	1 unit	150	1
	Refrigerator	1 unit	250	1
	Clothes Washer	1 unit	150	1
Automotive	Lead-Acid Battery			
	Auto	one	36	3
	Truck	one	47	3
	Scrap Tire			
	Light Duty Tires (passenger, light truck)	one	22.5	5
	Commercial Tires	one	120	5
	Fluids			
	Used Motor Oil	gallon	7.4	2
	Antifreeze	gallon	8.42	2
	Other Automotive			
	Oil Filters not crushed	drum	175	1
	Oil Filters crushed	drum	700	1
	Oil Filters	gallon	5	1
Carpeting	Carpet			
	Carpet	cubic yard	147	6
	Carpet Padding	cubic yard	62	6
Commingled Recyclable Material	Containers (Plastic bottles, Aluminum cans, Steel cans, Glass bottles) and Paper			
	Commingled Recyclables	cubic yard	262	4
	Containers (Plastic bottles, Aluminum cans, Steel cans, Glass bottles), Corrugated Containers and Paper			
	Campus Recyclables	cubic yard	92	7
	Commingled Recyclables	cubic yard	111	4
	Containers (Plastic bottles, Aluminum cans, Steel cans, Glass bottles) – No paper			
	Campus Recyclables	cubic yard	70	7
	Commingled Recyclables	cubic yard	67	4
	Commercial Recyclables	cubic yard	113	8
	Containers (Cans, Plastic) - No glass			
	Campus Recyclables	cubic yard	32	7
	Containers (Cans, Plastic) and Paper – No glass			
	Residential Recyclables	cubic yard	260	2
	Containers (Food/beverage, Glass) Corrugated Containers and Paper			
	Commercial Recyclables	cubic yard	88	2
	Commercial Recyclables	cubic yard	58	21
	Multifamily Recyclables	cubic yard	96	2
	Multifamily Recyclables	cubic yard	51	21

Category	Recyclable Materials	Volume	Estimated Weight (lbs)	Source
Commingled Recyclable Material	Single family Recyclables	cubic yard	126	2
	Containers (Food/beverage, Glass) Corrugated Containers and Paper- No glass			
	Campus Recyclables	cubic yard	139	2
	Commercial Recyclables	cubic yard	155	2
Electronics	Computer Equipment			
	Desktop	one	27	24
	Laptop	one	9.8	24
	Monitor			
	CRT	one	40	1
	15"	one	30	2
	17"	one	45	2
	21"	one	60	2
	Flat Panel	one	24	1
	Mixed Monitors	one	29.4	24
	Televisions			
	CRT < 19 inch	one	41	1
	CRT ≥ 19 inch	one	73	1
	Flat Panel	one	29	1
	Mixed TVs	one	67.3	24
	Peripheral Devices			
	Printers	one	16.1	24
	Mice	one	0.2	9
	Keyboards	one	2.9	9
	Mobile Devices			
	Cellular Phone	one	0.22	9
	Mixed Electronics			
	Brown Goods	cubic yard	343	6
	Computer-related Electronics	cubic yard	354	6
	Other Small Consumer Electronics	cubic yard	438	6
Food				
	Fats, Oils, Grease	55-gallon	412	2
	Organics - commercial	cubic yard	135	21
	Source Separated Organics - commercial	cubic yard	1,000	15
	Food Waste - restaurants	cubic yard	396	21
	Food Waste	cubic yard	463	4
	Food Waste	cubic foot	22-45	4
	Food waste - university	gallon	3.8	22
	Food Waste	64 gallon toter	150	4
	Food waste	2 cubic yard full towable	2,736	4
Glass	Bottles			
	Loose	cubic yard	380	4

Category	Recyclable Materials	Volume	Estimated Weight (lbs)	Source
Metals	Aluminum Cans			
	<i>Uncompacted</i>	cubic yard	46	4
	<i>Uncompacted</i>	case = 24 cans	0.7	11
	<i>Baled</i>	cubic yard	250-500	10
	Steel Cans			
	<i>Whole</i>	cubic yard	50-175	10
	<i>Baled</i>	cubic yard	700-1,000	10
	Steel Cans - Institution			
	<i>Whole</i>	can	0.09	7
	<i>Whole</i>	cubic yard	136	7
Paper	Newsprint			
	<i>Loose</i>	cubic yard	360-800	1
	<i>Baled</i>	cubic yard	750-1,000	10
	Books - paperback, loose	cubic yard	428	23
	Old Corrugated Containers			
	<i>Flattened</i>	cubic yard	106	4
	<i>Baled</i>	cubic yard	700-1,100	10
	Old Corrugated Containers and Chip Board			
	<i>Uncompacted</i>	cubic yard	74.54	4
	Office Paper			
	<i>Computer Paper</i>			
	<i>Loose</i>	cubic yard	375-465	1
	<i>Compacted/Baled</i>	cubic yard	755-925	1
	<i>Mixed</i>			
	<i>Loose</i>	cubic yard	110-380	1
	<i>Loose</i>	cubic yard	323	4
	<i>Compacted</i>	cubic yard	610-755	1
	<i>Shredded</i>	cubic yard	128	4
	<i>Mixed Baled</i>	cubic yard	1,000-1,200	10
	Miscellaneous			
	<i>Cartons (milk and juice) uncrushed</i>	cubic yard	50	7
Plastic	PET			
	<i>PET Bottles - baled</i>	30"x42"x 48"	525-630	12
	<i>PET Thermoform - baled</i>	30"x42"x 48"	525-595	12
	HDPE			
	<i>HDPE Dairy - baled</i>	30"x42"x 48"	525-700	12
	<i>HDPE Mixed - baled</i>	30"x42"x 48"	525-700	12
	Mixed PET and HDPE			
	<i>Loose</i>	cubic yard	32	7
	Mixed Bottles/Containers #1 - #7			
	<i>Loose</i>	cubic yard	40.4	4
	Mixed Bottles/Containers #3 - #7			

Category	Recyclable Materials	Volume	Estimated Weight (lbs)	Source
Plastic	Loose	cubic yard	25.7	4
	Film			
	LDPE, loose	cubic yard	35	13
	LDPE, compacted	cubic yard	150	13
	LDPE, baled	30" x 42" x 48"	1,100	13
	Miscellaneous			
	Trash Bags	cubic yard	35	6
	Grocery/Merchandise Bags	cubic yard	35	6
	Expanded Polystyrene Packaging/Insulation	cubic yard	32	6
Textiles	Mixed Textiles			
	Loose	cubic yard	125-175	10
	Baled	cubic yard	600-750	10
Wood	Wood			
	Wood Chips, green	cubic yard	473	1
	Wood Chips, dry	cubic yard	243	1
	Saw Dust, wet	cubic yard	530	1
	Saw Dust, dry	cubic yard	275	1
	Pallets	one	25	1
	Pallets and Crates	cubic yard	169	18
	Christmas Trees, loose	cubic yard	30	1
Yard Trimmings	Yard Trimmings			
	Leaves	cubic yard	250-500	1
	Leaves (Minnesota)	cubic yard	300 - 383	15
	Mixed Yard Waste			
	Uncompacted	cubic yard	250	1
	Compacted	cubic yard	640	1
	Prunings & Trimmings	cubic yard	127	6
	Branches & Stumps	cubic yard	127	6
Municipal Solid Waste	MSW - Commercial			
	Commercial - dry waste	cubic yard	56-73	16, 8
	Commercial - all waste, uncompacted	cubic yard	138	21
	Mixed MSW - Residential, Institutional, Commercial			
	Uncompacted	cubic yard	250-300	14
	Compacted	cubic yard	400-700	14
	Mixed MSW - Multifamily uncompacted	cubic yard	95	21
	MSW - Landfill			
	Compacted - MSW Small Landfill with Best Management Practices	cubic yard	1,200-1,700	17
	Compacted - MSW Large Landfill with Best Management Practices	cubic yard	1,700-2,000	17

Category	Recyclable Materials	Volume	Estimated Weight (lbs)	Source
<b>Municipal Solid Waste</b>	<i>Compacted - MSW Very Large Landfill with Best Management and Cover Practices, Combined MMSW/Industrial/and other solid waste, or/and Leachate Recirculation</i>	cubic yard	>2,000	17
<b>C &amp; D</b>	<b>Concrete</b>			
	<i>Large Concrete with Re-bar</i>	cubic yard	860	18
	<i>Large Concrete without Re-bar</i>	cubic yard	860	18
	<i>Small Concrete with Re-bar</i>	cubic yard	860	18
	<i>Small Concrete without Re-bar</i>	cubic yard	860	18
	<b>Asphalt Paving</b>			
	<i>Large Asphalt Paving with Re-bar</i>	cubic yard	773	19
	<i>Large Asphalt Paving without Re-bar</i>	cubic yard	773	19
	<i>Small Asphalt Paving with Re-bar</i>	cubic yard	773	19
	<i>Small Asphalt Paving without Re-Bar</i>	cubic yard	773	19
	<b>Roofing</b>			
	<i>Composition Roofing</i>	cubic yard	731	18
	<i>Other Asphalt Roofing</i>	cubic yard	731	18
	<b>Other Aggregates</b>	cubic yard	860	18
	<b>Wood</b>			
	<i>Clean Dimensional Lumber</i>	cubic yard	169	18
	<i>Clean Engineered Wood</i>	cubic yard	268	18
	<i>Other Recyclable Wood</i>	cubic yard	169	18
	<i>Painted/Stained Wood</i>	cubic yard	169	18
	<i>Treated Wood</i>	cubic yard	169	18
	<b>Gypsum Board</b>			
	<i>Clean Gypsum Board</i>	cubic yard	467	18
	<i>Painted/Demolition Gypsum</i>	cubic yard	467	18
	<b>Aggregate</b>			
	<i>Large Rock</i>	cubic yard	999	18
	<i>Small Rock/Gravel</i>	cubic yard	999	18
	<b>Dirt and Sand</b>	cubic yard	929	18
	<b>Remainder/Composite Construction and Demolition</b>	cubic yard	417	18
	<b>Construction &amp; Demolition Bulk</b>	cubic yard	484	20
	<b>Metal</b>			
	<i>Major Appliances</i>	cubic yard	145	18
	<i>Other Ferrous</i>	cubic yard	225	18
	<i>Other Non-Ferrous</i>	cubic yard	225	18
	<i>Remainder/Composite Metal (avg of metals, without used oil filters)</i>	cubic yard	143	18
	<i>HVAC Ducting</i>	cubic yard	47	18



- 1 Oregon Department of Environmental Quality. 2007 Oregon Material Recovery and Waste Generation Rates Report September 2008 08-LQ-092. Attachment B: Measurement Standards and Reporting Guidelines 07-LQ-134.  
<http://www.deq.state.or.us/lq/pubs/docs/sw/MRAttachmentB.pdf>
- 2 Department of Ecology, State of Washington. Coordinated Prevention Grant Conversion Sheet. March, 2014.  
[www.ecy.wa.gov/pubs/1107016.pdf](http://www.ecy.wa.gov/pubs/1107016.pdf)
- 3 Factor developed using lead per battery data from Battery Council International. Recycling Rates 2009 to 2013. April 2014.  
[http://c.ymcdn.com/sites/batterycouncil.org/resource/resmgr/BCI\\_Recycling\\_Rate\\_Study\\_200.pdf](http://c.ymcdn.com/sites/batterycouncil.org/resource/resmgr/BCI_Recycling_Rate_Study_200.pdf) applied to battery composition data from Sullivan, JL and Gaines, L. 2010. A Review of Battery Life Cycle Analysis: State of Knowledge and Critical Needs. October 2010. Center for Transportation Research, Energy Systems Division, Argonne National Laboratory ANL/ESD/10-7.
- 4 Keep America Beautiful. Volume-to-Weight Recycling and Trash Conversion Factors Report. December 2013.
- 5 Rubber Manufacturers Association (RMA). 2013 U.S. Scrap Tire Management Summary. November 2014.  
[http://www.rma.org/download/scrap-tires/market-reports/US\\_STMarket2013.pdf](http://www.rma.org/download/scrap-tires/market-reports/US_STMarket2013.pdf)
- 6 California Integrated Waste Management Board. Targeted Statewide Waste Characterization Study: Detailed Characterization of Construction and Demolition Waste. June 2006. <http://www.calrecycle.ca.gov/publications/Documents/Disposal%5C34106007.pdf>  
Brown Goods: larger, non-portable electronic goods that have some circuitry. Examples include microwaves, stereos, VCRs, DVD players, radios, audio/visual equipment, and non-CRT televisions (such as LCD televisions).  
Computer-related Electronics: electronics with large circuitry that is computer-related. Examples include processors, mice, keyboards, laptops, disk drives, printers, modems, and fax machines.  
Other Small Consumer Electronics: portable non-computer-related electronics with large circuitry. Examples include personal digital assistants (PDAs), cell phones, phone systems, phone answering machines, computer games and other electronic toys, portable CD players, camcorders, and digital cameras.
- 7 Keep America Beautiful, Recycle-Bowl Competition. Accessed February 2015. <http://recycle-bowl.org/wp-content/uploads/Recycle-Bowl-Estimating-Data-Fact-Sheet.pdf>
- 8 Great Forest. Volume to Weight Conversion Ratios for Commercial Office Waste in New York City. January 2013. Primary data; Commingled; large commercial properties (500,000 sq. ft – 1m sq. ft) in the New York metropolitan area.  
<http://www.greatforest.com/files/FileUpload/files/Great%20Forest%20-%20Waste%20Conversion%20Paper%20>
- 9 US EPA Electronics Waste Management in the United States Through 2009. May 2011.
- 10 WasteCare Corporation. Some Typical Loose and Baled Weights of Various Materials. Accessed April 2015.  
<http://www.wastecare.com/Products-Services/Balers/aboutbalers.htm>.
- 11 The Aluminum Association. U.S. Aluminum Beverage Can Recycling.  
[http://www.aluminum.org/sites/default/files/section\\_images/UBCRecyclingRate2013.pdf](http://www.aluminum.org/sites/default/files/section_images/UBCRecyclingRate2013.pdf)
- 12 The Association of Postconsumer Plastic Recyclers (APR). Model Bale Specifications. <http://www.plasticsrecycling.org>
- 13 Caldwell, Maggie. Recycling Plastic Film and Shrink Wrap. May 16, 2014. <http://www.federalinternational.com/blog/recy>
- 14 Caterpillar Performance Handbook. 40th Edition. January 2010.
- 15 Minnesota Pollution Control Agency. Data provided by professional composter. 2015. Source separated organics - food scraps, non-recyclable paper (paper plates/towels/etc) and compostable plastics.
- 16 Minnesota Department of Administration 2015 hauler records (excludes organics).
- 17 Minnesota Pollution Control Agency. 2013 MPCA MSW Landfill Annual Report Data.
- 18 California Integrated Waste Management Board. Targeted Statewide Waste Characterization Study: Detailed Characterization of Construction and Demolition Waste. June 2006
- 19 Tellus scaled down by factor from Florida C&D study -- Converting C&D Debris from Volume to Weight: A Fact Sheet for C&D Debris Facility Operators, University of Florida, 2000.
- 20 Florida Dept of Environmental Protection <http://www.dep.state.fl.us/waste/categories/recycling/cd/canddmain.htm>
- 21 CalRecycle. 2014 Generator-Based Characterization of Commercial Sector Disposal and Diversion in California. September 10, 2015.  
<http://www.calrecycle.ca.gov/Publications/Documents/1543/20151543.pdf>  
Organics - putrescible material hauled by a contracted third party to a permitted facility mainly engaged in producing compost or mulch, or in anaerobic digestion of organics. Minor mechanical separation of contaminants or recyclable materials may occur at the facility prior to composting or digestion.
- 22 Goldstein, Nora. "Food Scraps Composting Laboratory". *BioCycle*. January 2013, Vol. 54, No. 1, p. 33.  
<https://www.biocycle.net/2013/01/22/food-scraps-composting-laboratory/>
- 23 U.S. EPA. Standard Volume-to-Weight Conversion Factors. Last updated: February 28, 2006. <https://www.epa.gov/smm/metrics-waste-reduction>
- 24 National Center for Electronics Recycling (NCER). <http://www.electronicrecycling.org/>  
Mixed monitors and TVs: total pounds collected divided by total units collected.

**Orfom® SX-12 (Solvent Extraction Diluent)**

Version 1.8

Revision Date 2015-05-07

**SECTION 1: Identification of the substance/mixture and of the company/undertaking****Product information**

Product Name : Orfom® SX-12 (Solvent Extraction Diluent)  
Material : 1111854, 1102155, 1098697, 1096235, 1016863, 1016865,  
1016864

Use : Solvent Extraction Diluent

Company : Chevron Phillips Chemical Company LP  
Mining Chemicals  
10001 Six Pines Drive  
The Woodlands, TX 77380

**Emergency telephone:****Health:**

866.442.9628 (North America)  
1.832.813.4984 (International)

**Transport:**

North America: CHEMTREC 800.424.9300 or 703.527.3887  
Asia: +800 CHEMCALL (+800 2436 2255) China: +86-21-22157316  
EUROPE: BIG +32.14.584545 (phone) or +32.14583516 (telefax)  
South America SOS-Cotec Inside Brazil: 0800.111.767 Outside Brazil: +55.19.3467.1600

Responsible Department : Product Safety and Toxicology Group  
E-mail address : SDS@CPChem.com  
Website : www.CPChem.com

**SECTION 2: Hazards identification****Classification of the substance or mixture**

This product has been classified in accordance with the hazard communication standard 29 CFR 1910.1200; the SDS and labels contain all the information as required by the standard.

**Emergency Overview****Danger**

**Physical state:** Liquid **Color:** Colorless **Odor:** Mild  
**OSHA Hazards** : Combustible Liquid, Aspiration hazard, Moderate skin irritant

**Classification**

: Flammable liquids , Category 4  
Skin irritation , Category 2  
Aspiration hazard , Category 1



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**Labeling**

Symbol(s)

:



Signal Word

:

Danger

Hazard Statements

:

H227: Combustible liquid.  
 H304: May be fatal if swallowed and enters airways.  
 H315: Causes skin irritation.

Precautionary Statements

:

**Prevention:**  
 P210 Keep away from heat/sparks/open flames/hot surfaces.  
 - No smoking.  
 P264 Wash skin thoroughly after handling.  
 P280 Wear protective gloves/ eye protection/ face protection.  
**Response:**  
 P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.  
 P302 + P352 IF ON SKIN: Wash with plenty of soap and water.  
 P331 Do NOT induce vomiting.  
 P332 + P313 If skin irritation occurs: Get medical advice/ attention.  
 P362 Take off contaminated clothing and wash before reuse.  
 P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.  
**Storage:**  
 P403 + P235 Store in a well-ventilated place. Keep cool.  
 P405 Store locked up.  
**Disposal:**  
 P501 Dispose of contents/ container to an approved waste disposal plant.

**Carcinogenicity:****IARC**

No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

**NTP**

No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

**ACGIH**

Confirmed animal carcinogen with unknown relevance to humans  
 Distillates (petroleum), 64742-47-8  
 Hydrotreated light

**SECTION 3: Composition/information on ingredients**

Synonyms

:

Solvent Extraction Diluent

Molecular formula

:

UVCB

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Component	CAS-No.	Weight %
Distillates (petroleum), Hydrotreated light	64742-47-8	100

**SECTION 4: First aid measures**

- General advice : Move out of dangerous area. Show this material safety data sheet to the doctor in attendance. Material may produce a serious, potentially fatal pneumonia if swallowed or vomited.
- If inhaled : If unconscious place in recovery position and seek medical advice. If symptoms persist, call a physician.
- In case of skin contact : If skin irritation persists, call a physician. If on skin, rinse well with water. If on clothes, remove clothes.
- In case of eye contact : Flush eyes with water as a precaution. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.
- If swallowed : Keep respiratory tract clear. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician. Take victim immediately to hospital.

**SECTION 5: Firefighting measures**

- Flash point : 77 °C (171 °F)
- Autoignition temperature : No data available
- Suitable extinguishing media : Carbon dioxide (CO<sub>2</sub>).
- Unsuitable extinguishing media : High volume water jet.
- Specific hazards during fire fighting : Do not allow run-off from fire fighting to enter drains or water courses.
- Special protective equipment for fire-fighters : Wear self-contained breathing apparatus for firefighting if necessary.
- Further information : Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. For safety reasons in case of fire, cans should be stored separately in closed containments. Use a water spray to cool fully closed containers.
- Fire and explosion protection : Do not spray on an open flame or any other incandescent material. Keep away from open flames, hot surfaces and sources of ignition.

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Hazardous decomposition products : Carbon oxides.

**SECTION 6: Accidental release measures**

Personal precautions : Use personal protective equipment. Ensure adequate ventilation.

Environmental precautions : Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.

Methods for cleaning up : Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

**SECTION 7: Handling and storage****Handling**

Advice on safe handling : Avoid formation of aerosol. Do not breathe vapors/dust. Avoid contact with skin and eyes. For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Provide sufficient air exchange and/or exhaust in work rooms. Dispose of rinse water in accordance with local and national regulations.

Advice on protection against fire and explosion : Do not spray on an open flame or any other incandescent material. Keep away from open flames, hot surfaces and sources of ignition.

**Storage**

Requirements for storage areas and containers : No smoking. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

**SECTION 8: Exposure controls/personal protection****Ingredients with workplace control parameters****US**

Ingredients	Basis	Value	Control parameters	Note
Distillates (petroleum), Hydrotreated light	OSHA Z-1	TWA	500 ppm, 2,000 mg/m <sup>3</sup>	(b),
	OSHA Z-1-A	TWA	400 ppm, 1,600 mg/m <sup>3</sup>	
	ACGIH	TWA	200 mg/m <sup>3</sup>	P, A3, Skin, varies,

(b) The value in mg/m<sup>3</sup> is approximate

A3 Confirmed animal carcinogen with unknown relevance to humans

P Application restricted to conditions in which there are negligible aerosol exposures

Skin Danger of cutaneous absorption

varies varies

**Engineering measures**

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Adequate ventilation to control airborne concentrations below the exposure guidelines/limits. Consider the potential hazards of this material (see Section 2), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

**Personal protective equipment**

- Respiratory protection : Wear a supplied-air NIOSH approved respirator unless ventilation or other engineering controls are adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure. Wear a NIOSH approved respirator that provides protection when working with this material if exposure to harmful levels of airborne material may occur, such as: Air-Purifying Respirator for Organic Vapors. Use a positive pressure, air-supplying respirator if there is potential for uncontrolled release, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.
- Hand protection : The suitability for a specific workplace should be discussed with the producers of the protective gloves. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
- Eye protection : Eye wash bottle with pure water. Tightly fitting safety goggles.
- Skin and body protection : Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. Wear as appropriate: Flame-resistant clothing. Footwear protecting against chemicals.
- Hygiene measures : When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

**SECTION 9: Physical and chemical properties****Information on basic physical and chemical properties****Appearance**

- Physical state : Liquid  
Color : Colorless  
Odor : Mild

**Safety data**

- Flash point : 77 °C (171 °F)  
Lower explosion limit : 0.7 %(V)  
Upper explosion limit : 5 %(V)  
Oxidizing properties : No

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Autoignition temperature	: No data available
Thermal decomposition	: No data available
Molecular formula	: UVCB
Molecular weight	: Not applicable
pH	: Not applicable
Freezing point	: -39 °C (-38 °F) Method: ASTM D5972
Pour point	-21 °C (-6 °F)
Boiling point/boiling range	: 207 - 294 °C (405 - 561 °F) Method: ASTM D2887
Vapor pressure	: 0.01 PSI at 38 °C (100 °F) Method: Reid
Relative density	: 0.81 at 16 °C (61 °F)
Density	: 0.82 G/ML at 15 °C (59 °F) Method: ASTMD 4052
Water solubility	: Negligible
Partition coefficient: n-octanol/water	: No data available
Solubility in other solvents	: Medium: Hydrocarbons Soluble
Viscosity, kinematic	: No data available
Relative vapor density	: 4.5 (Air = 1.0)
Evaporation rate	: 1
Percent volatile	: > 99 %

**SECTION 10: Stability and reactivity**

Chemical stability	: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
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**Possibility of hazardous reactions**

- Conditions to avoid : Heat, flames and sparks.
- Materials to avoid : May react with oxygen and strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
- Thermal decomposition : No data available
- Hazardous decomposition products : Carbon oxides
- Other data : No decomposition if stored and applied as directed.

**SECTION 11: Toxicological information****Orfom® SX-12 (Solvent Extraction Diluent)**

- Acute oral toxicity** : LD50 Oral: > 5,000 mg/kg  
Method: Acute toxicity estimate

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- Acute inhalation toxicity** : LC50: unknown

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- Acute dermal toxicity** : LD50 Dermal: > 5,000 mg/kg  
Method: Acute toxicity estimate

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- Skin irritation** : Irritating to skin.  
May cause skin irritation in susceptible persons.

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- Eye irritation** : May irritate eyes.  
Vapors may cause irritation to the eyes, respiratory system and the skin.

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- Sensitization** : No adverse effects expected. Information given is based on data obtained from similar substances.

**Repeated dose toxicity**

- Distillates (petroleum), Hydrotreated light : Sex: male  
Application Route: inhalation (vapor)  
Dose: 0 , 500, 1000 mg/m3  
Exposure time: 13 wks  
Number of exposures: 24 h/d  
Lowest observable effect level: 500 mg/m3  
Method: OECD Guideline 413  
Target Organs: Liver



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Application Route: inhalation (vapor)  
 Dose: 0, 500, 1000 mg/m<sup>3</sup>  
 Exposure time: 13 wks  
 Number of exposures: 24 h/d  
 NOEL: > 1000 mg/m<sup>3</sup>  
 Method: OECD Guideline 413  
 No adverse effect has been observed in chronic toxicity tests.

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**Carcinogenicity** : Method: Estimated based on individual component values.  
 Remarks: Not expected to be carcinogenic based on individual component data.

**Developmental Toxicity**

Distillates (petroleum),  
 Hydrotreated light : Species: Rat  
 Application Route: Inhalation  
 Dose: 0, 106, 364 mg/l  
 Exposure time: 6h/d  
 Test period: GD 6 - 20  
 NOAEL Teratogenicity: >= 364 mg/l  
 NOAEL Maternal: >= 364 mg/l

Species: Rat  
 Application Route: oral gavage  
 Dose: 500, 1000, 1500, 2000 mg/kg/d  
 Exposure time: 10 d  
 Test period: GD 6 - 15  
 Method: OECD Guideline 414  
 NOAEL Teratogenicity: 1,000 mg/kg  
 NOAEL Maternal: 500 mg/kg

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**Aspiration toxicity** : May be fatal if swallowed and enters airways.  
 Substances known to cause human aspiration toxicity hazards or to be regarded as if they cause human aspiration toxicity hazard.

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**Further information** : Solvents may degrease the skin. Inhalation of high vapor concentrations can cause CNS-depression and narcosis.  
 Solvents may degrease the skin.

**SECTION 12: Ecological information****Toxicity to fish**

Distillates (petroleum),  
 Hydrotreated light : NOEC: 2 mg/l  
 Exposure time: 96 h  
 Species: Salmo gairdneri (Rainbow trout)  
 Method: OECD Test Guideline 203

**Toxicity to daphnia and other aquatic invertebrates**

Distillates (petroleum), : EL50: 1.4 mg/l

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Hydrotreated light

Exposure time: 48 h  
 Species: *Daphnia magna* (Water flea)  
 static test Method: OECD Test Guideline 202

**Toxicity to algae**

Distillates (petroleum),  
 Hydrotreated light

: EL50: 1 - 3 mg/l  
 Exposure time: 72 h  
 Species: *Pseudokirchneriella subcapitata* (green algae)  
 Method: OECD Test Guideline 201

**Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)**

Distillates (petroleum),  
 Hydrotreated light

: NOEC: 0.48 mg/l  
 Exposure time: 21 Days  
 Species: *Daphnia magna* (Water flea)

Elimination information (persistence and degradability)

Biodegradability

: Taking into consideration the properties of several ingredients,  
 the product is estimated to be biodegradable according to  
 OECD classification.

**Ecotoxicology Assessment**

Acute aquatic toxicity

: Toxic to aquatic life.

Chronic aquatic toxicity

: Toxic to aquatic life with long lasting effects.

Toxicity Data on Soil

: No data available

Other organisms relevant to  
the environment

: No data available

Impact on Sewage  
Treatment

: No data available

Additional ecological  
information

: Toxic to aquatic life with long lasting effects.

An environmental hazard cannot be excluded in the event of  
 unprofessional handling or disposal., Toxic to aquatic life with  
 long lasting effects.

**SECTION 13: Disposal considerations**

The information in this SDS pertains only to the product as shipped.

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

Product

: The product should not be allowed to enter drains, water  
 courses or the soil. Do not contaminate ponds, waterways or  
 ditches with chemical or used container. Send to a licensed  
 waste management company.

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# Orfom® SX-12 (Solvent Extraction Diluent)

SAFETY DATA SHEET

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Contaminated packaging : Empty remaining contents. Dispose of as unused product.  
Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum.

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## SECTION 14: Transport information

**The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition).**

Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping description for the material. Flashpoints for the material may vary slightly between the SDS and the bill of lading.

### US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)

NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION BY THIS AGENCY.

Testing (ASTM D4206) has shown product does not sustain combustion.

### IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., (DISTILLATES (PETROLEUM), HYDROTREATED LIGHT), 9, III, (77 °C), MARINE POLLUTANT, (DISTILLATES (PETROLEUM), HYDROTREATED LIGHT)

### IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., (DISTILLATES (PETROLEUM), HYDROTREATED LIGHT), 9, III

### ADR (AGREEMENT ON DANGEROUS GOODS BY ROAD (EUROPE))

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., (DISTILLATES (PETROLEUM), HYDROTREATED LIGHT), 9, III, (E)

### RID (REGULATIONS CONCERNING THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS (EUROPE))

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., (DISTILLATES (PETROLEUM), HYDROTREATED LIGHT), 9, III

### ADN (EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS)

UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S., (DISTILLATES (PETROLEUM), HYDROTREATED LIGHT), 9, III

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

# Orfom® SX-12 (Solvent Extraction Diluent)

SAFETY DATA SHEET

Version 1.8

Revision Date 2015-05-07

## SECTION 15: Regulatory information

### National legislation

- SARA 311/312 Hazards** : Fire Hazard  
Acute Health Hazard
- CERCLA Reportable Quantity** : Calculated RQ exceeds reasonably attainable upper limit.  
Naphthalene
- SARA 302 Reportable Quantity** : This material does not contain any components with a SARA 302 RQ.
- SARA 302 Threshold Planning Quantity** : No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.
- SARA 304 Reportable Quantity** : This material does not contain any components with a section 304 EHS RQ.
- SARA 313 Ingredients** : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

### Clean Air Act

- Ozone-Depletion Potential** : This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

The following chemical(s) are listed as HAP under the U.S. Clean Air Act, Section 12 (40 CFR 61):

- : Naphthalene - 91-20-3
- Ethylbenzene - 100-41-4
- Benzene, dimethyl- - 1330-20-7

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

The following chemical(s) are listed under the U.S. Clean Air Act Section 111 SOCMII Intermediate or Final VOC's (40 CFR 60.489):

- : Ethylbenzene - 100-41-4
- Benzene, dimethyl- - 1330-20-7

### US State Regulations

**Orfom® SX-12 (Solvent Extraction Diluent)**

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**Pennsylvania Right To Know**

: Distillates (petroleum), Hydrotreated light - 64742-47-8  
 Naphthalene - 91-20-3  
 Ethylbenzene - 100-41-4  
 Benzene, dimethyl- - 1330-20-7

**New Jersey Right To Know**

: Distillates (petroleum), Hydrotreated light - 64742-47-8

**California Prop. 65  
Ingredients**

: WARNING! This product contains a chemical known in the  
 State of California to cause cancer.

**Notification status****Europe REACH**

: This mixture contains only ingredients which have been  
 subject to a pre-registration according to Regulation  
 (EU) No. 1907/2006 (REACH).

**United States of America TSCA**

: On TSCA Inventory

**Canada DSL**

: All components of this product are on the Canadian  
 DSL.

**Australia AICS**

: On the inventory, or in compliance with the inventory

**New Zealand NZIoC**

: On the inventory, or in compliance with the inventory

**Japan ENCS**

: On the inventory, or in compliance with the inventory

**Korea KECI**

: On the inventory, or in compliance with the inventory

**Philippines PICCS**

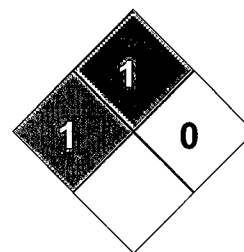
: On the inventory, or in compliance with the inventory

**China IECSC**

: On the inventory, or in compliance with the inventory

**SECTION 16: Other information****NFPA Classification**

: Health Hazard: 1  
 Fire Hazard: 1  
 Reactivity Hazard: 0

**Further information**

Legacy SDS Number : 98120

Significant changes since the last version are highlighted in the margin. This version replaces all previous versions.

The information in this SDS pertains only to the product as shipped.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is

**Orfom® SX-12 (Solvent Extraction Diluent)**

Version 1.8

Revision Date 2015-05-07

not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Key or legend to abbreviations and acronyms used in the safety data sheet			
ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%
AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
NDSL	Canada, Non-Domestic Substances List	NIOSH	National Institute for Occupational Safety & Health
CNS	Central Nervous System	NTP	National Toxicology Program
CAS	Chemical Abstract Service	NZIoC	New Zealand Inventory of Chemicals
EC50	Effective Concentration	NOAEL	No Observable Adverse Effect Level
EC50	Effective Concentration 50%	NOEC	No Observed Effect Concentration
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials
<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50	Lethal Concentration 50%		



**SHELL FORMULASHELL ® ATF Type F - DONAX ® TF**

MSDS# 67310E

Version 14.0

Effective Date 07/08/2008

According to OSHA Hazard Communication Standard, 29 CFR

1910.1200

## **Material Safety Data Sheet**

be obtained from the use of the product.

**Material Safety Data Sheet****Comprehensive Environmental Release, Compensation & Liability Act (CERCLA)**

Zinc dialkyldithiophosphate (113894-90-9)

**SARA Hazard Categories (311/312)**

No SARA 311/312 Hazards.

**SARA Toxic Release Inventory (TRI) (313)**

Zinc dialkyldithiophosphate (113894-90-9) 0.212%

**State Regulatory Status****California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)**

This material does not contain any chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

**New Jersey Right-To-Know Chemical List**

Zinc dialkyldithiophosphate (113894-90-9) Listed.

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**16. OTHER INFORMATION**

**NFPA Rating (Health, Fire, Reactivity)** : 0, 1, 0

**MSDS Version Number** : 14.0

**MSDS Effective Date** : 07/08/2008

**MSDS Revisions** : A vertical bar (|) in the left margin indicates an amendment from the previous version.

**MSDS Regulation** : The content and format of this MSDS is in accordance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

**MSDS Distribution** : The information in this document should be made available to all who may handle the product.

**Disclaimer** : The information contained herein is based on our current knowledge of the underlying data and is intended to describe the product for the purpose of health, safety and environmental requirements only. No warranty or guarantee is expressed or implied regarding the accuracy of these data or the results to

**Material Safety Data Sheet**

- Mobility** : Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.
- Persistence/degradability** : Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.
- Bioaccumulation** : Contains components with the potential to bioaccumulate.
- Other Adverse Effects** : Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

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**13. DISPOSAL CONSIDERATIONS**

- Material Disposal** : Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.
- Container Disposal** : Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.
- Local Legislation** : Disposal should be in accordance with applicable regional, national, and local laws and regulations.

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**14. TRANSPORT INFORMATION****US Department of Transportation Classification (49CFR)**

This material is not subject to DOT regulations under 49 CFR Parts 171-180.

**IMDG**

This material is not classified as dangerous under IMDG regulations.

**IATA (Country variations may apply)**

This material is not classified as dangerous under IATA regulations.

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**15. REGULATORY INFORMATION**

The regulatory information is not intended to be comprehensive. Other regulations may apply to this material.

**Federal Regulatory Status****Notification Status**

EINECS	All components listed.
TSCA	All components listed.
DSL	All components listed.

**Material Safety Data Sheet**

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**10. STABILITY AND REACTIVITY**

<b>Stability</b>	: Stable.
<b>Conditions to Avoid</b>	: Extremes of temperature and direct sunlight.
<b>Materials to Avoid</b>	: Strong oxidising agents.
<b>Hazardous Decomposition Products</b>	: Hazardous decomposition products are not expected to form during normal storage.

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**11. TOXICOLOGICAL INFORMATION**

<b>Basis for Assessment</b>	: Information given is based on data on the components and the toxicology of similar products.
<b>Acute Oral Toxicity</b>	: Expected to be of low toxicity: LD50 > 5000 mg/kg , Rat
<b>Acute Dermal Toxicity</b>	: Expected to be of low toxicity: LD50 > 5000 mg/kg , Rabbit
<b>Acute Inhalation Toxicity</b>	: Not considered to be an inhalation hazard under normal conditions of use.
<b>Skin Irritation</b>	: Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
<b>Eye Irritation</b>	: Expected to be slightly irritating.
<b>Respiratory Irritation</b>	: Inhalation of vapours or mists may cause irritation.
<b>Sensitisation</b>	: Not expected to be a skin sensitiser.
<b>Repeated Dose Toxicity</b>	: Not expected to be a hazard.
<b>Mutagenicity</b>	: Not considered a mutagenic hazard.
<b>Carcinogenicity</b>	: Product contains mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC). Other components are not known to be associated with carcinogenic effects.
<b>Reproductive and Developmental Toxicity</b>	: Not expected to be a hazard.
<b>Additional Information</b>	: Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible.

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**12. ECOLOGICAL INFORMATION**

Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

<b>Acute Toxicity</b>	: Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) (LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract). Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.
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**Material Safety Data Sheet**

- health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65 °C (149 °F)].
- Hand Protection** : Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.
- Eye Protection** : Wear safety glasses or full face shield if splashes are likely to occur.
- Protective Clothing** : Skin protection not ordinarily required beyond standard issue work clothes.
- Monitoring Methods** : Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate.
- Environmental Exposure Controls** : Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

**9. PHYSICAL AND CHEMICAL PROPERTIES**

- Appearance : May be dyed. Liquid at room temperature.
- Odour : Slight hydrocarbon.
- pH : Not applicable.
- Initial Boiling Point and Boiling Range : > 280 °C / 536 °F estimated value(s)
- Flash point : > 176.67 °C / 350.01 °F (COC)
- Upper / lower Flammability or Explosion limits : Typical 1 - 10 %(V) (based on mineral oil)
- Auto-ignition temperature : > 320 °C / 608 °F
- Vapour pressure : < 0.5 Pa at 20 °C / 68 °F (estimated value(s))
- Specific gravity : Data not available
- Water solubility : Negligible.
- n-octanol/water partition coefficient (log Pow) : > 6 (based on information on similar products)
- Kinematic viscosity : > 40 mm<sup>2</sup>/s
- Vapour density (air=1) : > 1 (estimated value(s))
- Evaporation rate (nBuAc=1) : Data not available

**Material Safety Data Sheet**

**Additional Advice** : sand or other suitable material and dispose of properly.  
: Local authorities should be advised if significant spillages cannot be contained.

**7. HANDLING AND STORAGE**

**General Precautions** : Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

**Handling** : Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used.

**Storage** : Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers. Storage Temperature: 0 - 50 °C / 32 - 122 °F

**Recommended Materials** : For containers or container linings, use mild steel or high density polyethylene.

**Unsuitable Materials** : PVC.

**Additional Information** : Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Occupational Exposure Limits**

Material	Source	Type	ppm	mg/m3	Notation
Oil mist, mineral	ACGIH	TWA(Mist.)		5 mg/m3	
Oil mist, mineral	ACGIH	STEL(Mist.)		10 mg/m3	

**Exposure Controls** : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.

**Personal Protective Equipment** : Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

**Respiratory Protection** : No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker



**Material Safety Data Sheet**

chemical when evaluated according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

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**4. FIRST AID MEASURES**

<b>General Information</b>	:	Not expected to be a health hazard when used under normal conditions.
<b>Inhalation</b>	:	No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.
<b>Skin Contact</b>	:	Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention.
<b>Eye Contact</b>	:	Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.
<b>Ingestion</b>	:	In general no treatment is necessary unless large quantities are swallowed, however, get medical advice.
<b>Advice to Physician</b>	:	Treat symptomatically.

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**5. FIRE FIGHTING MEASURES**

Clear fire area of all non-emergency personnel.

<b>Flash point</b>	:	> 176.67 °C / 350.01 °F (COC)
<b>Upper / lower Flammability or Explosion limits</b>	:	Typical 1 - 10 %(V)(based on mineral oil)
<b>Auto ignition temperature</b>	:	> 320 °C / 608 °F
<b>Specific Hazards</b>	:	Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.
<b>Suitable Extinguishing Media</b>	:	Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.
<b>Unsuitable Extinguishing Media</b>	:	Do not use water in a jet.
<b>Protective Equipment for Firefighters</b>	:	Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

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**6. ACCIDENTAL RELEASE MEASURES**

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. See Chapter 13 for information on disposal. Observe all relevant local and international regulations.

<b>Protective measures</b>	:	Avoid contact with skin and eyes. Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.
<b>Clean Up Methods</b>	:	Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay,

**Material Safety Data Sheet**

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**1. MATERIAL AND COMPANY IDENTIFICATION**

**Material Name** : SHELL FORMULASHELL® ATF Type F - DONAX® TF

**Manufacturer/Supplier** : SOPUS Products  
PO Box 4427  
Houston, TX 77210-4427  
USA

**MSDS Request** : 877-276-7285

**Emergency Telephone Number**  
**Spill Information** : 877-242-7400  
**Health Information** : 877-504-9351

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**2. COMPOSITION/INFORMATION ON INGREDIENTS**

Highly refined mineral oils and additives.

The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.

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**3. HAZARDS IDENTIFICATION**

<b>Emergency Overview</b>	
<b>Appearance and Odour</b>	: May be dyed. Liquid at room temperature. Slight hydrocarbon.
<b>Health Hazards</b>	: Not classified as dangerous for supply or conveyance.
<b>Safety Hazards</b>	: Not classified as flammable but will burn.
<b>Environmental Hazards</b>	: Not classified as dangerous for the environment.

**Health Hazards** : Not expected to be a health hazard when used under normal conditions.

**Health Hazards**  
**Inhalation** : Under normal conditions of use, this is not expected to be a primary route of exposure.

**Skin Contact** : Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.

**Eye Contact** : May cause slight irritation to eyes.

**Ingestion** : Low toxicity if swallowed.

**Other Information** : Used oil may contain harmful impurities.

**Signs and Symptoms** : Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea.

**Aggravated Medical Condition** : Pre-existing medical conditions of the following organ(s) or organ system(s) may be aggravated by exposure to this material: Skin.

**Environmental Hazards** : Not classified as dangerous for the environment.

**Additional Information** : Under normal conditions of use or in a foreseeable emergency, this product does not meet the definition of a hazardous



## Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2\\_054242](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242)

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- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2\\_053374](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374)
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelpdb1043084>

# APPENDIX B

## Location Standards for new Class IVb Landfills - Supporting Information

Director's Actions Date (office use only): 10/24/14

MINERAL LEASE NO. ML 17661

GRANT: SCH

## AMENDMENT AND RESTATEMENT OF UTAH STATE METALLIFEROUS MINERALS LEASE FORM

THIS AMENDED MINING LEASE AND AGREEMENT (the "Lease") is entered into effective the 1<sup>st</sup> day of January 2015, (the "Effective Date"), by and between the STATE OF UTAH, acting by and through the SCHOOL AND INSTITUTIONAL TRUST LANDS ADMINISTRATION, 675 East 500 South, Suite 500, Salt Lake City, Utah 84102 ("Lessor"), and

LISBON VALLEY MINING COMPANY  
920 SOUTH COUNTY ROAD 313  
P.O. BOX 400  
MOAB, UT 84532

having a business address as shown above ("Lessee").

WITNESSETH:

That the State of Utah, as Lessor, in consideration of the rentals, royalties, and other financial consideration paid or required to be paid by Lessee, and the covenants of Lessee set forth below, does hereby GRANT AND LEASE to Lessee the exclusive right and privilege to explore for, drill for, mine, remove, transport, convey, cross-haul, commingle, and sell the leased substances covered by this lease and located within the boundaries of the following-described tract of land (the "Leased Premises") located in San Juan County, State of Utah:

T30S, R25E, SLB&M.  
SEC. 36: SW¼

Containing 160.00 acres, more or less.

Together with the right and privilege to make use of the surface and subsurface of the Leased Premises for uses reasonably incident to the mining of leased substances by Lessee on the Leased Premises or on other lands under the control of Lessee or mined in connection with operations on the Leased Premises, including, but not limited to, conveying, storing, loading, hauling and otherwise transporting leased substances; excavating; removing, stockpiling, depositing and redepositing of surface materials; developing and utilizing mine portals and adjacent areas for access, staging and other purposes incident to mining; and the subsidence, mitigation, restoration and reclamation of the surface.



This Mining Lease and Agreement is subject to, and Lessee hereby agrees to and accepts, the following covenants, terms, and conditions:

1. LEASED SUBSTANCES.

- 1.1 Metalliferous Minerals, as Classified and defined in Utah Administrative Code R850-25-100(1)(a) (collectively "leased substances"). This mineral lease grants Lessee the right, subject to the terms and conditions set forth herein, to extract the leased substances. In the event that minerals or materials other than the leased substances are discovered during lease operations, Lessee shall promptly notify the Lessor and shall not further disturb or remove the other minerals or materials without Lessor's written permission. Upon notifying Lessor of such discovery the Lessee shall have preference in making application to the Lessor for a lease or permit covering the unleased minerals or materials that are discovered.
- 1.2 No Warranty of Title. Lessor claims title to the mineral estate covered by this Lease. Lessor does not warrant title nor represent that no one will dispute the title asserted by Lessor. It is expressly agreed that Lessor shall not be liable to Lessee for any alleged deficiency in title to the mineral estate, nor shall Lessee become entitled to any refund for any rentals, bonuses, or royalties paid under this Lease in the event of title failure.

2. RESERVATIONS TO LESSOR. Subject to the exclusive rights and privileges granted to Lessee under this Lease, and further provided that Lessor shall refrain from taking actions with respect to the Leased Premises that may unreasonably interfere with Lessee's operations, Lessor hereby excepts and reserves from the operation of this Lease the following rights and privileges (to the extent that Lessor has the right to grant such rights and privileges):

- 2.1 Rights-of-Way and Easements. Lessor reserves the right, following consultation with the Lessee, to establish rights-of-way and easements upon, through or over the Leased Premises, under terms and conditions that will not unreasonably interfere with operations under this Lease, for roads, pipelines, electric transmission lines, transportation and utility corridors, mineral access, and any other purpose deemed reasonably necessary by Lessor.
- 2.2 Other Mineral Leases. Lessor reserves the right to enter into mineral leases and agreements with third parties covering minerals other than the leased substances, under terms and conditions that will not unreasonably interfere with operations under this Lease in accordance with Lessor's regulations, if any, governing multiple mineral development.
- 2.3 Use and Disposal of Surface. To the extent that Lessor owns the surface estate of the Leased Premises and subject to the rights granted to the Lessee pursuant to this Lease, Lessor reserves the right to use, lease, sell, or otherwise dispose of the surface estate or any part thereof, provided that any such actions will not unreasonably interfere with operations under this Lease. Lessor shall notify Lessee of any such sale, lease, or other disposition of the surface estate.
- 2.4 Rights Not Expressly Granted. Lessor further reserves all rights and privileges of every kind and nature, except as specifically granted in this Lease, provided that any actions under such reservations will not unreasonably interfere with operations under this Lease.

3. TERM OF LEASE; MINIMUM ROYALTIES; READJUSTMENT.

- 3.1 Primary Term. This Lease was granted for a "primary term" of ten (10) years that began January 1, 1959, and ended December 31, 1968.
- 3.2 Extension beyond Primary Term by Production. Subject to Lessee's compliance with the other provisions of this Lease, this Lease shall remain in effect beyond the primary term so long as leased substances are being produced in paying quantities, as defined herein, from the Leased Premises, or from lands constituting a mining unit as approved by Lessor in its reasonable discretion. For purposes of this lease, production of leased substances in paying quantities shall mean the mining and sale of the leased substances during the lease-year in an amount sufficient to cover all operating expenses accruing to the lessee pursuant to the leasehold for that lease year, including the payment of all taxes and the payment of rentals and royalties accruing to the Lessor.
- 3.3 Extension beyond Primary Term by Diligent Development, Financial Investment and Minimum Royalty. In the absence of actual production in paying quantities as set forth in paragraph 3.2, Extension Beyond Primary Term, this Lease shall remain in effect beyond the primary term only if the Lessee is engaged in diligent operations, exploration or development activity, as well as making a substantial financial investment, which in Lessor's sole discretion is calculated to advance development or production of leased substances from the Leased Premises or lands constituting a mining unit as approved by the Director which includes the Leased Premises, and Lessee pays the annual minimum royalty set forth in Paragraph 3.4, Minimum Royalty, in advance, before the anniversary date of the date first written hereinabove.
- 3.4 Minimum Royalty. Commencing on the effective date of this lease amendment, January 1, 2015, Lessee shall pay Lessor an annual minimum royalty, in advance, on or before the Effective Date and each anniversary thereafter. The advance annual minimum royalty shall be Two Thousand Six Hundred Twenty Five Dollars (\$2,625.00). Payment of the annual minimum royalty shall satisfy the requirement for diligent operations for the year paid. Rentals and minimum royalties paid annually shall be credited against actual production royalties for the year in which they accrue, but annual rentals shall not be credited against minimum royalties.
- 3.5 Expiration; Cessation of Production. After expiration of the primary term, this Lease will expire of its own terms, without the necessity of any notice or action by Lessor, if: (a) Lessee fails to produce leased substances in accordance with Article 3.2; (b) Lessee ceases to engage in exploration, development, or operations or fails to pay annual advance minimum royalties in accordance with Article 3.4; or, (c) the Director fails to make a written determination that it is in the interest of the trust beneficiaries to extend this lease.
- 3.6 Readjustment. On December 17, 2004, the lease was extended without readjustment to December 31, 2014, prior to this readjustment, the lease was last readjusted effective August 15, 1995; the terms of the readjusted lease allowed the lease to be readjusted any time after January 1, 2005. The lease will now be subject to readjustment at the end of each period of TEN (10) years after the effective date of this readjustment, January 1, 2015 ("Readjustment Period"), Lessor may exercise its option to readjust the terms and conditions of this Lease (including, without limitation: rental rates, minimum royalties, royalty rates, valuation methods, and provisions concerning reclamation). Notice of intent to exercise the right to readjust is timely given by Lessor if mailed prior to the end of the Readjustment Period to the last address set forth for Lessee in Lessor's files. Lessor shall have up to one year after exercising its option to readjust to review and communicate in writing

the final readjusted terms of the lease. If within thirty (30) days after submission of the readjusted lease terms to the Lessee, the Lessee determines that any or all of the proposed readjusted terms and conditions are unreasonable, then Lessee shall so notify Lessor in writing and the parties, acting reasonably, shall attempt to resolve the objectionable term or condition. If the parties are unable, acting reasonably, to resolve the matter and agree upon the readjusted terms and conditions as submitted by Lessor at the end of the Readjustment Period, Lessee shall forfeit any right to the continued extension of this lease, and the lease shall automatically terminate, provided that nothing herein shall be deemed to preclude Lessee from appealing any readjustment by Lessor pursuant to applicable law.

4. **BONUS BID.** An initial bonus bid having been paid at the time of original lease issuance, no further bonus bid is required as of this amendment and restatement of the Lease. The initial bonus bid may not be credited against annual rentals, annual minimum royalties or production royalties accruing pursuant to this lease.
5. **RENTALS/MINIMUM RENTALS.** Lessee agrees to pay Lessor an annual rental of \$1.00 for each acre and fractional part thereof within the Leased Premises; provided however, the minimum annual rental required by this lease shall be \$500.00 irrespective of acreage. Lessee shall promptly pay annual rentals each year in advance before the anniversary date of the Effective Date. The rental payment for a mineral lease year may be credited against production royalties only as they accrue for that lease year. The Lessee may not credit rentals paid for one lease year against production royalties accruing to another lease year. Rental payments may not be credited against minimum royalties or bonus bids accruing to any lease year.
6. **ROYALTIES.**
  - 6.1 **Production Royalties.** Lessee shall pay Lessor a production royalty on the basis of eight percent (8%) of the Gross Value, for fissionable metalliferous minerals; lessee shall also pay Lessor a production royalty on the basis of four percent (4)% of the gross value for non-fissionable metalliferous minerals f.o.b. the mine. The royalty shall be based on arm's length transaction, bona fide contract of sale of the leased substances. It is understood that Lessee's sold product consists of "Production Grade A" copper cathode, therefore, for purposes of this lease the Gross Value of the leased substances shall mean the actual compensation received by the Lessee, or any affiliated entity, on the basis of U.S. Dollars, including all payments, bonuses and allowances, received plus the value of all services, payments in kind and all other compensation whether monetary or non-monetary, received by the Lessee from the buyer or from other parties for the sale or disposal of said copper cathode less processing and refining costs as outlined in Appendix A: Royalty Agreement.
  - 6.2 **Non-Arm's Length Transactions.** In the event that Lessee uses, sells or otherwise disposes of leased substances without a non-arm's-length contract or bill of sale, Lessee shall promptly notify Lessor of such use, sale or disposal. The Director may then determine and assign the Gross Value to the leased substances for royalty purposes after taking into account spot market prices, the value of similar or like leased substances reported by other trust lands lessees, the value of like mineral commodities as reported by the United States Geological Survey, and other pertinent economic data regarding the fair market value of the leased substances, f.o.b. the mine.
  - 6.3 **No Mining Cost Deductions.** It is expressly understood and agreed that none of Lessee's mining, administrative, depreciation, deductions for property tax, or transportation costs, including but not limited to costs for materials, labor, overhead, distribution, transportation f.o.b. mine, loading, crushing, or general and

administrative activities, may be deducted in computing Lessor's royalty. All such costs shall be entirely borne by Lessee and are anticipated by the rate of royalty set forth in this Lease.

- 6.4 **Royalty Payment.** Effective as of January 1, 2015, for all leased substances that are sold or transported from the leased lands during a particular month, Lessee shall pay royalties to Lessor on or before the end of the next succeeding month. Royalty payments shall be accompanied by a verified statement, in a form approved by Lessor, stating the amount of leased substances sold or transported, the gross proceeds accruing to Lessee, and any other information reasonably required by Lessor to verify production and disposition of the leased substances or leased substances products. Delinquent royalties may be subject to late fees and penalties in accordance with Lessor's Rules.
- 6.5 **Suspension, Waiver or Reduction of Rents or Royalties.** Lessor, to the extent not prohibited by applicable law, is authorized to waive, suspend, or reduce the rental or minimum royalty, or reduce the royalty applicable with respect to the entire Lease, whenever in Lessor's sole judgment it is necessary to do so in order to promote development, or whenever in the Lessor's sole judgment the Lease cannot be successfully operated under the terms provided herein and continued operations are in the trust land beneficiaries best interest.

7. **RECORDKEEPING; INSPECTION; AUDITS.**

- 7.1 **Registered Agent; Records.** Lessee shall maintain a registered agent within the State of Utah to whom any and all notices may be sent by Lessor and upon whom process may be served. Lessee shall also maintain an office within the State of Utah containing originals or copies of all maps, engineering data, permitting materials, books, records or contracts (whether such documents are in paper or electronic form) generated by Lessee that pertain in any way to leased substances production, output and valuation; mine operations; assays; processing returns; leased substances sales and dispositions; and calculation of royalties from the Leased Premises. Lessee shall maintain such documents for at least seven years after the date of the leased substances production to which the documents pertain. Lessee shall provide to Lessor third party prepared audited financial records annually.
- 7.2 **Inspection.** Lessor's employees and authorized agents at Lessor's sole risk and expense shall have the right to enter the Leased Premises to check scales as to their accuracy, and to go on any part of the Leased Premises to examine, inspect, survey and take measurements for the purposes of verifying production amounts and proper lease operations. Upon reasonable notice to Lessee, Lessor's employees and authorized agents shall further have the right to audit, examine and copy (at Lessor's expense) all documents described in paragraph 7.1, Registered Agent; Records, whether such documents are located at the mine site or elsewhere. Lessee shall furnish all conveniences necessary for said inspection, survey, or examination; provided, however, that such inspections shall be conducted in a manner that is in conformance with all applicable mine safety regulations and does not unreasonably interfere with Lessee's operations.
- 7.3 **Geologic Information.** In the event Lessee conducts core-drilling operations or other geologic evaluation of the Leased Premises, Lessor may inspect core samples, evaluations thereof, and proprietary geologic information concerning the Leased Premises. Upon request by Lessor, Lessee shall timely provide Lessor with a true and correct copy of all such evaluations, geological reports, drilling logs, assays and interpretive maps of the leased substances within the leased lands.

- 7.4 Confidentiality. Any and all documents and geologic data obtained by Lessor through the exercise of its rights as set forth in paragraphs 7.2, Inspection., and 7.3, Geologic Information., may be declared confidential information by Lessee, in which event Lessor and its authorized agents shall maintain such documents and geologic data as protected records under the Utah Governmental Records Access Management Act or other applicable privacy statute, and shall not disclose the same to any third party without the written consent of Lessee, or as required under the order of a court of competent jurisdiction requiring such disclosure, provided that Lessor's obligations of confidentiality to Lessee shall cease upon termination of this Lease.

8. USE OF SURFACE ESTATE.

- 8.1 Lessor-Owned Surface. If Lessor owns the surface estate of all or some portion of the Leased Premises, at the time of the execution of this Lease, Lessee may use such lands to the extent reasonably necessary and expedient for the economic operation of the leasehold, subject to paragraph 13.2, PLAN OF OPERATIONS. Lessee may not use the surface estate of the Leased Premises prior to complying with the requirements of paragraph 13.2. Lessee's right to surface use of Lessor-owned surface estate shall include the right to subside the surface. Such surface uses shall be exercised subject to the rights reserved to Lessor as provided in paragraph 2, RESERVATIONS TO LESSOR, and without unreasonable interference with the rights of any prior or subsequent lessee of Lessor.
- 8.2 Split-Estate Lands. If Lessor does not own the surface estate of any portion of the Leased Premises, Lessee's access to and use of the surface of such lands shall be determined by applicable law governing mineral development on split-estate lands, including without limitation applicable statutes governing access by mineral owners to split estate lands, and reclamation and bonding requirements. Lessee shall indemnify, defend and hold Lessor harmless for all claims, causes of action, damages, costs and expenses (including attorney's fees and costs) arising out of or related to damage caused by Lessee's operations to surface lands or improvements owned by third parties.

9. APPLICABLE LAWS AND REGULATIONS; HAZARDOUS SUBSTANCES

- 9.1 Trust Lands Statute and Regulations. This Lease is issued pursuant to, and is subject to, the provisions of Title 53C, Utah Code Annotated, 1953, as amended. Further, Lessee and this lease are subject to and shall comply with all current and future rules and regulations adopted by the School and Institutional Trust Lands Administration and its successor agencies.
- 9.2 Other Applicable Laws and Regulations. Lessee shall comply with all applicable federal, state and local statutes, regulations, and ordinances, including without limitation the Utah Mined Land Reclamation Act, applicable statutes and regulations relating to mine safety and health, and applicable statutes, regulations and ordinances relating to public health, pollution control, management of hazardous substances, cultural resources, and environmental protection.
- 9.3 Hazardous Substances. Lessee [or other occupant pursuant to any agreement authorizing mining] shall not keep on or about the premises any hazardous substances, as defined under 42 U.S.C. § 9601(14) or any other Federal environmental law, any regulated substance contained in or released from any underground storage tank, as defined by the Resource Conservation and Recovery Act, 42 U.S.C. § 6991, *et seq.*, or any substances defined and regulated as "hazardous" by applicable State law, (hereinafter, for the purposes of this Lease,

collectively referred to as "Hazardous Substances") unless such substances are reasonably necessary in Lessee's mining operations, and the use of such substances or tanks is noted and approved in the Lessee's mining plan, and unless Lessee fully complies with all Federal, State and local laws, regulations, statutes, and ordinances, now in existence or as subsequently enacted or amended, governing Hazardous Substances. Lessee shall immediately notify Lessor, the surface management agency, and any other Federal, State and local agency with jurisdiction over the Leased Premises, of contamination thereon, of (i) all reportable spills or releases of any Hazardous Substance affecting the Leased Premises, (ii) all failures to comply with any applicable Federal, state or local law, regulation or ordinance governing Hazardous Substances, as now enacted or as subsequently enacted or amended, (iii) all inspections of the Leased Premises by, or any correspondence, order, citations, or notifications from any regulatory entity concerning Hazardous Substances affecting the Leased Premises, (iv) all regulatory orders or fines or all response or interim cleanup actions taken by or proposed to be taken by any government entity or private Party concerning the Leased Premises.

9.4 **Hazardous Substances Indemnity.** Lessee [or other occupant pursuant to any agreement authorizing mining] shall indemnify, defend, and hold harmless Lessor, employees, officers, and agents with respect to any and all damages, costs, liabilities, fees (including reasonable attorneys' fees and costs), penalties (civil and criminal), and cleanup costs arising out of or in any way related to Lessee's use, disposal, transportation, generation, sale or location upon or affecting the Leased Premises of Hazardous Substances, as defined in paragraph 9.3 of this Lease. This indemnity shall extend to the actions of Lessee's employees, agents assigns, sublessees, contractors, subcontractors, licensees and invitees. Lessee shall further indemnify, defend and hold harmless Lessor from any and all damages, costs, liabilities, fees (including reasonable attorneys' fees and costs), penalties (civil and criminal), and cleanup costs arising out of or in any way related to any breach of the provisions of this Lease concerning Hazardous Substances. This indemnity is in addition to, and in no way limits, the general indemnity contained in paragraph 16.1 of this Lease.

9.5 **Waste Certification.** The Lessee shall provide upon abandonment, transfer of operation, assignment of rights, sealing-off of a mined area, and prior to lease relinquishment, certification to the Lessor that, based upon a complete search of all the operator's records for the Lease, and upon its knowledge of past operations, there have been no reportable quantities of hazardous substances as defined in 40 Code of Federal Regulations §302.4, or used oil as defined in Utah Administrative Code R315-15, discharged (as defined at 33 U.S.C. §1321(a)(2)), deposited or released within the Leased Premises, either on the surface or underground, and that all remedial actions necessary have been taken to protect human health and the environment with respect to such substances. Lessee shall additionally provide to Lessor a complete list of all hazardous substances, hazardous materials, and their respective Chemical Abstracts Service Registry Numbers, used or stored on, or delivered to, the Leased Premises. Such disclosure will be in addition to any other disclosure required by law or agreement.

## 10. **BONDING.**

10.1 **Lease Bond May Be Required.** At the time this Lease is executed, Lessor may require Lessee to execute and file with the Lessor a good and sufficient bond or other financial guarantee acceptable to Lessor in order to: (a) guarantee Lessee's performance of all covenants and obligations under this Lease, including Lessee's obligation to pay royalties; and (b) ensure compensation for damage, if any, to the surface estate and any surface improvements.

- 10.2 Reclamation Bonding. The bond required by and filed with the Utah Division of Oil, Gas and Mining ("UDOGM") in connection with the issuance of a mine permit which includes the Leased Premises may be accepted by the Director to satisfy Lessor's bonding requirements with respect to Lessee's reclamation obligations under this Lease; provided, however, upon notice to Lessee, the Lessor may, in its reasonable discretion, determine that the bond filed with UDOGM is insufficient to protect Lessor's interests. In such an event the Director shall enter written findings as to the basis for calculation of the perceived insufficiency and enter an order establishing the amount of additional bonding required. Lessee shall file any required additional bond with Lessor within thirty (30) days after demand by Lessor. Lessor may increase or decrease the amount of any additional bond from time to time in accordance with the same procedure.

11. WATER RIGHTS.

- 11.1 Water Rights in Name of Lessor. If Lessee files to appropriate water for use in association with this lease or operations upon the Leased Premises, the filing for such water right shall be made by Lessee in the name of Lessor at no cost to Lessor, and such water right shall become an appurtenance to the Leased Premises, subject to Lessee's right to use such water right at no cost during the term of this Lease.
- 11.2 Option to Purchase. If Lessee purchases or acquires an existing water right for use in association with this lease or operations upon the Leased Premises, Lessor shall have the option to acquire that portion of such water right as was used on the Leased Premises upon expiration or termination of this Lease. The option price for such water right shall be the fair market value of the water right as of the date of expiration or termination of this Lease. Upon expiration or termination of this Lease, Lessee shall notify Lessor in writing of all water rights purchased or acquired by Lessee for leased substances mining operations on the Leased Premises and its estimate of the fair market value of such water right. Lessor shall then have forty-five (45) days to exercise its option to acquire the water by payment to Lessee of the estimated fair market value. If Lessor disagrees with Lessee's estimate of fair market value, Lessor shall notify Lessee of its disagreement within the 45 day option exercise period. The fair market value of the water right shall then be appraised by a single appraiser mutually acceptable to both parties, which appraisal shall be final and not subject to review or appeal. If the parties cannot agree upon the choice of an appraiser, the fair market value of the water right shall be determined by a court of competent jurisdiction. Conveyance of any water right pursuant to this paragraph shall be by quit claim deed.

12. ASSIGNMENT OR SUBLEASE; OVERRIDING ROYALTIES.

- 12.1 Consent Required. Lessee shall not assign or sublease this Lease in whole or in part, or otherwise assign or convey any rights or privileges granted by this Lease, including, without limitation, creation of overriding royalties or production payments, without the prior written consent of Lessor, which shall not be unreasonably withheld. Lessee agrees that Lessor, in determining whether to consent to any proposed assignment, may reasonably consider the proposed assignee's financial capacity, ability to market and process leased substances, and may refuse to consent to such assignment if, in the Lessor's reasonable opinion, the proposed assignee lacks the necessary financial or technical capacity to mine, market and/or process leased substances in a manner comparable to Lessee. Any assignment, sublease or other conveyance made without prior written consent of Lessor shall have no legal effect unless and until approved in writing by Lessor. Exercise of any right with respect to the Leased Premises in violation of this provision shall constitute a default under this Lease.



- 12.2 Binding Effect. All of the terms and provisions of this Lease shall be binding upon and shall inure to the benefit of their respective successors, assigns, and sublessees.
- 12.3 Limitation on Overriding Royalties. Lessor reserves the right to disapprove the creation of an overriding royalty or production payment that would, in Lessor's reasonable discretion, constitute an unreasonable economic burden upon operation of the Lease. In exercising its discretion to disapprove the creation of an overriding royalty, Lessor shall consult with Lessee and any third parties involved and shall prepare findings to evidence the basis of its decision. Any transfer in interest which would create a cumulative overriding royalty burden in excess of that due to the Lessor shall not be approved.

13. OPERATIONS.

- 13.1 Permitting. Before Lessee commences exploration, drilling, or mining operations on the Leased Premises, it shall have obtained such permits and posted such bonds as may be required under applicable provisions of the Utah Mined Land Reclamation Act and associated regulations. Lessee shall maintain any required permits in place for the duration of mining operations and reclamation. Upon request, Lessee shall provide Lessor with a copy of all regulatory filings relating to permitting matters.
- 13.2 Plan of Operations. Lessee does not have the right to conduct surface disturbing operations or any operations that have the potential to affect historic properties without first obtaining Lessor's approval pursuant to *Utah Administrative Code* R850-24-700. Prior to the commencement of any such activities on the Leased Premises, Lessee shall obtain Lessor's approval of a plan of operations for the Leased Premises. Lessor may modify the proposed plan of operations as is needed to insure that there is no waste of economically recoverable mineral reserves contained on the Leased Premises. In this context "waste" shall mean the inefficient utilization of, or the excessive or improper loss of an otherwise economically recoverable mineral resource. Lessor shall notify Lessee in writing of its approval or modifications of the plan of operations. The plan of operations submitted by Lessee shall be deemed approved by Lessor if Lessor has not otherwise notified Lessee within sixty (60) days of filing.
- 13.3 Plan of Operations - Modification. In the event that material changes are required to the plan of operations during the course of mining, Lessee shall submit a modification of the plan of operations to the Lessor. Routine adjustments to the plan of operations based upon geologic circumstances encountered during day-to-day mining operations that do not result in increased surface disturbance do not require the submission of a modification. If the proposed changes require emergency action by Lessee, then the Lessee shall so notify the Lessor at the time of submission of the modification and the parties shall use their best efforts to meet the Lessee's time schedule regarding implementation of the changes. Non-emergency modifications will be reviewed promptly by Lessor to insure that there is no waste of economically recoverable mineral reserves pursuant to the plan of operations, as modified, and Lessor shall notify lessee in writing of its approval or modification of the proposed modification. Modifications shall be deemed approved by Lessor if Lessor has not otherwise notified Lessee within thirty (30) days of filing.
- 13.4 Mine Maps. Lessee shall maintain at the mine office clear, accurate, and detailed maps of all actual and planned operations. Such maps shall be certified by an engineer or geologist who is professionally licensed by the State of Utah or by a state having a reciprocal licensing agreement with the State of Utah. Lessee shall provide copies of such maps to Lessor upon request.

- 13.5 Good Mining Practices. Lessee shall conduct exploration and mining operations on the Leased Premises in accordance with standard industry operating practices, and shall avoid waste of economically recoverable leased substances. Lessee shall comply with all regulations and directives of the Mine Safety and Health Administration or successor agencies for the health and safety of employees and workers.
- 13.6 Mining Units. Lessor may approve the inclusion of the Leased Premises in a mining unit with federal, private or other non-state lands upon terms and conditions that it deems necessary to protect the interests of the Lessor, including without limitation segregation of production, accounting for commingled leased substances production, and minimum production requirements or minimum royalties for the Leased Premises.
- 13.7 Cultural Resources. Prior to commencing any surface disturbing operations or any operations that have the potential to affect historic properties, Lessee shall complete a cultural resource inventory prepared in accordance with applicable laws and regulations, or otherwise provide evidence of compliance with *Utah Administrative Code* R850-60-800. Lessee shall provide such cultural resource compliance materials to Lessor prior to the approval of the mining permit. Lessor will review all cultural resource compliance materials provided by Lessee, and may approve, condition, or deny its consent to the mining permit based upon impacts to cultural resources. Lessor may require Lessee to complete appropriate cultural resources mitigation measures as a condition of permit approval.
14. EQUIPMENT; RESTORATION.
- 14.1 Equipment. Upon termination of this Lease, Lessee shall remove, and shall have the right to remove, all improvements, equipment, stockpiles, and dumps from the Leased Premises within six (6) months; provided, however, that Lessor may, at Lessor's sole risk and expense, and subject to Lessee's compliance with requirements imposed by UDOGM and MSHA, require Lessee to retain in place underground timbering supports, shaft linings, rails, and other installations reasonably necessary for future mining of the Leased Premises. All improvements and equipment remaining on the Leased Premises after six (6) months may be deemed forfeited to Lessor upon written notice of such forfeiture to Lessee. Lessee may abandon underground improvements, equipment of any type, stockpiles and dumps in place if such abandonment is in compliance with applicable law, and further provided that Lessee provides Lessor with financial or other assurances sufficient in Lessor's reasonable discretion to protect Lessor from future environmental liability with respect to such abandonment or any associated hazardous waste spills or releases. Lessee shall identify and locate on the mine map the location of all equipment abandoned on the Lease Premises.
- 14.2 Restoration and Reclamation. Upon termination of this Lease, Lessee shall reclaim the Leased Premises in accordance with the requirements of applicable law, including mine permits and reclamation plans on file with UDOGM. Lessee shall further abate any hazardous condition on or associated with the Leased Premises. Lessee and representatives of all governmental agencies having jurisdiction shall have the right to re-enter the Leased Premises for reclamation purposes for a reasonable period after termination of the Lease.

15. MULTIPLE MINERAL DEVELOPMENT.

The Utah School and Institutional Trust Lands Administration may designate any lands under its authority as a Multiple Mineral Development Area (MMD). In designated MMDs the Lessor may require in addition to the terms and conditions of this lease such stipulations or restrictions as may be necessary in the determination of the Director to integrate and coordinate the operations of lessees having an interest in the lands in order to conserve natural resource and optimize revenues to the trust-land beneficiaries.

16. DEFAULT

16.1 Notice of Default; Termination. Upon Lessee's violation of or failure to comply with any of the terms, conditions or covenants set forth in this Lease, Lessor shall notify Lessee of such default by registered or certified mail, return receipt requested, at the last address for Lessee set forth in Lessor's files. Lessee shall then have thirty (30) days, or such longer period as may be granted in writing by Lessor, to either cure the default or request a hearing pursuant to the Lessor's administrative adjudication rules. In the event Lessee fails to cure the default or request a hearing within the specified time period, Lessor may cancel this Lease without further notice to or appeal by Lessee.

16.2 Effect of Termination. The termination of this Lease for any reason, whether through expiration, cancellation or relinquishment, shall not limit the rights of the Lessor to recover any royalties and/or damages for which Lessee may be liable, to recover on any bond on file, or to seek injunctive relief to enjoin continuing violations of the Lease terms. No remedy or election under this Lease shall be deemed exclusive, but shall, wherever possible, be cumulative with all other remedies available under this Lease, at law, or in equity. Lessee shall surrender the Leased Premises upon termination; however, the obligations of Lessee with respect to reclamation, indemnification and other continuing covenants imposed by this Lease shall survive the termination. All fees, rentals and monies of any type previously paid by the Lessee to the Lessor are forfeited to the trust.

17. MISCELLANEOUS PROVISIONS.

17.1 Indemnity. Except as limited by paragraph 7.2, Inspection, Lessee shall indemnify and hold Lessor harmless for, from and against each and every claim, demand, liability, loss, cost, damage and expense, including, without limitation, attorneys' fees and court costs, arising in any way out of Lessee's occupation and use of the Leased Premises, including without limitation claims for death, personal injury, property damage, and unpaid wages and benefits. Lessee further agrees to indemnify and hold Lessor harmless for, from and against all claims, demands, liabilities, damages and penalties arising out of any failure of Lessee to comply with any of Lessee's obligations under this Lease, including without limitation reasonable attorneys' fees and court costs. Lessee may be required to obtain insurance in a type and in an amount acceptable to Lessor, naming the Trust Lands Administration, its employees, its Board of trustees and the State of Utah as co-insured parties under the policy.

17.2 Interest. Interest shall accrue and be payable on all obligations arising under this Lease at such current rate as may from time to time be enacted by the Director and recorded in the Director's Minutes of the School and Institutional Trust Lands Administration. Interest shall accrue and be payable, without necessity of demand, from the date each such obligation shall arise.



- 17.3 Suspension. In the event that Lessor in its reasonable discretion determines that suspension is necessary in the interests of conservation of the leased substances; that prevailing market conditions for the leased substances render continued operation of the subject property uneconomic, or if Lessee has been prevented from performing any of its obligations or responsibilities under this Lease or from conducting mining operations by labor strikes, fires, floods, explosions, riots, acts of terrorism, any unusual mining casualties or conditions, Acts of God, government restrictions or orders, severe weather conditions, or other extraordinary events beyond its control, then the time for performance of this Lease by Lessee shall be suspended during the continuance of such conditions or acts which prevent performance, excepting any payments due and owing to Lessor.
- 17.4 Consent to Suit; Jurisdiction. This Lease shall be governed by the laws of the State of Utah. Lessor and Lessee agree that all disputes arising out of this Lease shall be litigated only in the Third Judicial District Court for Salt Lake County, Utah, and Lessee consents to the jurisdiction of such court. Lessee shall not bring any action against Lessor without exhaustion of available administrative remedies and compliance with applicable requirements of the Utah Governmental Immunity Act.
- 17.5 No Waiver. No waiver of the breach of any provision of this Lease shall be construed as a waiver of any preceding or succeeding breach of the same or any other provision of this Lease, nor shall the acceptance of rentals or royalties by Lessor during any period of time in which Lessee is in default be deemed to be a waiver of such default.
- 17.6 Severability. The invalidity of any provision of this Lease, as determined by a court of competent jurisdiction, shall in no way affect the validity of any other provision hereof.
- 17.7 Entire Lease. This Lease, together with any attached stipulations, sets forth the entire agreement between Lessor and Lessee with respect to the subject matter of this Lease. No subsequent alteration or amendment to this Lease shall be binding upon Lessor and Lessee unless in writing and signed by each of them.

## APPENDIX A – ROYALTY AGREEMENT

The following Royalty Calculation procedure is agreed to by Utah School and Institutional Trust Lands Administration (SITLA) and Lisbon Valley Mining Company, LLC (LVMC).

LVMC shall track and be able to show through chemical analysis that ore mined at the Lisbon Valley Mine is approximately 90% soluble and therefore accessible through their leaching processes and that their leaching processes are approximately 80% efficient and therefore the recoverable copper is 72% of the contained copper in the ore. Any significant change in the amount of soluble copper or leaching efficiency shall be reported to SITLA.

LVMC, through survey and chemical analysis of the ore shall track the amount (tonnage), the grade (contained copper), and the property of origin (specifically SITLA Lands) of the ore that is placed on the acid leach stockpile. SITLA and LVMC agree to assume that the recoverable copper is leached from the ore placed on the acid leach stockpile over a three (3) year period of normal leach operations (Interruptions of normal leach operations will be reported to SITLA) on the following basis:

Year #1, Months 1 – 3(Qtr 0), 10% of the recoverable copper is removed; total recoverable copper 10%,  
 Year #1, Months 4 – 6(Qtr 0-1), 10% of the recoverable copper is removed; total recoverable copper 20%,  
 Year #1, Months 7 – 9(Qtr 0-2), 8% of the recoverable copper is removed; total recoverable copper 28%,  
 Year #1, Months 10 – 12(Qtr 0-3), 8% of the recoverable copper is removed; total recoverable copper 36%,  
 Year #2, Months 1 – 3(Qtr 0-4), 8% of the recoverable copper is removed; total recoverable copper 44%,  
 Year #2, Months 4 – 6(Qtr 0-5), 8% of the recoverable copper is removed; total recoverable copper 52%,  
 Year #2, Months 7 – 9(Qtr 0-6), 8% of the recoverable copper is removed; total recoverable copper 60%,  
 Year #2, Months 10 – 12(Qtr 0-7), 8% of the recoverable copper is removed; total recoverable copper 68%,  
 Year #3, Months 1 – 3(Qtr 0-8), 8% of the recoverable copper is removed; total recoverable copper 76%,  
 Year #3, Months 4 – 6(Qtr 0-9), 8% of the recoverable copper is removed; total recoverable copper 84%,  
 Year #3, Months 7 – 9(Qtr 0-10), 8% of the recoverable copper is removed; total recoverable copper 92%,  
 Year #3, Months 10 – 12(Qtr 0-11), 8% of the recoverable copper is removed; total recoverable copper 100%.

LVMC shall track and be able to show through survey and chemical analysis the ore tonnage and grade (contained copper) from SITLA lands that is placed on the acid leach stockpile. The LVMC obligation to survey and perform chemical analysis is of the essence of this agreement. Failure of LVMC to comply with these reporting requirements is grounds for termination of the lease pursuant to paragraph 3.5 as expiration and cessation of production.

The Quarterly Royalty Basis for any particular year shall be four percent (4%) of the sum of:

1: SITLA tons placed on leach pad for initial Quarter (Qtr 0) x 2000 lbs/ton x Cu Grade %/100 x Soluble Cu\* %/100 x Process Efficiency\* %/100 x Price Rcvd \$/lb - Process Cost \$/lb x Yr 1Qtr 1 % (10%)/100

Plus,

2: SITLA tons placed on leach pad in Quarter prior to “Qtr 0”(Qtr 0-1) x 2000 lbs/ton x Cu Grade %/100 x Soluble Cu\* %/100 x Process Efficiency\* %/100 x Price Rcvd \$/lb - Process Cost \$/lb x Yr 1Qtr 2 % (10%)/100

Plus,

3: SITLA tons placed on leach pad in Quarter prior to “Qtr 0-1”(Qtr 0-2) x 2000 lbs/ton x Cu Grade %/100 x Soluble Cu\* %/100 x Process Efficiency\* %/100 x Price Rcvd \$/lb - Process Cost \$/lb x %Yr 1Qtr 3 (8%)/100

Plus,

**APPENDIX A – ROYALTY AGREEMENT continued**

- 4: SITLA tons placed on leach pad in Quarter prior to “Qtr 0-2”(Qtr 0-3) x 2000 lbs/ton x Cu Grade %/100 x Soluble Cu\* %/100 x Process Efficiency\* %/100 x Price Rcvd \$/lb - Process Cost \$/lb x %Yr 1Qtr 4 (8%)/100 Plus,
- 5: SITLA tons placed on leach pad in Quarter prior to “Qtr 0-3”(Qtr 0-4) x 2000 lbs/ton x Cu Grade %/100 x Soluble Cu\* %/100 x Process Efficiency\* %/100 x Price Rcvd \$/lb - Process Cost \$/lb x %Yr 2Qtr 1 (8%)/100 Plus,
- 6: SITLA tons placed on leach pad in Quarter prior to “Qtr 0-4”(Qtr 0-5) x 2000 lbs/ton x Cu Grade %/100 x Soluble Cu\* %/100 x Process Efficiency\* %/100 x Price Rcvd \$/lb - Process Cost \$/lb x %Yr 2Qtr 2 (8%)/100 Plus,
- 7: SITLA tons placed on leach pad in Quarter prior to “Qtr 0-5”(Qtr 0-6) x 2000 lbs/ton x Cu Grade %/100 x Soluble Cu\* %/100 x Process Efficiency\* %/100 x Price Rcvd \$/lb - Process Cost \$/lb x %Yr 2Qtr 3 (8%)/100 Plus,
- 8: SITLA tons placed on leach pad in Quarter prior to “Qtr 0-6”(Qtr 0-7) x 2000 lbs/ton x Cu Grade %/100 x Soluble Cu\* %/100 x Process Efficiency\* %/100 x Price Rcvd \$/lb - Process Cost \$/lb x %Yr 2Qtr 4 (8%)/100 Plus,
- 9: SITLA tons placed on leach pad in Quarter prior to “Qtr 0-7”(Qtr 0-8) x 2000 lbs/ton x Cu Grade %/100 x Soluble Cu\* %/100 x Process Efficiency\* %/100 x Price Rcvd \$/lb - Process Cost \$/lb x %Yr 3Qtr 1 (8%)/100 Plus,
- 10: SITLA tons placed on leach pad in Quarter prior to “Qtr 0-8”(Qtr 0-9) x 2000 lbs/ton x Cu Grade %/100 x Soluble Cu\* %/100 x Process Efficiency\* %/100 x Price Rcvd \$/lb - Process Cost \$/lb x %Yr 3Qtr 2 (8%)/100 Plus,
- 11: SITLA tons placed on leach pad in Quarter prior to “Qtr 0-9”(Qtr 0-10) x 2000 lbs/ton x Cu Grade %/100 x Soluble Cu\* %/100 x Process Efficiency\* %/100 x Price Rcvd \$/lb - Process Cost \$/lb x %Yr 3Qtr 3 (8%)/100 Plus,
- 12: SITLA tons placed on leach pad in Quarter prior to “Qtr 0-10”(Qtr 0-11) x 2000 lbs/ton x Cu Grade %/100 x Soluble Cu\* %/100 x Process Efficiency\* %/100 x Price Rcvd \$/lb - Process Cost \$/lb x %Yr 3Qtr 4 (8%)/100

Royalty paid for the quarter (Qtr 0+1) equals four percent (4%) of the sum of 1 through 12 above.  
[1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12] x 0.04

Deductions for processing costs must be directly related to processing and will not include mining nor administrative costs.

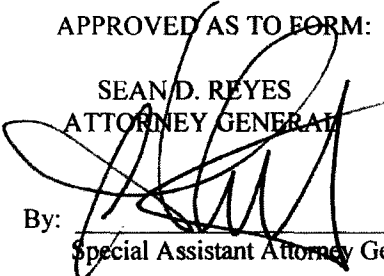
\*Significant increase in the amount of soluble copper or process efficiency may lead to a corresponding increase in the numbers used for these values in the royalty calculation.



IN WITNESS WHEREOF, the parties have executed this Lease as of the Effective Date.

APPROVED AS TO FORM:

SEAN D. REYES  
ATTORNEY GENERAL

By:   
Special Assistant Attorney General

Form Approved: 7/18/2016

THE STATE OF UTAH, acting by and through the  
SCHOOL AND INSTITUTIONAL TRUST LANDS  
ADMINISTRATION ("LESSOR")

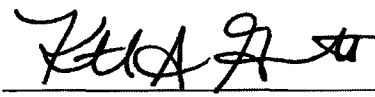
DAVID URE, DIRECTOR

By:   
THOMAS B. FADDIES  
ASSISTANT DIRECTOR/MINERALS

LESSEE:

LISBON VALLEY MINING CO. LLC

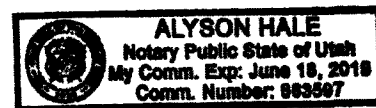
BY ITS MANAGER,  
LVMC HOLDINGS LLC

By:   
KENNETH GARNETT  
ITS AUTHORIZED PERSON

STATE OF UTAH                    )  
  :  
COUNTY OF SALT LAKE        )

The foregoing instrument was acknowledged before me this 17<sup>th</sup> day of October 2016,  
by Thomas B. Faddies, in his capacity as Assistant Director/Minerals of the School and Institutional Trust Lands  
Administration.

Alyson Hale  
Notary Public



STATE OF \_\_\_\_\_ )  
  :  
COUNTY OF \_\_\_\_\_ )

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_,  
by \_\_\_\_\_, in his/her capacity as \_\_\_\_\_ of the Lessee.

\_\_\_\_\_  
Notary Public

STATE OF New York        )  
  :  
COUNTY OF New York     )

The foregoing instrument was acknowledged before me this 6<sup>th</sup> day of October 2016,  
by Kenneth Barnett, Lessee.

Stephanie M. Weyant  
Notary Public

STEPHANIE M. WEYANT  
NOTARY PUBLIC-STATE OF NEW YORK  
No. 01WE6331960  
Qualified in New York County  
My Commission Expires October 19, 2019



United States  
Department of  
Agriculture

**NRCS**

Natural  
Resources  
Conservation  
Service

A product of the National  
Cooperative Soil Survey,  
a joint effort of the United  
States Department of  
Agriculture and other  
Federal agencies, State  
agencies including the  
Agricultural Experiment  
Stations, and local  
participants

# **Custom Soil Resource Report for Canyonlands Area, Utah - Parts of Grand and San Juan Counties**

**LVMC**



September 6, 2018



# Preface

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Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist ([http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2\\_053951](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951)).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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# How Soil Surveys Are Made

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Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units).

Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

## Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.



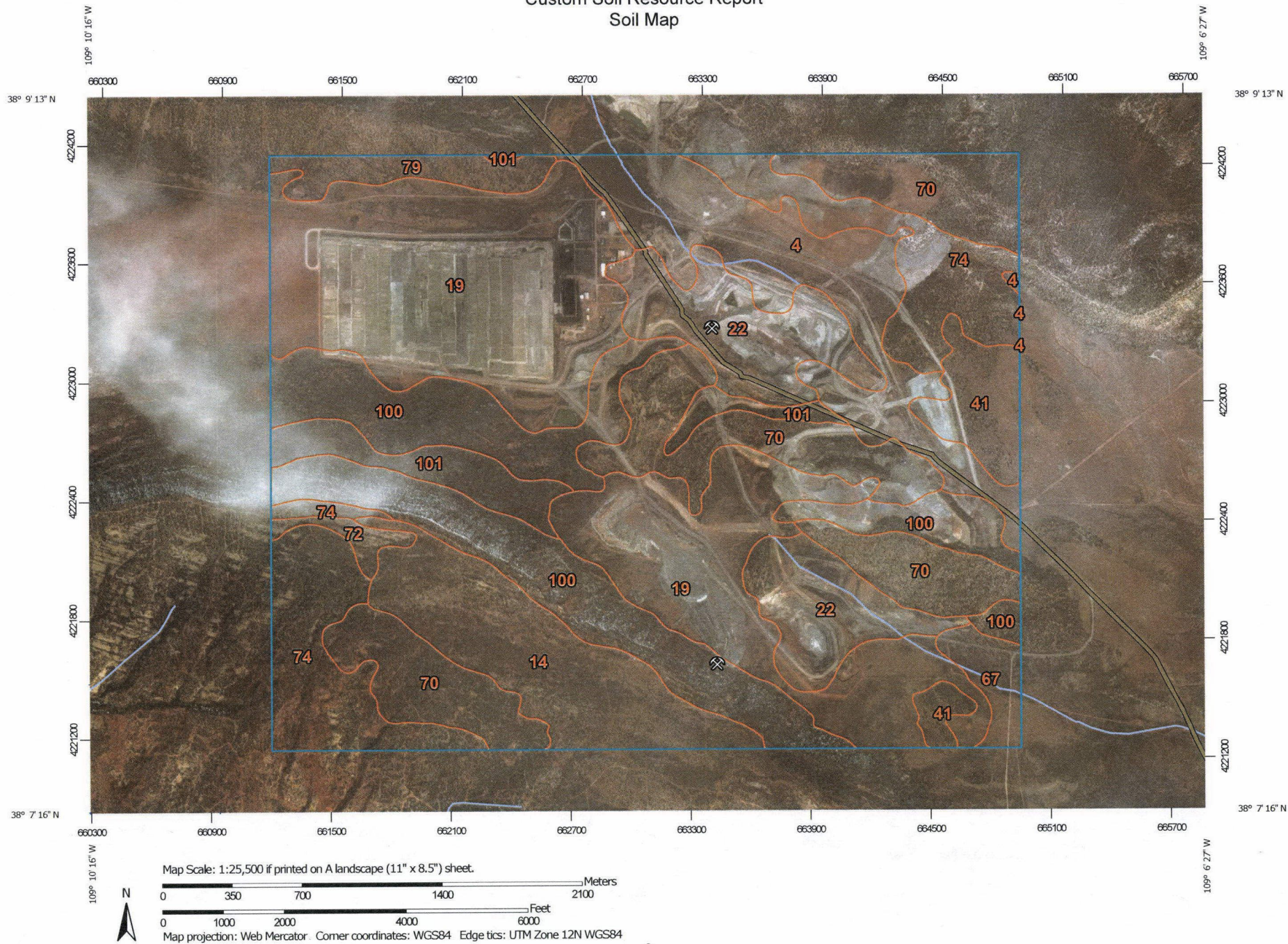
# Soil Map

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The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.




# Custom Soil Resource Report Soil Map





## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

### Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

### Water Features



Streams and Canals

### Transportation



Rails



Interstate Highways



US Routes



Major Roads

Local Roads

### Background



Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Canyonlands Area, Utah - Parts of Grand and San Juan Counties

Survey Area Data: Version 12, Sep 7, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 9, 2009—Nov 18, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
4	Barnum loam, 3 to 8 percent slopes	251.4	9.0%
14	Bond-Rizno fine sandy loams, 3 to 15 percent slopes	214.9	7.7%
19	Cahona fine sandy loam, 2 to 8 percent slopes	727.0	26.0%
22	Dumps-Pits complex	237.8	8.5%
41	Ignacio-Leanto fine sandy loams, 2 to 6 percent slopes	81.4	2.9%
67	Redbank fine sandy loam, dry, 3 to 8 percent slopes	36.3	1.3%
70	Rizno-Rock outcrop complex, 3 to 15 percent slopes	389.0	13.9%
72	Rock outcrop	17.6	0.6%
74	Rock outcrop-Rizno complex, 3 to 15 percent slopes	278.6	10.0%
79	Shalako-Anasazi-Rock outcrop complex, 3 to 15 percent slopes	52.5	1.9%
100	Ustic Torriorthents-Ustollic Calciorthids complex, 10 to 60 percent slopes	417.8	15.0%
101	Ustic Torriorthents-Ustollic Haplargids complex, 10 to 60 percent slopes	90.0	3.2%
<b>Totals for Area of Interest</b>		<b>2,794.0</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

## Custom Soil Resource Report

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion

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of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.



## Canyonlands Area, Utah - Parts of Grand and San Juan Counties

### 4—Barnum loam, 3 to 8 percent slopes

#### Map Unit Setting

*National map unit symbol:* 1vlt  
*Elevation:* 6,200 to 6,600 feet  
*Mean annual precipitation:* 10 to 12 inches  
*Mean annual air temperature:* 46 to 48 degrees F  
*Frost-free period:* 100 to 120 days  
*Farmland classification:* Farmland of statewide importance

#### Map Unit Composition

*Barnum and similar soils:* 85 percent  
*Minor components:* 15 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Barnum

##### Setting

*Landform:* Terraces, valley floors  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Parent material:* Alluvium derived from sandstone

##### Typical profile

*A - 0 to 3 inches:* loam  
*C - 3 to 60 inches:* stratified loamy fine sand to clay loam

##### Properties and qualities

*Slope:* 3 to 8 percent  
*Depth to restrictive feature:* More than 80 inches  
*Natural drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* Occasional  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 20 percent  
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Sodium adsorption ratio, maximum in profile:* 4.0  
*Available water storage in profile:* Moderate (about 7.9 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 7e  
*Hydrologic Soil Group:* C  
*Ecological site:* Semidesert Loam (Wyoming Big Sagebrush) (R035XY209UT)  
*Other vegetative classification:* Loamy Bottom (Basin Big Sagebrush) (035XY011UT\_2)  
*Hydric soil rating:* No

**Minor Components**

**Begay**

*Percent of map unit: 5 percent*

**Redbank, dry**

*Percent of map unit: 5 percent*

**Ignacio, dry**

*Percent of map unit: 3 percent*

**Mivida**

*Percent of map unit: 2 percent*

**14—Bond-Rizno fine sandy loams, 3 to 15 percent slopes**

**Map Unit Setting**

*National map unit symbol: 1vkx*

*Elevation: 6,000 to 7,200 feet*

*Mean annual precipitation: 12 to 15 inches*

*Mean annual air temperature: 45 to 49 degrees F*

*Frost-free period: 100 to 130 days*

*Farmland classification: Not prime farmland*

**Map Unit Composition**

*Bond and similar soils: 40 percent*

*Rizno and similar soils: 30 percent*

*Minor components: 30 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Bond**

**Setting**

*Landform: Structural benches*

*Down-slope shape: Linear*

*Across-slope shape: Convex*

*Parent material: Eolian deposits derived from sandstone*

**Typical profile**

*A - 0 to 2 inches: fine sandy loam*

*BA - 2 to 6 inches: very fine sandy loam*

*Bt - 6 to 19 inches: sandy clay loam*

*R - 19 to 23 inches: unweathered bedrock*

**Properties and qualities**

*Slope: 3 to 15 percent*

*Depth to restrictive feature: 10 to 20 inches to lithic bedrock*

*Natural drainage class: Well drained*

*Runoff class: High*

*Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)*

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*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 5 percent  
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water storage in profile:* Low (about 3.2 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 7s  
*Hydrologic Soil Group:* D  
*Ecological site:* Upland Shallow Hardpan (Pinyon-Utah Juniper) (R035XY316UT)  
*Hydric soil rating:* No

## Description of Rizno

### Setting

*Landform:* Cuestas  
*Landform position (two-dimensional):* Backslope  
*Down-slope shape:* Linear  
*Across-slope shape:* Convex  
*Parent material:* Eolian deposits over residuum weathered from sandstone and shale

### Typical profile

*A - 0 to 2 inches:* fine sandy loam  
*C - 2 to 8 inches:* fine sandy loam  
*R - 8 to 12 inches:* unweathered bedrock

### Properties and qualities

*Slope:* 3 to 15 percent  
*Depth to restrictive feature:* 4 to 20 inches to lithic bedrock  
*Natural drainage class:* Well drained  
*Runoff class:* High  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 15 percent  
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water storage in profile:* Very low (about 0.9 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 7s  
*Hydrologic Soil Group:* D  
*Ecological site:* Upland Shallow Loam (Pinyon-Utah Juniper) (R035XY315UT)  
*Other vegetative classification:* Upland Shallow Loam (Pinyon-Utah Juniper) (035XY315UT\_3)  
*Hydric soil rating:* No

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### Minor Components

#### Windwhistle

*Percent of map unit: 10 percent*

#### Rock outcrop

*Percent of map unit: 10 percent*

#### Leanto

*Percent of map unit: 5 percent*

#### Barx

*Percent of map unit: 5 percent*

## 19—Cahona fine sandy loam, 2 to 8 percent slopes

### Map Unit Setting

*National map unit symbol: 1v12*

*Elevation: 6,200 to 7,200 feet*

*Mean annual precipitation: 12 to 14 inches*

*Mean annual air temperature: 46 to 48 degrees F*

*Frost-free period: 110 to 130 days*

*Farmland classification: Farmland of statewide importance*

### Map Unit Composition

*Cahona and similar soils: 70 percent*

*Minor components: 30 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Cahona

#### Setting

*Landform: Structural benches, cuestras*

*Down-slope shape: Linear*

*Across-slope shape: Linear, convex*

*Parent material: Eolian deposits derived from sandstone*

#### Typical profile

*A - 0 to 2 inches: fine sandy loam*

*Bt - 2 to 20 inches: silty clay loam*

*Bk - 20 to 60 inches: fine sandy loam*

#### Properties and qualities

*Slope: 2 to 8 percent*

*Depth to restrictive feature: More than 80 inches*

*Natural drainage class: Well drained*

*Runoff class: Medium*

*Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)*

*Depth to water table: More than 80 inches*



## Custom Soil Resource Report

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 15 percent

*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

*Available water storage in profile:* High (about 9.1 inches)

### **Interpretive groups**

*Land capability classification (irrigated):* 3e

*Land capability classification (nonirrigated):* 4e

*Hydrologic Soil Group:* C

*Ecological site:* Upland Loam (Basin Big Sagebrush) (R035XY306UT)

*Hydric soil rating:* No

### **Minor Components**

#### **Shalako**

*Percent of map unit:* 10 percent

#### **Begay**

*Percent of map unit:* 10 percent

#### **Hagerman**

*Percent of map unit:* 10 percent

## **22—Dumps-Pits complex**

### **Map Unit Composition**

*Dumps:* 60 percent

*Pits:* 40 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

## **41—Ignacio-Leanto fine sandy loams, 2 to 6 percent slopes**

### **Map Unit Setting**

*National map unit symbol:* 1v1w

*Elevation:* 5,800 to 6,800 feet

*Mean annual precipitation:* 12 to 14 inches

*Mean annual air temperature:* 48 to 50 degrees F

*Frost-free period:* 100 to 130 days

*Farmland classification:* Not prime farmland

### **Map Unit Composition**

*Ignacio and similar soils:* 40 percent

*Leanto and similar soils:* 35 percent

*Minor components:* 25 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

## Description of Ignacio

### Setting

*Landform:* Cuestas, structural benches  
*Down-slope shape:* Linear  
*Across-slope shape:* Convex, linear  
*Parent material:* Eolian deposits derived from sandstone

### Typical profile

*A - 0 to 2 inches:* fine sandy loam  
*Bw - 2 to 32 inches:* fine sandy loam  
*R - 32 to 36 inches:* unweathered bedrock

### Properties and qualities

*Slope:* 2 to 6 percent  
*Depth to restrictive feature:* 20 to 40 inches to lithic bedrock  
*Natural drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None  
*Calcium carbonate, maximum in profile:* 15 percent  
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water storage in profile:* Low (about 3.8 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 6s  
*Hydrologic Soil Group:* B  
*Ecological site:* Upland Loam (Basin Big Sagebrush) (R035XY306UT)  
*Hydric soil rating:* No

## Description of Leanto

### Setting

*Landform:* Cuestas, structural benches  
*Down-slope shape:* Linear  
*Across-slope shape:* Convex, linear  
*Parent material:* Eolian deposits derived from sandstone

### Typical profile

*A,Bw - 0 to 15 inches:* fine sandy loam  
*R - 15 to 19 inches:* unweathered bedrock

### Properties and qualities

*Slope:* 2 to 6 percent  
*Depth to restrictive feature:* 10 to 20 inches to lithic bedrock  
*Natural drainage class:* Well drained  
*Runoff class:* Medium  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)  
*Depth to water table:* More than 80 inches  
*Frequency of flooding:* None  
*Frequency of ponding:* None

## Custom Soil Resource Report

*Calcium carbonate, maximum in profile:* 15 percent  
*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)  
*Available water storage in profile:* Very low (about 1.8 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 7s  
*Hydrologic Soil Group:* D  
*Ecological site:* Upland Loam (Basin Big Sagebrush) (R035XY306UT)  
*Hydric soil rating:* No

### Minor Components

#### Begay

*Percent of map unit:* 10 percent

#### Mido

*Percent of map unit:* 6 percent

#### Rizno

*Percent of map unit:* 4 percent

#### Windwhistle

*Percent of map unit:* 3 percent

#### Rock outcrop

*Percent of map unit:* 2 percent

## 67—Redbank fine sandy loam, dry, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 1vms  
*Elevation:* 5,000 to 5,700 feet  
*Mean annual precipitation:* 10 to 12 inches  
*Mean annual air temperature:* 48 to 51 degrees F  
*Frost-free period:* 120 to 140 days  
*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

*Redbank and similar soils:* 70 percent  
*Minor components:* 30 percent  
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Redbank

#### Setting

*Landform:* Fan skirts, valley flats  
*Landform position (three-dimensional):* Talf  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave

## Custom Soil Resource Report

*Parent material:* Alluvium derived from sandstone

### Typical profile

*A - 0 to 4 inches:* fine sandy loam

*C - 4 to 60 inches:* stratified fine sandy loam to loam

### Properties and qualities

*Slope:* 3 to 8 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Well drained

*Runoff class:* Low

*Capacity of the most limiting layer to transmit water (Ksat):* High (2.00 to 6.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* Rare

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 15 percent

*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

*Sodium adsorption ratio, maximum in profile:* 4.0

*Available water storage in profile:* Moderate (about 8.3 inches)

### Interpretive groups

*Land capability classification (irrigated):* 3e

*Land capability classification (nonirrigated):* 7e

*Hydrologic Soil Group:* A

*Ecological site:* Semidesert Sandy Loam (4-Wing Saltbush) (R035XY215UT)

*Hydric soil rating:* No

### Minor Components

#### Redbank

*Percent of map unit:* 15 percent

#### Begay

*Percent of map unit:* 10 percent

#### Mivida

*Percent of map unit:* 5 percent

## 70—Rizno-Rock outcrop complex, 3 to 15 percent slopes

### Map Unit Setting

*National map unit symbol:* 1vmx

*Elevation:* 6,000 to 7,200 feet

*Mean annual precipitation:* 12 to 14 inches

*Mean annual air temperature:* 47 to 49 degrees F

*Frost-free period:* 110 to 130 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Rizno and similar soils:* 45 percent



## Custom Soil Resource Report

*Rock outcrop: 30 percent*

*Minor components: 25 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Rizno

#### Setting

*Landform: Cuestas, mesas, structural benches*

*Down-slope shape: Linear*

*Across-slope shape: Convex, linear*

*Parent material: Eolian deposits over residuum weathered from sandstone and shale*

#### Typical profile

*A - 0 to 2 inches: fine sandy loam*

*C - 2 to 8 inches: fine sandy loam*

*R - 8 to 12 inches: unweathered bedrock*

#### Properties and qualities

*Slope: 3 to 15 percent*

*Depth to restrictive feature: 4 to 20 inches to lithic bedrock*

*Natural drainage class: Well drained*

*Runoff class: High*

*Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)*

*Depth to water table: More than 80 inches*

*Frequency of flooding: None*

*Frequency of ponding: None*

*Calcium carbonate, maximum in profile: 15 percent*

*Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)*

*Available water storage in profile: Very low (about 0.9 inches)*

#### Interpretive groups

*Land capability classification (irrigated): None specified*

*Land capability classification (nonirrigated): 7s*

*Hydrologic Soil Group: D*

*Ecological site: Upland Shallow Loam (Pinyon-Utah Juniper) (R035XY315UT)*

*Other vegetative classification: Upland Shallow Loam (Pinyon-Utah Juniper) (035XY315UT\_3)*

*Hydric soil rating: No*

### Description of Rock Outcrop

#### Setting

*Landform: Cliffs, ledges*

### Minor Components

#### Leanto

*Percent of map unit: 5 percent*

#### Ignacio

*Percent of map unit: 5 percent*

#### Bond

*Percent of map unit: 5 percent*

**Sazi**

*Percent of map unit: 5 percent*

**Mido**

*Percent of map unit: 5 percent*

**72—Rock outcrop**

**Map Unit Composition**

*Rock outcrop: 100 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Rock Outcrop**

**Setting**

*Landform: Escarpments, cliffs*

*Down-slope shape: Linear*

*Across-slope shape: Linear*

**74—Rock outcrop-Rizno complex, 3 to 15 percent slopes**

**Map Unit Setting**

*National map unit symbol: 1vn1*

*Elevation: 6,000 to 7,200 feet*

*Mean annual precipitation: 12 to 14 inches*

*Mean annual air temperature: 47 to 49 degrees F*

*Frost-free period: 110 to 130 days*

*Farmland classification: Not prime farmland*

**Map Unit Composition**

*Rock outcrop: 70 percent*

*Rizno and similar soils: 20 percent*

*Minor components: 10 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Rock Outcrop**

**Setting**

*Landform: Escarpments on cuestas, ledges on cuestas, cliffs on cuestas*

*Down-slope shape: Linear*

*Across-slope shape: Convex, linear*

**Description of Rizno**

**Setting**

*Landform: Hogbacks, structural benches, escarpments on cuestas*

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*Down-slope shape:* Linear

*Across-slope shape:* Linear, convex

*Parent material:* Eolian deposits over residuum weathered from sandstone and shale

### Typical profile

*A - 0 to 2 inches:* fine sandy loam

*C - 2 to 8 inches:* fine sandy loam

*R - 8 to 12 inches:* unweathered bedrock

### Properties and qualities

*Slope:* 3 to 15 percent

*Depth to restrictive feature:* 4 to 20 inches to lithic bedrock

*Natural drainage class:* Well drained

*Runoff class:* High

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 15 percent

*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

*Available water storage in profile:* Very low (about 0.9 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7s

*Hydrologic Soil Group:* D

*Ecological site:* Upland Shallow Loam (Pinyon-Utah Juniper) (R035XY315UT)

*Other vegetative classification:* Upland Shallow Loam (Pinyon-Utah Juniper) (035XY315UT\_3)

*Hydric soil rating:* No

### Minor Components

#### Ignacio

*Percent of map unit:* 3 percent

#### Mido

*Percent of map unit:* 3 percent

#### Begay

*Percent of map unit:* 2 percent

#### Leanto

*Percent of map unit:* 2 percent

## 79—Shalako-Anasazi-Rock outcrop complex, 3 to 15 percent slopes

### Map Unit Setting

*National map unit symbol:* 1vn6

*Elevation:* 6,500 to 7,000 feet

*Mean annual precipitation:* 12 to 14 inches

*Mean annual air temperature:* 45 to 47 degrees F

*Frost-free period:* 110 to 130 days

*Farmland classification:* Not prime farmland

### Map Unit Composition

*Shalako and similar soils:* 40 percent

*Anasazi and similar soils:* 25 percent

*Rock outcrop:* 15 percent

*Minor components:* 20 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Shalako

#### Setting

*Landform:* Cuestas

*Landform position (two-dimensional):* Summit

*Down-slope shape:* Linear

*Across-slope shape:* Convex

*Parent material:* Residuum weathered from sandstone

#### Typical profile

*A - 0 to 2 inches:* gravelly fine sandy loam

*Bk - 2 to 13 inches:* gravelly sandy loam

*R - 13 to 17 inches:* unweathered bedrock

#### Properties and qualities

*Slope:* 3 to 15 percent

*Depth to restrictive feature:* 10 to 20 inches to lithic bedrock

*Natural drainage class:* Well drained

*Runoff class:* High

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 40 percent

*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

*Available water storage in profile:* Very low (about 1.6 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7s



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*Hydrologic Soil Group:* D

*Ecological site:* Upland Shallow Loam (Pinyon-Utah Juniper) (R035XY315UT)

*Other vegetative classification:* Upland Shallow Loam (Pinyon-Utah Juniper)  
(035XY315UT\_3)

*Hydric soil rating:* No

### Description of Anasazi

#### Setting

*Landform:* Cuestas

*Down-slope shape:* Linear

*Across-slope shape:* Convex

*Parent material:* Eolian deposits derived from sandstone

#### Typical profile

*A - 0 to 9 inches:* gravelly loam

*Bk - 9 to 26 inches:* gravelly loam

*R - 26 to 30 inches:* unweathered bedrock

#### Properties and qualities

*Slope:* 3 to 15 percent

*Depth to restrictive feature:* 20 to 40 inches to lithic bedrock

*Natural drainage class:* Well drained

*Runoff class:* High

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 25 percent

*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

*Available water storage in profile:* Very low (about 2.9 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7s

*Hydrologic Soil Group:* B

*Ecological site:* Upland Loam (Basin Big Sagebrush) (R035XY306UT)

*Hydric soil rating:* No

### Description of Rock Outcrop

#### Setting

*Landform:* Ledges on cuestas

*Down-slope shape:* Linear

*Across-slope shape:* Convex

### Minor Components

#### Leanto

*Percent of map unit:* 5 percent

#### Bond

*Percent of map unit:* 5 percent

#### Very deep loamy soils

*Percent of map unit:* 5 percent

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### Rizno

*Percent of map unit: 5 percent*

## 100—Ustic Torriorthents-Ustollic Calciorthids complex, 10 to 60 percent slopes

### Map Unit Setting

*National map unit symbol: 1vkn*

*Elevation: 5,800 to 7,500 feet*

*Mean annual precipitation: 10 to 14 inches*

*Mean annual air temperature: 48 to 52 degrees F*

*Frost-free period: 120 to 140 days*

*Farmland classification: Not prime farmland*

### Map Unit Composition

*Ustic torriorthents and similar soils: 45 percent*

*Ustollic calciorthids and similar soils: 25 percent*

*Minor components: 30 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Ustic Torriorthents

#### Setting

*Landform: Landslides on escarpments*

*Down-slope shape: Linear*

*Across-slope shape: Linear, convex*

*Parent material: Colluvium derived from sandstone and shale*

#### Typical profile

*A - 0 to 3 inches: very cobbly sandy loam*

*C1 - 3 to 11 inches: very cobbly loam*

*C2 - 11 to 30 inches: very gravelly sandy clay loam*

*C3 - 30 to 45 inches: cobbly sandy clay loam*

*Cr - 45 to 49 inches: weathered bedrock*

#### Properties and qualities

*Slope: 10 to 60 percent*

*Depth to restrictive feature: 20 to 79 inches to paralithic bedrock*

*Natural drainage class: Well drained*

*Runoff class: High*

*Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)*

*Depth to water table: More than 80 inches*

*Frequency of flooding: None*

*Frequency of ponding: None*

*Calcium carbonate, maximum in profile: 15 percent*

*Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)*

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*Available water storage in profile:* Low (about 5.2 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7e

*Hydrologic Soil Group:* B

*Ecological site:* Talus Slope (Blackbrush-Shadscale) (R035XY018UT)

*Hydric soil rating:* No

### Description of Ustollic Calciorthids

#### Setting

*Landform:* Escarpments

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Colluvium derived from sandstone and shale

#### Typical profile

*A - 0 to 1 inches:* gravelly fine sandy loam

*Bw - 1 to 8 inches:* fine sandy loam

*Bk - 8 to 32 inches:* gravelly loam

*2C - 32 to 40 inches:* clay loam

*2Cr - 40 to 44 inches:* weathered bedrock

#### Properties and qualities

*Slope:* 10 to 40 percent

*Depth to restrictive feature:* 20 to 79 inches to paralithic bedrock

*Natural drainage class:* Well drained

*Runoff class:* High

*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 40 percent

*Salinity, maximum in profile:* Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

*Available water storage in profile:* Low (about 5.5 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7e

*Hydrologic Soil Group:* C

*Ecological site:* Semidesert Gravelly Loam (Utah Juniper-Pinyon)  
(R035XY206UT)

*Other vegetative classification:* Semidesert Gravelly Loam (Utah Juniper-Pinyon)  
(035XY206UT\_2)

*Hydric soil rating:* No

### Minor Components

#### Lithic ustic torriorthents

*Percent of map unit:* 10 percent

#### Badland

*Percent of map unit:* 10 percent

#### Moab

*Percent of map unit:* 5 percent

## Custom Soil Resource Report

### **Rock outcrop**

*Percent of map unit: 5 percent*

## **101—Ustic Torriorthents-Ustollic Haplargids complex, 10 to 60 percent slopes**

### **Map Unit Setting**

*National map unit symbol: 1vvp*

*Elevation: 5,800 to 7,500 feet*

*Mean annual precipitation: 10 to 14 inches*

*Mean annual air temperature: 48 to 52 degrees F*

*Frost-free period: 120 to 140 days*

*Farmland classification: Not prime farmland*

### **Map Unit Composition**

*Ustic torriorthents and similar soils: 45 percent*

*Ustollic haplargids and similar soils: 30 percent*

*Minor components: 25 percent*

*Estimates are based on observations, descriptions, and transects of the mapunit.*

### **Description of Ustic Torriorthents**

#### **Setting**

*Landform: Landslides on escarpments*

*Down-slope shape: Linear*

*Across-slope shape: Convex, linear*

*Parent material: Colluvium derived from sandstone and shale*

#### **Typical profile**

*A - 0 to 3 inches: very cobbly sandy loam*

*C1 - 3 to 11 inches: very cobbly loam*

*C2 - 11 to 30 inches: very gravelly sandy clay loam*

*C3 - 30 to 45 inches: cobbly sandy clay loam*

*Cr - 45 to 49 inches: weathered bedrock*

#### **Properties and qualities**

*Slope: 10 to 60 percent*

*Depth to restrictive feature: 20 to 79 inches to paralithic bedrock*

*Natural drainage class: Well drained*

*Runoff class: High*

*Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)*

*Depth to water table: More than 80 inches*

*Frequency of flooding: None*

*Frequency of ponding: None*

*Calcium carbonate, maximum in profile: 15 percent*

*Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)*

*Available water storage in profile: Low (about 5.2 inches)*



## Custom Soil Resource Report

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7e

*Hydrologic Soil Group:* B

*Ecological site:* Talus Slope (Blackbrush-Shadscale) (R035XY018UT)

*Hydric soil rating:* No

### Description of Ustollic Haplargids

#### Setting

*Landform:* Landslides on escarpments

*Down-slope shape:* Linear

*Across-slope shape:* Linear, convex

*Parent material:* Colluvium derived from sandstone

#### Typical profile

*A - 0 to 8 inches:* stony sandy loam

*Bt - 8 to 24 inches:* stony sandy clay loam

*Bk,C - 24 to 60 inches:* stony silty clay loam

#### Properties and qualities

*Slope:* 10 to 40 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Well drained

*Runoff class:* High

*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to high  
(0.06 to 2.00 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 40 percent

*Salinity, maximum in profile:* Nonsaline to very slightly saline (0.0 to 2.0  
mmhos/cm)

*Available water storage in profile:* Moderate (about 8.1 inches)

### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 7e

*Hydrologic Soil Group:* B

*Ecological site:* Upland Stony Loam (Pinyon-Utah Juniper) (R035XY321UT)

*Other vegetative classification:* Upland Shallow Loam (Pinyon-Utah Juniper)  
(035XY315UT\_3)

*Hydric soil rating:* No

### Minor Components

#### Strych

*Percent of map unit:* 8 percent

#### Ignacio

*Percent of map unit:* 5 percent

#### Rock outcrop

*Percent of map unit:* 5 percent

#### Rizno

*Percent of map unit:* 5 percent

## Custom Soil Resource Report

### **Badland**

*Percent of map unit: 2 percent*

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---

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## Custom Soil Resource Report

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NOAA Atlas 14, Volume 1, Version 5  
Location name: La Sal, Utah, USA\*  
Latitude: 38.1312°, Longitude: -109.1367°  
Elevation: 6600.61 ft\*\*

\* source: ESRI Maps  
\*\* source: USGS



### POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF\\_tabular](#) | [PF\\_graphical](#) | [Maps & aeriels](#)

### PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.134 (0.118-0.156)	0.172 (0.154-0.201)	0.232 (0.206-0.270)	0.285 (0.252-0.333)	0.364 (0.318-0.429)	0.432 (0.372-0.513)	0.509 (0.434-0.615)	0.597 (0.502-0.737)	0.730 (0.599-0.932)	0.848 (0.683-1.12)
10-min	0.204 (0.179-0.236)	0.262 (0.234-0.305)	0.353 (0.313-0.411)	0.434 (0.382-0.507)	0.554 (0.484-0.653)	0.658 (0.567-0.781)	0.775 (0.662-0.936)	0.908 (0.765-1.12)	1.11 (0.912-1.42)	1.29 (1.04-1.71)
15-min	0.253 (0.222-0.293)	0.325 (0.290-0.378)	0.438 (0.388-0.510)	0.538 (0.474-0.628)	0.687 (0.600-0.810)	0.815 (0.703-0.969)	0.961 (0.820-1.16)	1.13 (0.948-1.39)	1.38 (1.13-1.76)	1.60 (1.29-2.11)
30-min	0.340 (0.299-0.394)	0.438 (0.390-0.509)	0.590 (0.522-0.686)	0.724 (0.639-0.846)	0.925 (0.808-1.09)	1.10 (0.946-1.30)	1.29 (1.10-1.56)	1.52 (1.28-1.87)	1.85 (1.52-2.37)	2.15 (1.73-2.85)
60-min	0.421 (0.370-0.488)	0.541 (0.483-0.630)	0.730 (0.646-0.849)	0.896 (0.790-1.05)	1.14 (0.999-1.35)	1.36 (1.17-1.61)	1.60 (1.37-1.93)	1.88 (1.58-2.32)	2.30 (1.88-2.93)	2.67 (2.15-3.52)
2-hr	0.509 (0.455-0.585)	0.646 (0.573-0.738)	0.860 (0.761-0.982)	1.05 (0.920-1.19)	1.34 (1.16-1.53)	1.60 (1.36-1.83)	1.90 (1.58-2.19)	2.25 (1.82-2.62)	2.80 (2.18-3.32)	3.29 (2.49-3.97)
3-hr	0.569 (0.512-0.642)	0.715 (0.640-0.808)	0.923 (0.827-1.04)	1.11 (0.985-1.25)	1.39 (1.23-1.57)	1.65 (1.43-1.87)	1.95 (1.66-2.21)	2.30 (1.91-2.64)	2.84 (2.30-3.35)	3.34 (2.62-4.01)
6-hr	0.711 (0.647-0.789)	0.882 (0.801-0.978)	1.11 (1.00-1.22)	1.30 (1.17-1.44)	1.59 (1.42-1.77)	1.84 (1.63-2.05)	2.12 (1.84-2.38)	2.48 (2.12-2.80)	3.03 (2.52-3.47)	3.53 (2.87-4.09)
12-hr	0.886 (0.809-0.975)	1.10 (1.01-1.22)	1.36 (1.24-1.50)	1.58 (1.43-1.74)	1.89 (1.70-2.08)	2.13 (1.90-2.35)	2.40 (2.12-2.66)	2.70 (2.35-3.01)	3.22 (2.76-3.64)	3.70 (3.13-4.22)
24-hr	1.09 (0.997-1.20)	1.36 (1.24-1.50)	1.71 (1.55-1.88)	2.00 (1.81-2.20)	2.40 (2.16-2.65)	2.73 (2.43-3.03)	3.08 (2.72-3.44)	3.45 (3.01-3.89)	3.97 (3.40-4.55)	4.39 (3.71-5.11)
2-day	1.25 (1.14-1.38)	1.56 (1.42-1.72)	1.94 (1.76-2.13)	2.25 (2.04-2.48)	2.69 (2.42-2.98)	3.05 (2.72-3.38)	3.42 (3.03-3.83)	3.81 (3.33-4.32)	4.36 (3.75-5.03)	4.81 (4.06-5.65)
3-day	1.37 (1.25-1.51)	1.70 (1.55-1.88)	2.12 (1.93-2.34)	2.47 (2.24-2.73)	2.96 (2.66-3.28)	3.35 (2.99-3.73)	3.77 (3.33-4.23)	4.20 (3.67-4.77)	4.82 (4.13-5.56)	5.31 (4.48-6.24)
4-day	1.48 (1.35-1.63)	1.85 (1.68-2.04)	2.31 (2.10-2.55)	2.69 (2.44-2.98)	3.23 (2.90-3.59)	3.66 (3.26-4.09)	4.12 (3.63-4.63)	4.60 (4.00-5.22)	5.27 (4.51-6.09)	5.82 (4.90-6.83)
7-day	1.73 (1.57-1.91)	2.17 (1.96-2.39)	2.71 (2.44-2.99)	3.15 (2.84-3.47)	3.76 (3.37-4.16)	4.24 (3.77-4.71)	4.74 (4.18-5.31)	5.27 (4.60-5.96)	6.00 (5.14-6.90)	6.58 (5.55-7.70)
10-day	1.94 (1.76-2.14)	2.42 (2.20-2.67)	3.02 (2.74-3.33)	3.51 (3.18-3.87)	4.18 (3.76-4.63)	4.72 (4.21-5.24)	5.27 (4.66-5.90)	5.85 (5.11-6.60)	6.66 (5.72-7.65)	7.31 (6.18-8.51)
20-day	2.52 (2.29-2.77)	3.15 (2.86-3.46)	3.89 (3.53-4.28)	4.47 (4.05-4.92)	5.24 (4.72-5.80)	5.84 (5.22-6.48)	6.44 (5.72-7.18)	7.03 (6.19-7.91)	7.83 (6.81-8.90)	8.44 (7.26-9.69)
30-day	3.09 (2.82-3.37)	3.84 (3.52-4.20)	4.72 (4.31-5.16)	5.40 (4.93-5.91)	6.31 (5.73-6.92)	6.99 (6.31-7.70)	7.68 (6.88-8.50)	8.36 (7.43-9.32)	9.26 (8.13-10.4)	9.94 (8.65-11.3)
45-day	3.76 (3.45-4.12)	4.68 (4.29-5.13)	5.73 (5.25-6.27)	6.54 (5.98-7.17)	7.60 (6.91-8.35)	8.39 (7.59-9.25)	9.17 (8.24-10.2)	9.94 (8.87-11.1)	10.9 (9.66-12.3)	11.7 (10.2-13.3)
60-day	4.46 (4.09-4.87)	5.54 (5.08-6.06)	6.73 (6.16-7.35)	7.62 (6.96-8.34)	8.77 (7.98-9.62)	9.62 (8.71-10.6)	10.4 (9.41-11.5)	11.2 (10.1-12.5)	12.3 (10.9-13.8)	13.0 (11.5-14.7)

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

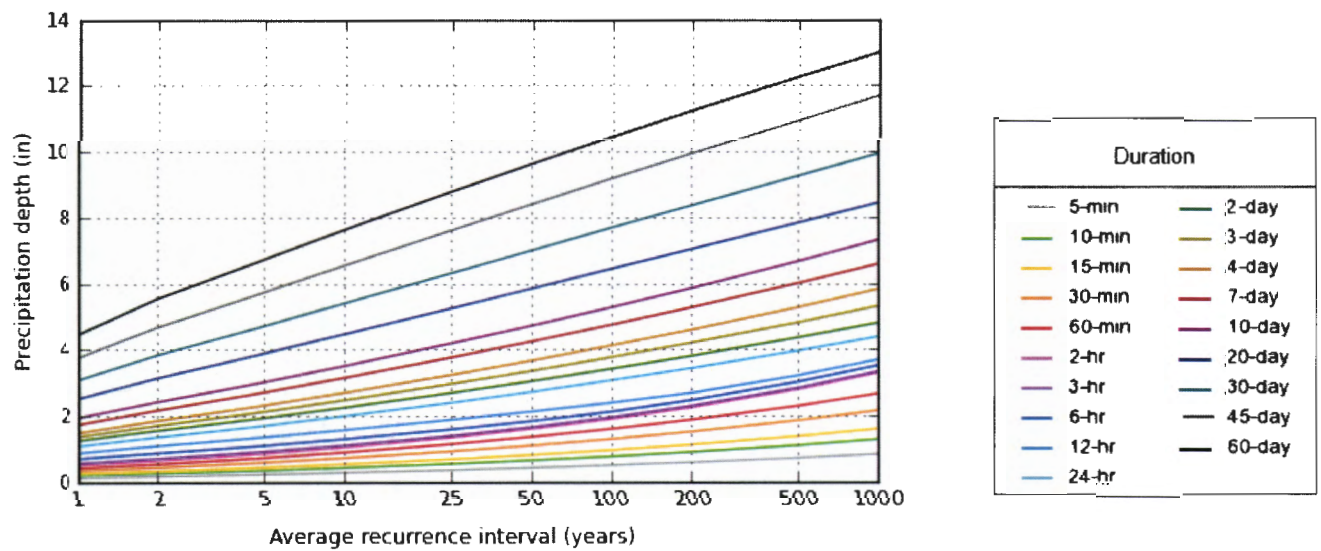
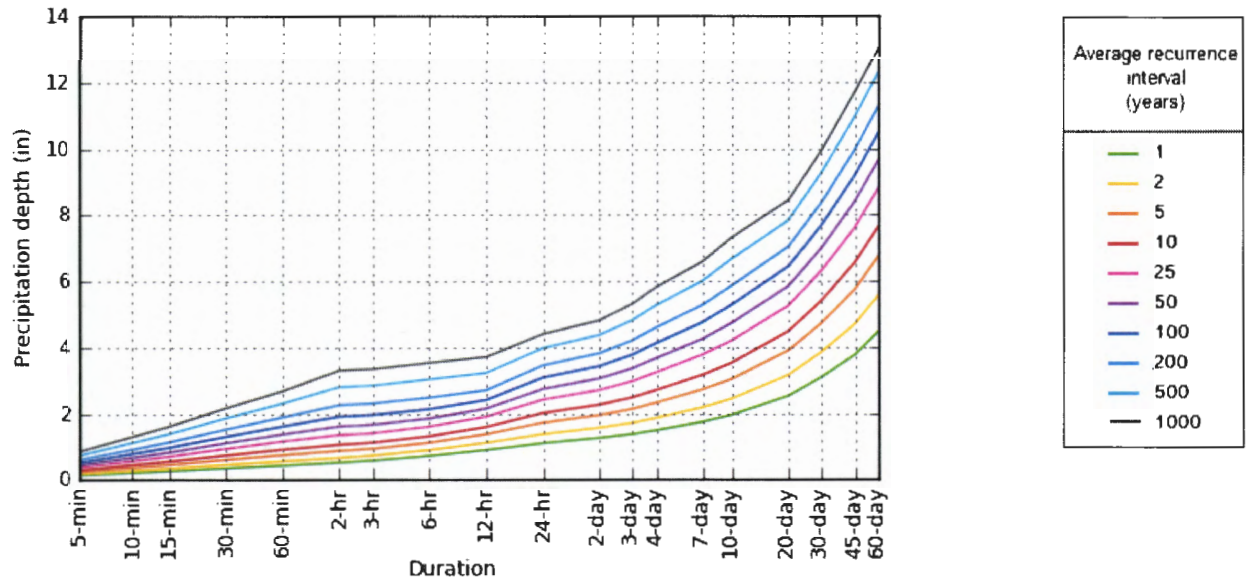
Please refer to NOAA Atlas 14 document for more information.

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## PF graphical

### PDS-based depth-duration-frequency (DDF) curves

Latitude: 38.1312°, Longitude: -109.1367°



NOAA Atlas 14, Volume 1, Version 5

Created (GMT): Fri Sep 7 21:04:45 2018

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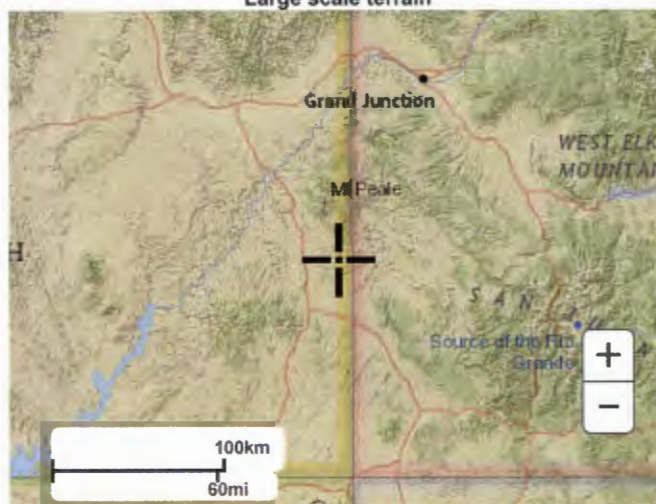
## Maps & aerals

Small scale terrain





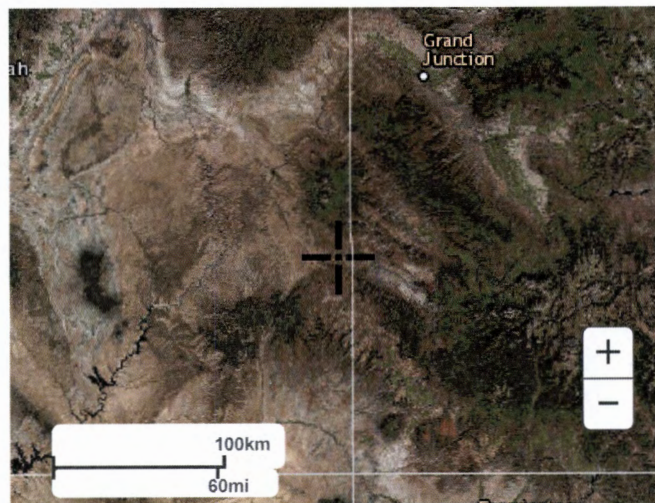
Large scale terrain



Large scale map



Large scale aerial



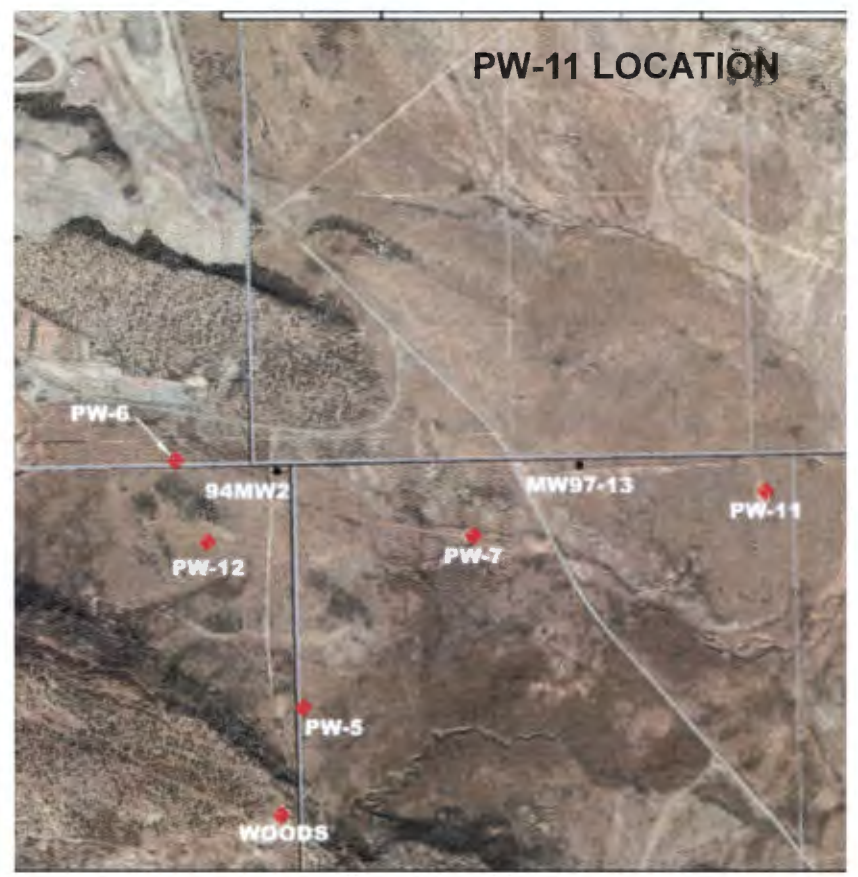
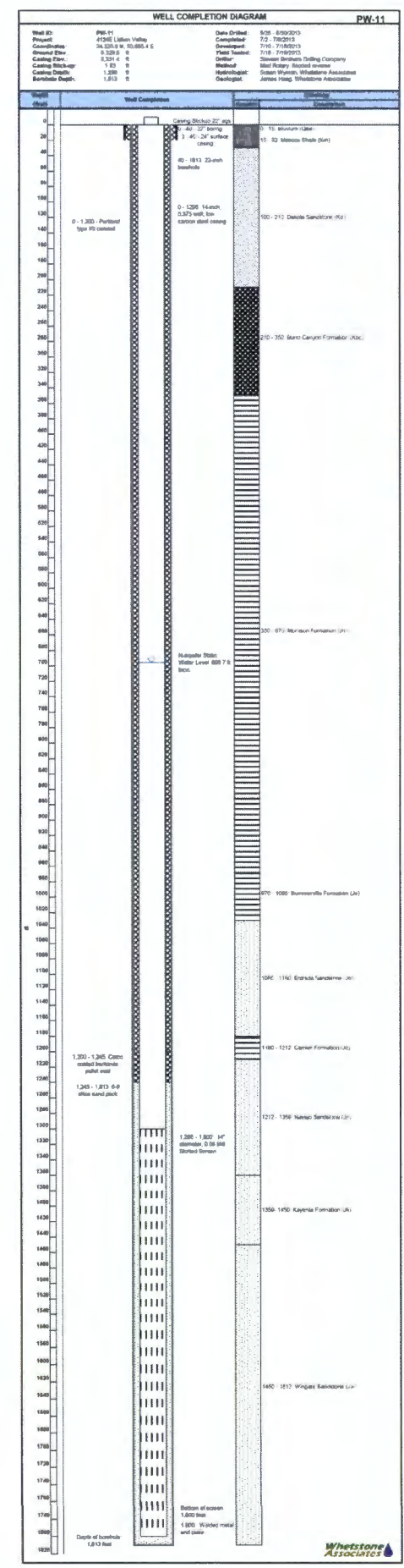
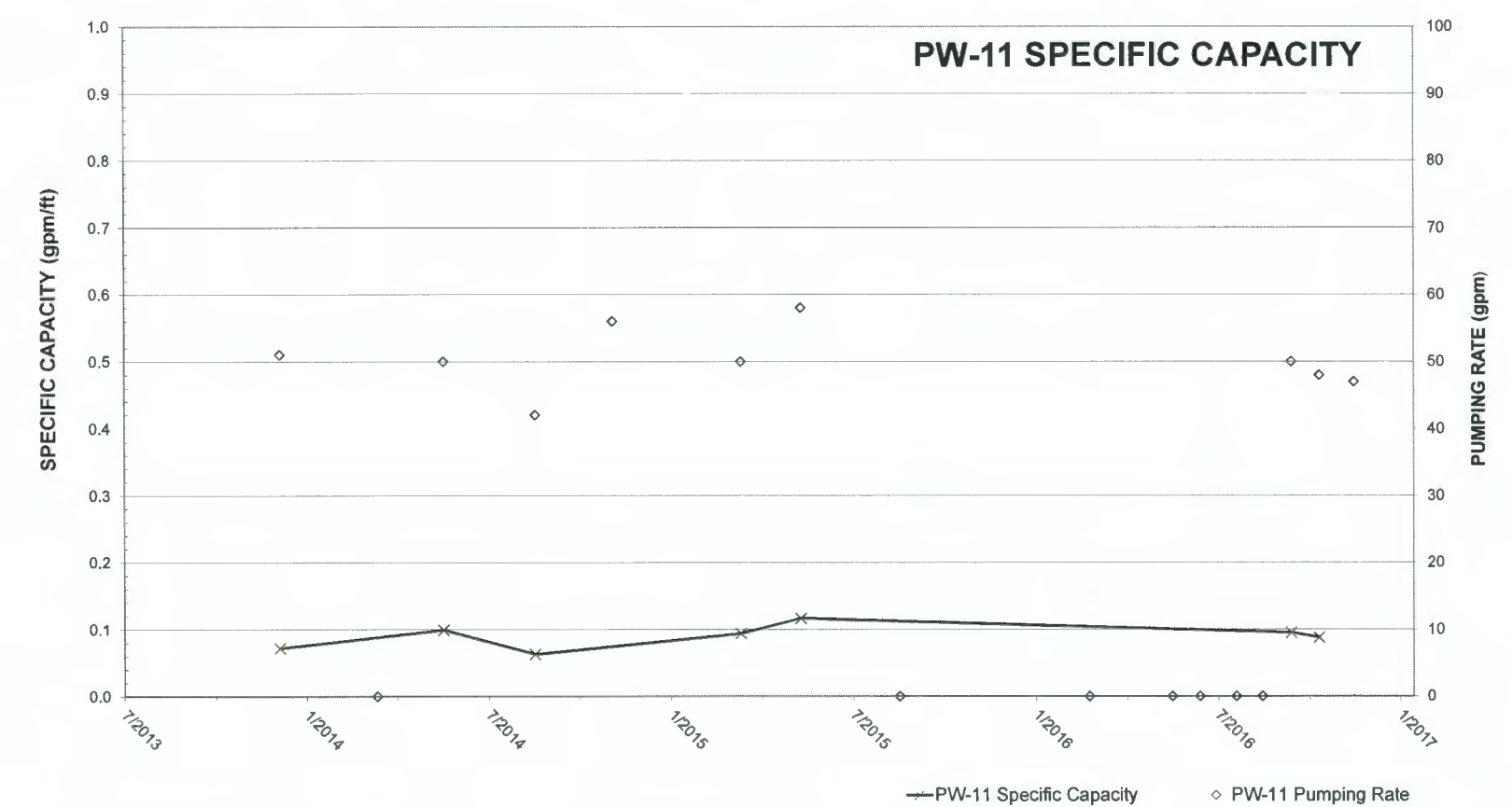
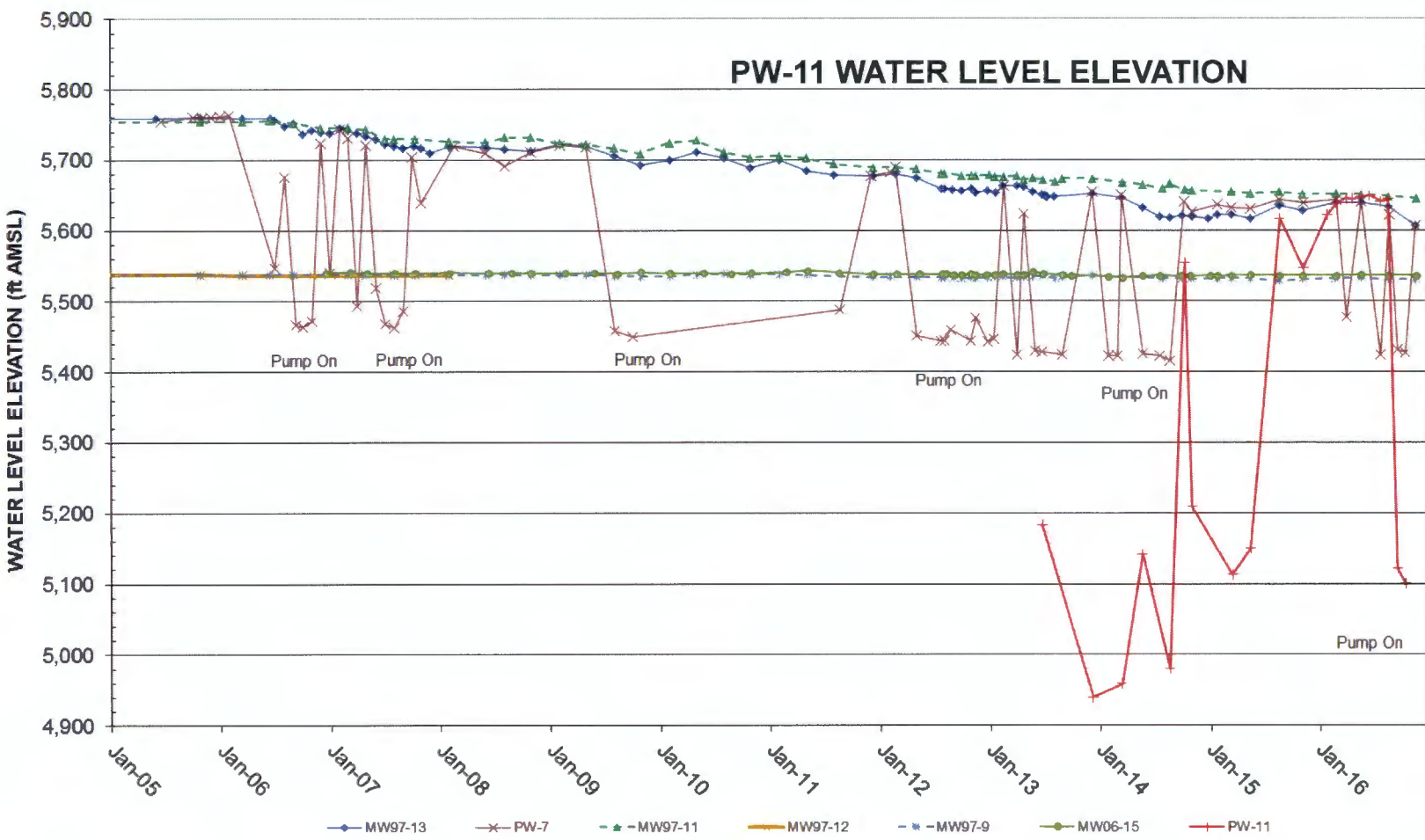
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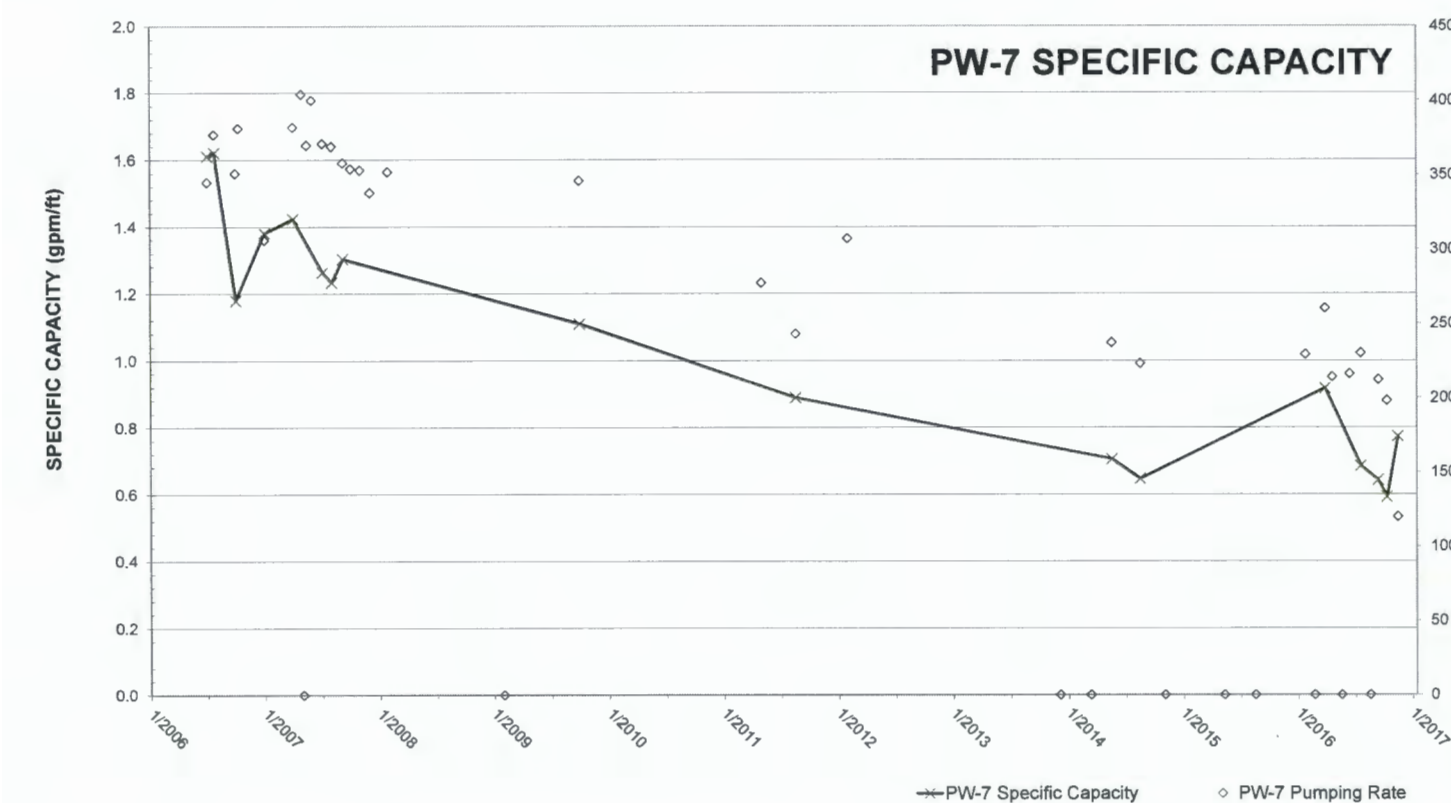
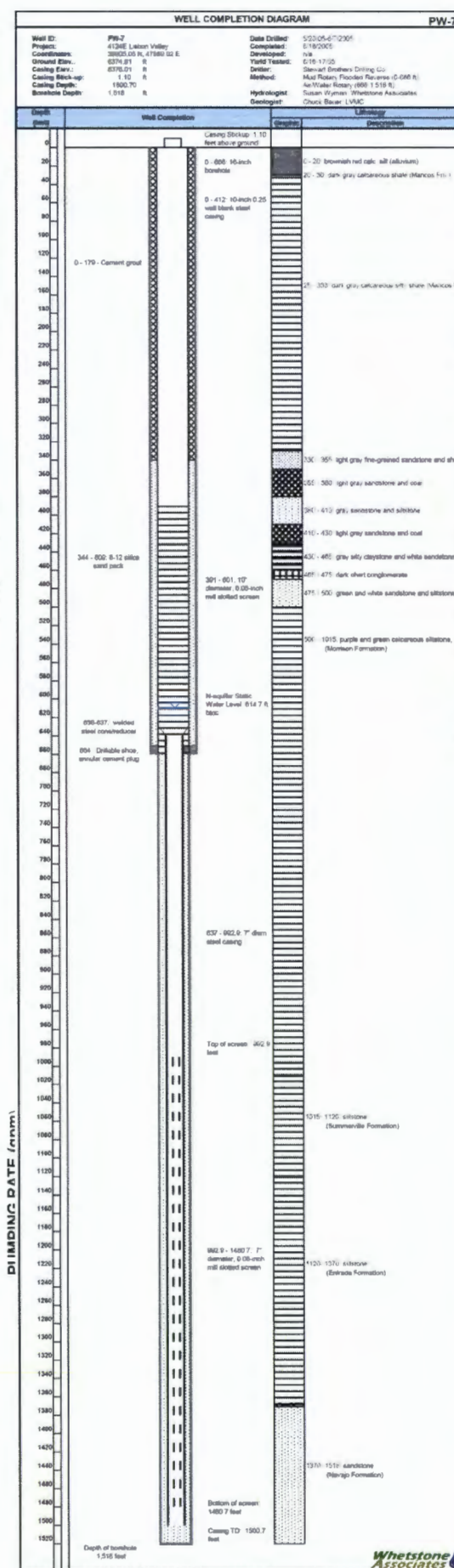
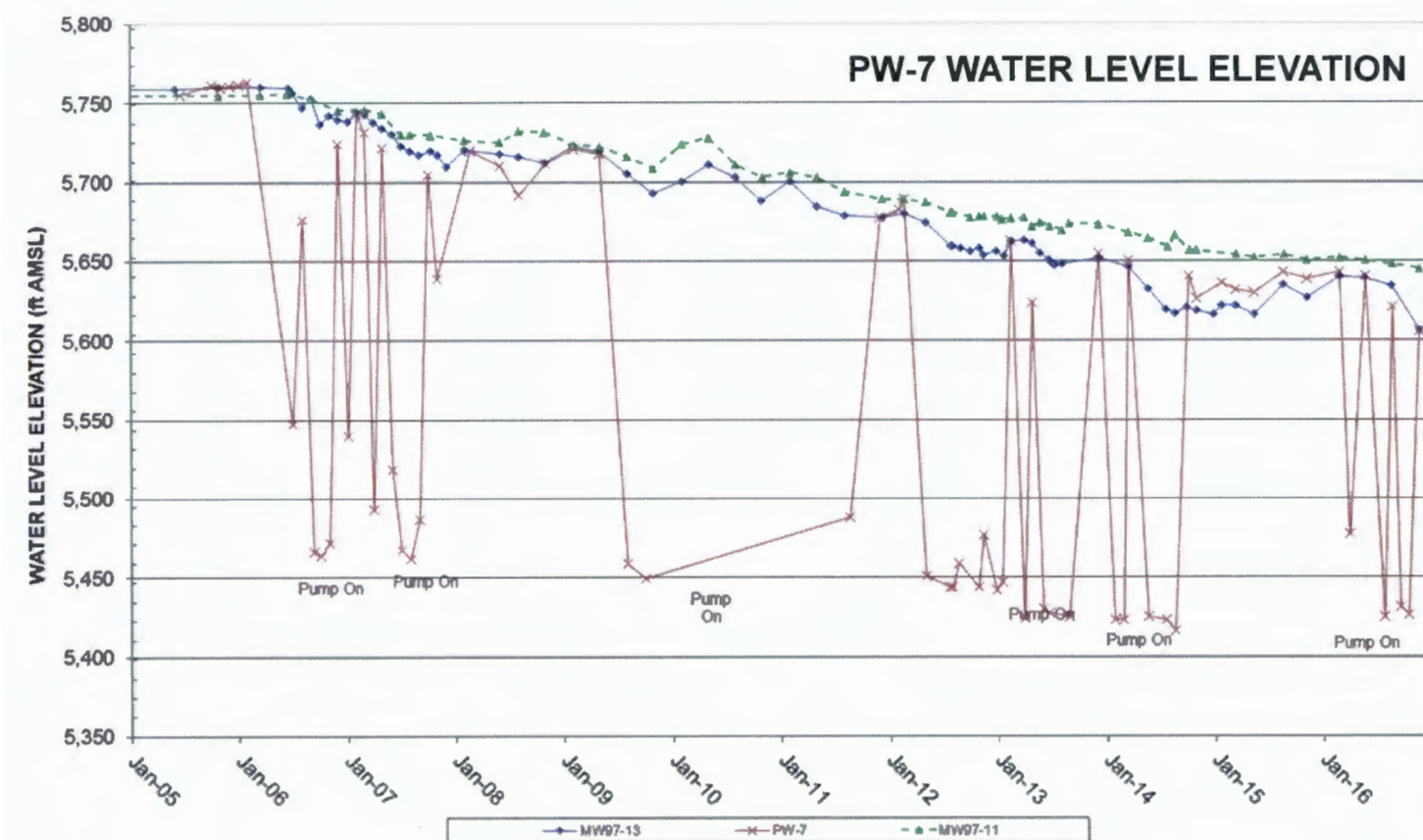
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**LISBON VALLEY MINING CO.**  
**PRODUCTION**  
**WELL REPORT**  
  
**PW-11**  
**1/23/2017**





### PW-7 BACTERIOLOGICAL TESTING

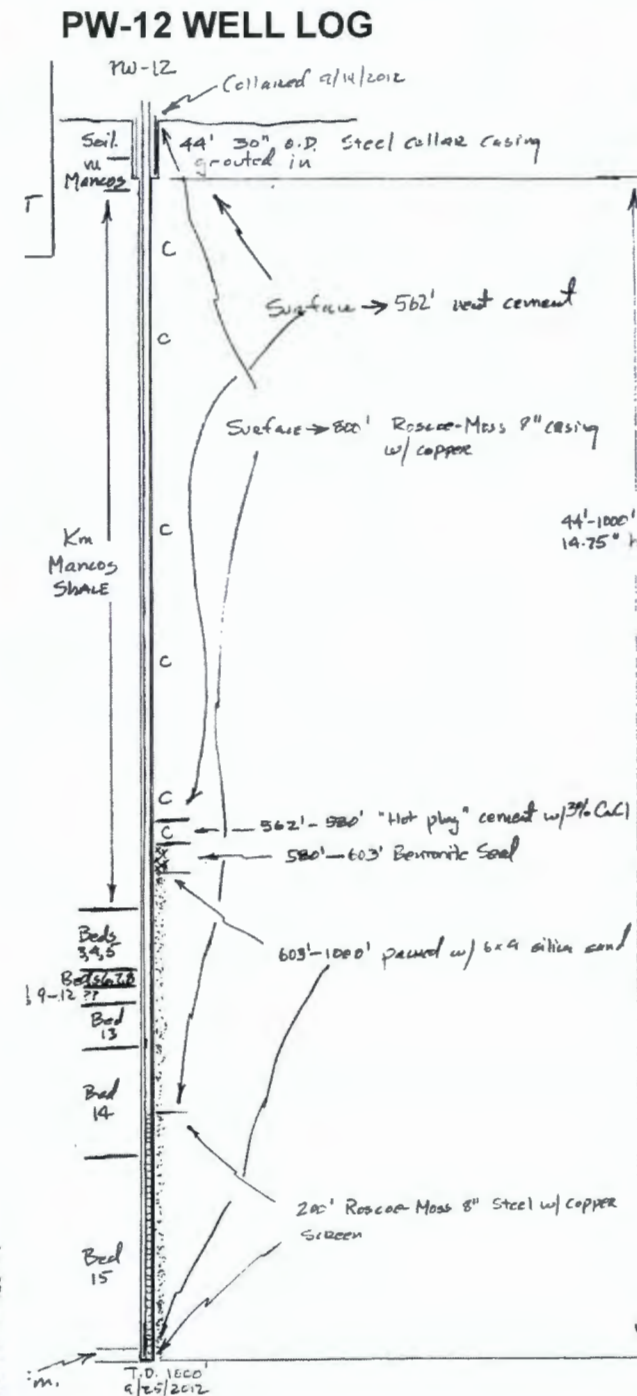
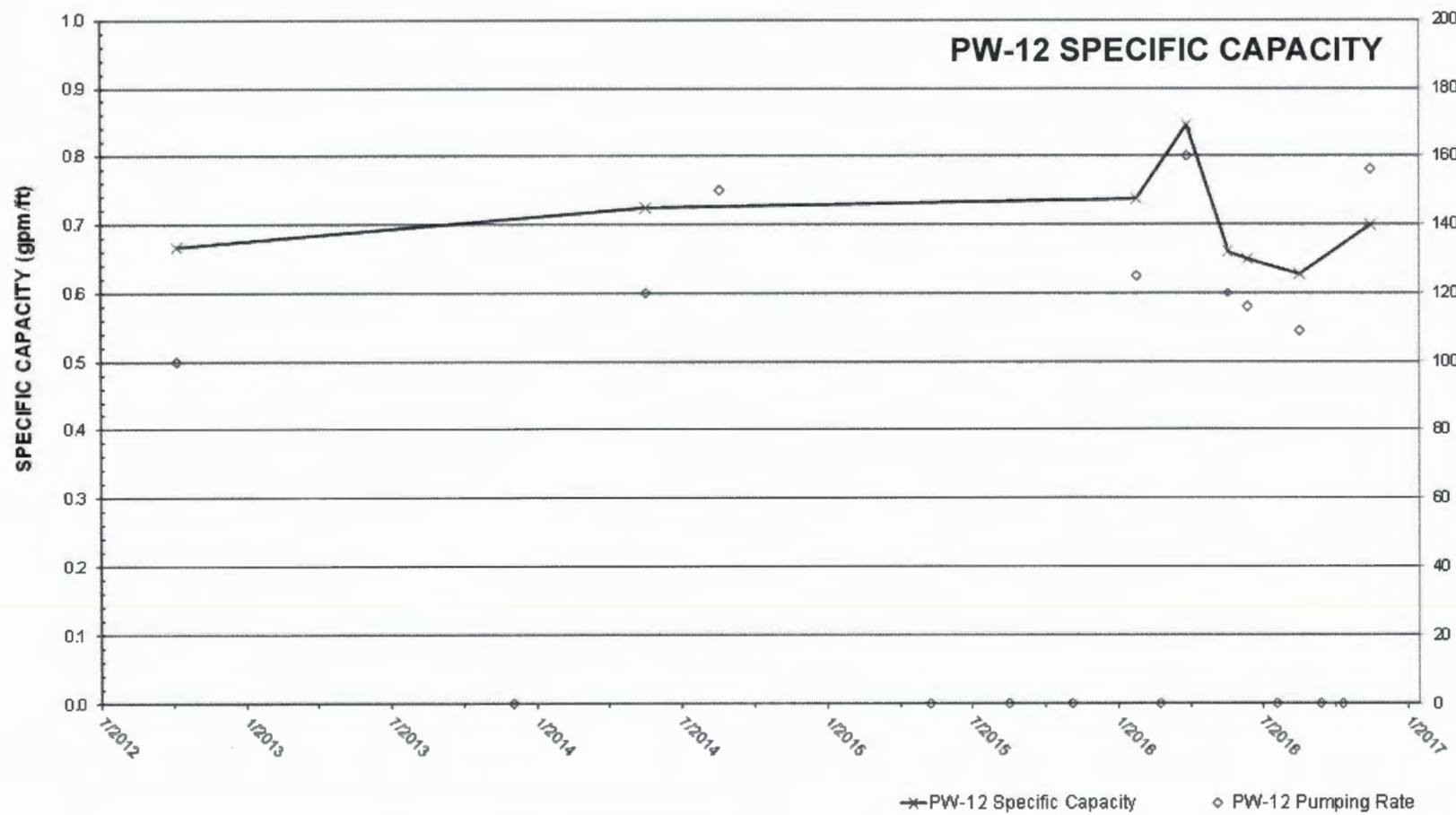
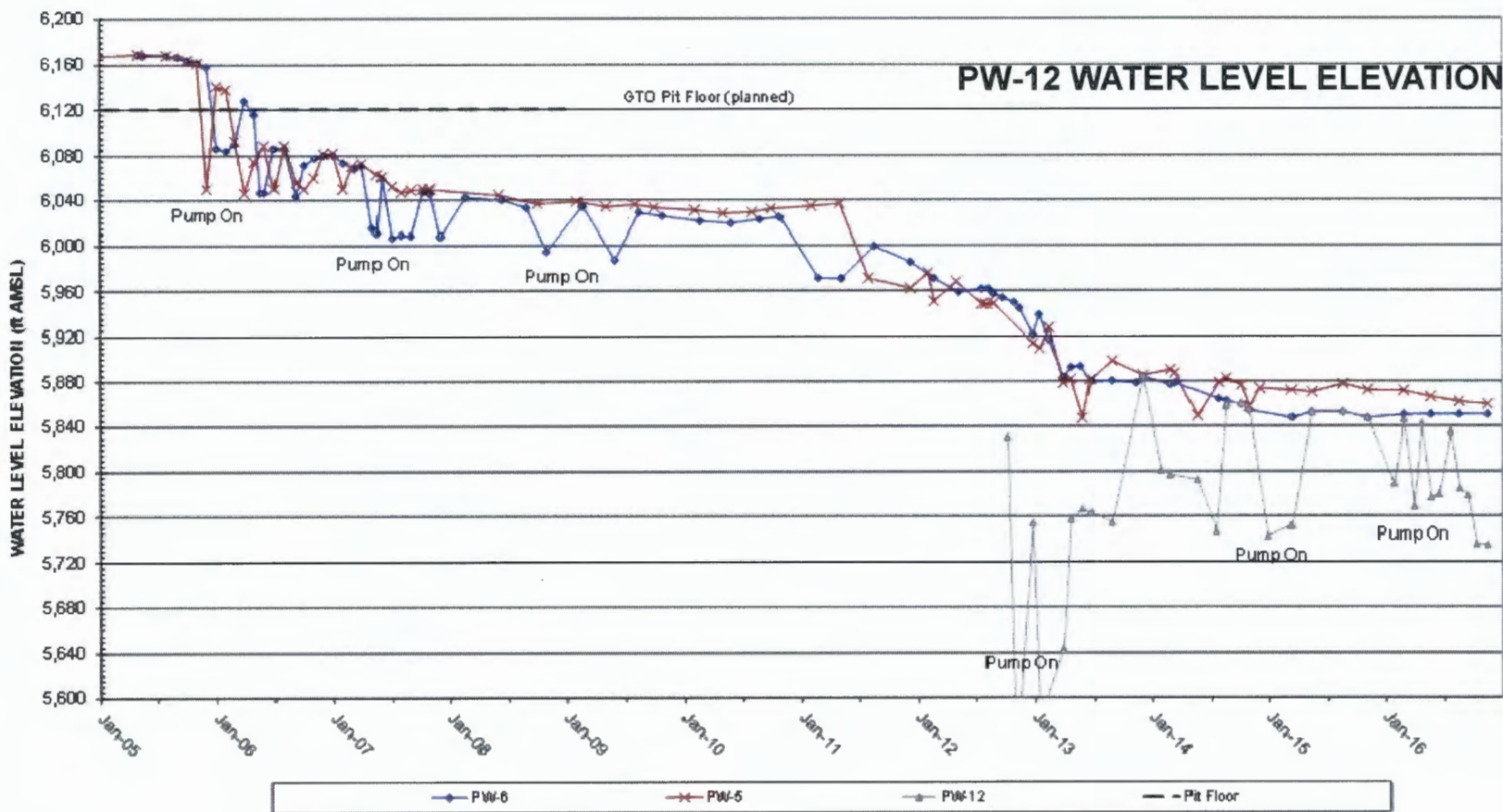
Station	Collection Date	Total Organic Carbon (mg/l)	Coliforms, Fecal (#/100ml)	Iron Related Bacteria	Slime Forming Bacteria	Sulfate Reducing Bacteria
PW-7	8/18/2016 12:00	<1	0	Present	Present	Present
PW-8	8/18/2016 13:10	<1	0	Absent	Present	Absent
PW-12	8/18/2016 12:35	<1	0	Absent	Present	Present

**LISBON VALLEY MINING CO**

### PRODUCTION WELL REPORT

**PW-7**  
**1/23/2017**





### PW-12 BACTERIOLOGICAL TESTING

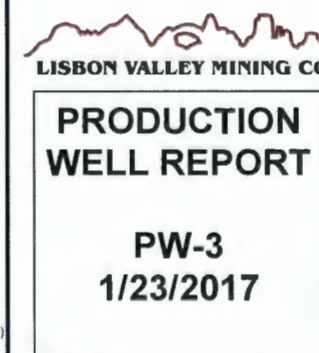
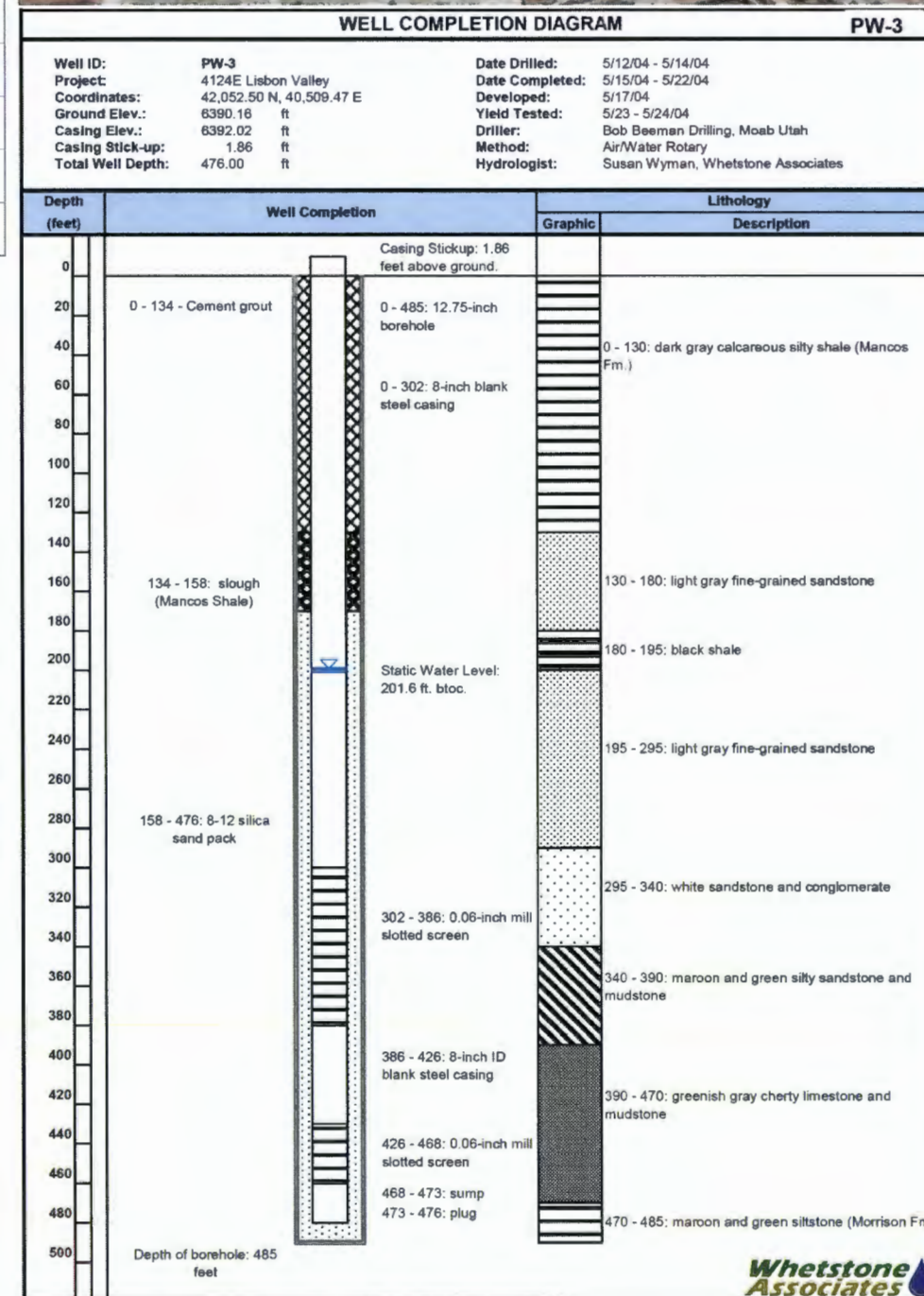
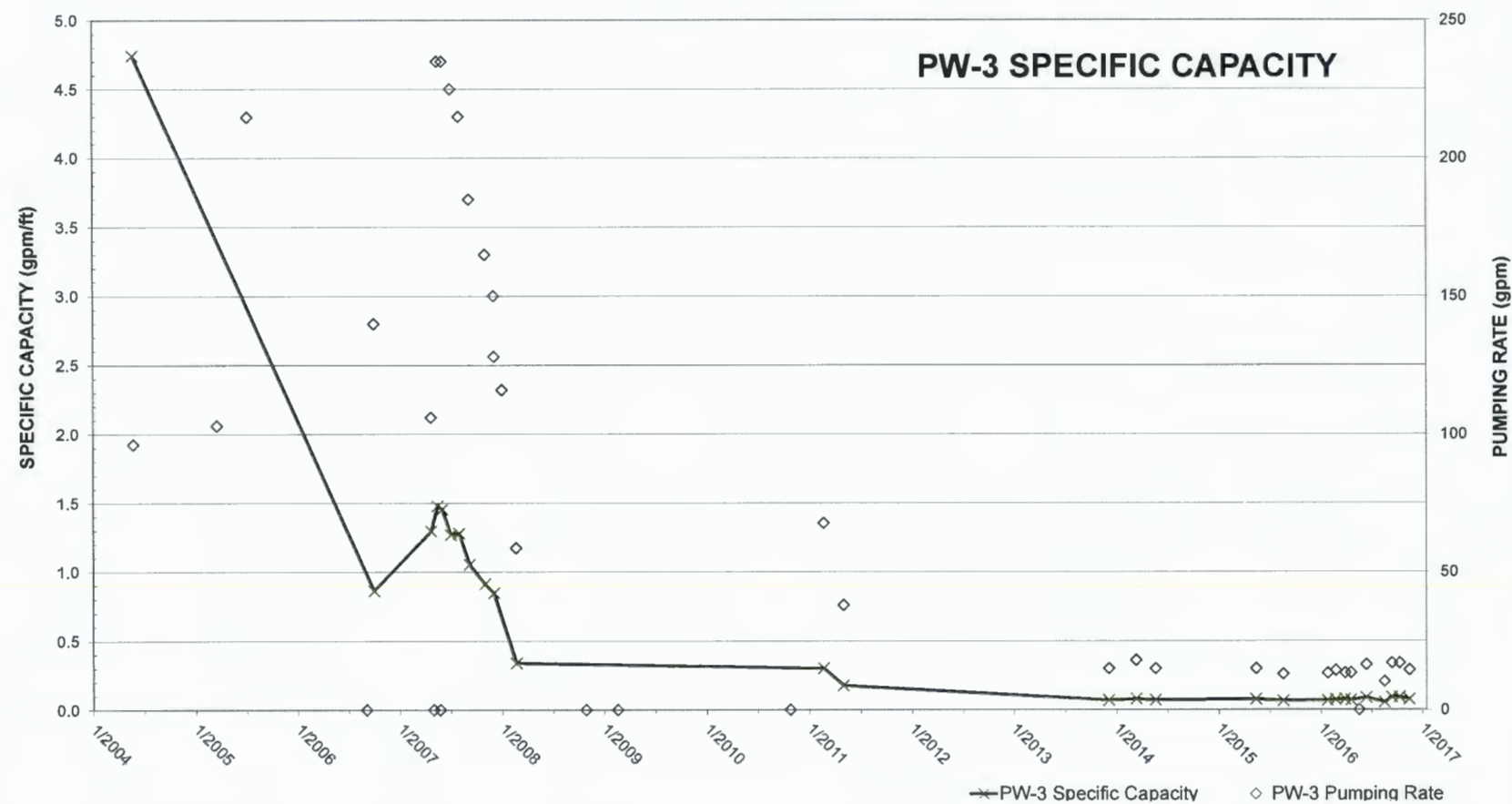
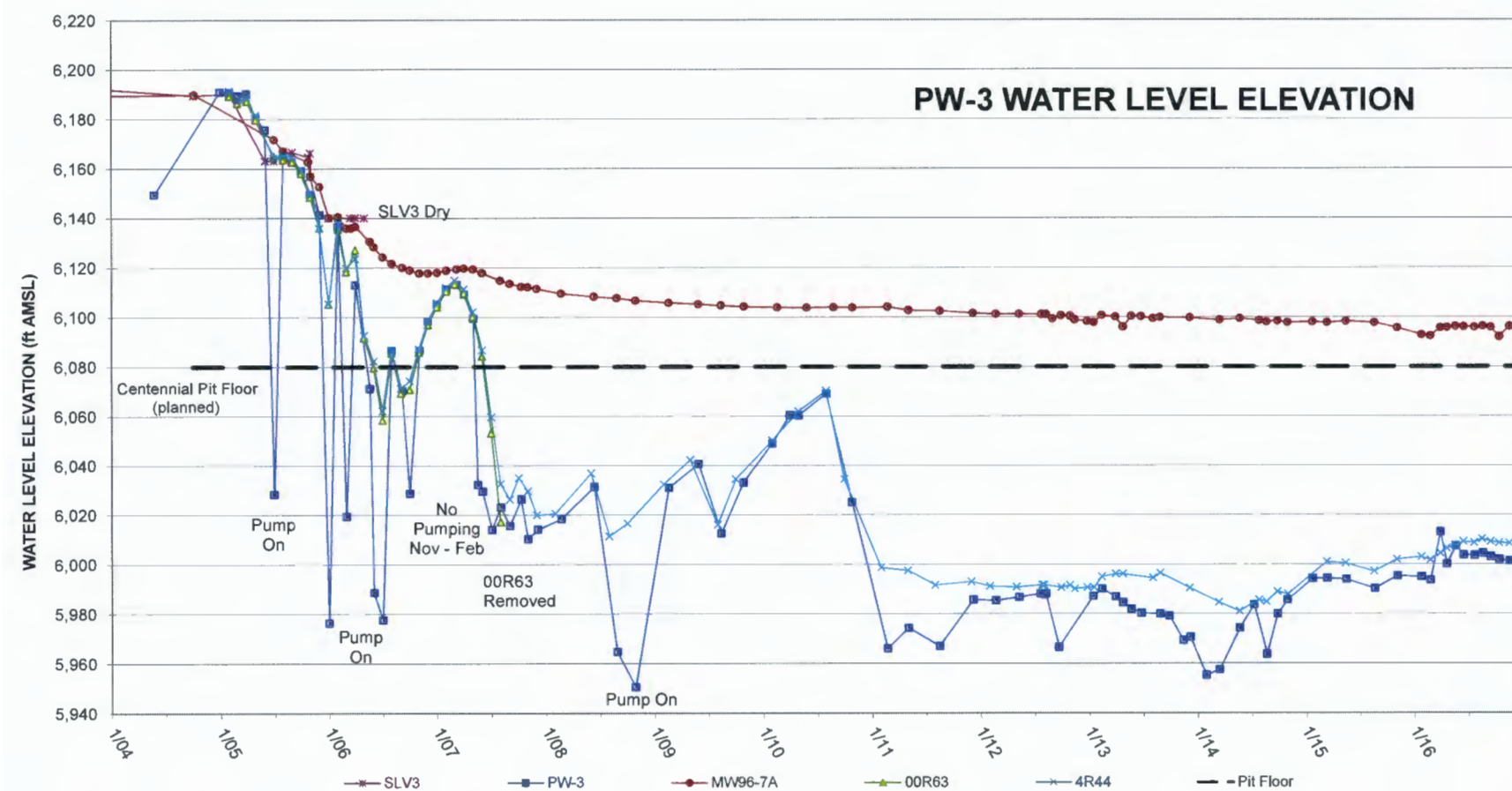
Station	Collection Date	Total Organic Carbon (mg/l)	Coliforms, Fecal (#/100ml)	Iron Related Bacteria	Slime Forming Bacteria	Sulfate Reducing Bacteria
PW-7	8/18/2016 12:00	<1	0	Present	Present	Present
PW-8	8/18/2016 13:10	<1	0	Absent	Present	Absent
PW-12	8/18/2016 12:35	<1	0	Absent	Present	Present



### PRODUCTION WELL REPORT

**PW-12**  
**1/23/2017**







# APPENDIX C

## Waste Handling Procedures & Inspection Forms

Lisbon Valley Mining Company

Landfill Log

Date	Name	Cover Applied?		Size of Load (Cubic Yards)	Waste Type*	Contents of Load
		Y	N			

\*Waste types = Construction/demolition debris; yard waste; inert waste; waste tires; petroleum-contaminated soils. Refer to the attached Waste Types for more detailed information.

Waste Type	Acceptable Waste Material
Construction / Demolition Debris	Wood, Metal, HDPE & Plastic Piping, HDPE & Plastic liner material, pallets, totes, sidings, miscellaneous construction debris, miscellaneous demolition debris
Yard Waste	trees, shrubs
Inert Waste	concrete, cement, neutralized tailings, neutralized acid-contaminated soils, soils from the Tank Farm
Waste Tires	tires that have been damaged and/or are unfit for recycle
Contaminated Soils	SX clay, crud, contaminated soils from small spills around the Truck Shop

**Lisbon Valley Mining Company**

## Landfill Inspection Form

[illegible]



**Lisbon Valley Mining Company**

## Post-Closure Landfill Inspection Form

[illegible]

# Lisbon Valley Mining Company – Lisbon Valley Copper Project

## General Training and Site Safety Plan Addendum for Landfill Operations

This plan was developed for the safety of landfill operators and operations at the Lisbon Valley Copper Project, in accordance with the Utah Department of Environmental Quality Administrative Code R315-302-3(2)(n).

Training will include the following topics:

- 1.0 Applicability
- 2.0 Frequency
- 3.0 Information and Awareness
- 4.0 Equipment Operation
- 5.0 Emergency Procedures and Notification

### 1.0 Applicability

- A. All landfill operators must have received the general site safety training prior to receiving this training. (Note: During monthly safety meetings, waste identification and disposal methods are discussed).
- B. All landfill operators will receive this training in addition to the general site safety training.
- C. New or transferred employees who have landfill responsibilities will receive this training prior to working at the landfill.
- D. A new or transferred employee who has not received this training may work at the landfill under the direct supervision of a trained landfill operator under: a) temporary or emergency conditions, or b) up to a period of 90 days, starting with the day the new or transferred employee began working at the landfill.

### 2.0 Frequency

All applicable employees will receive this training on an annual basis, or when significant changes occur at the landfill.

### 3.0 Information and Awareness

Training will include:

- A. A review of the landfill permit conditions.
- B. A list of acceptable and unacceptable waste for the landfill.
- C. Guidelines for maintaining the landfill (fill, cover, inspections, etc.)
- D. Proper record keeping of wastes received.
- E. Unacceptable waste procedures (discussed in the monthly safety meetings).
- F. Alternative waste disposal in the event that the landfill is unavailable.

### 4.0 Equipment Operation

The Safety Officer or their designee will determine that all landfill operators are trained in the proper operation of all landfill equipment.

### 5.0 Emergency Procedures and Notification

All landfill operators will be trained on proper landfill emergency notification procedures. Emergency procedures and/or contact numbers will be made available to all landfill operators.