U.S. OIL SANDS®
www.usoilsandsinc.com

April
Wayne
Leslie
Lynn
#353

November 21, 2014

Utah Division of Oil, Gas and Mining
1594 W. North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

RECEIVED
NOV 21 2014
DIV. OF OIL, GAS & MINING

Dear Paul Baker:

Re: **M/047/0090 - U.S. Oil Sands, Inc., PR Spring Mine - Revision to Notice of Intention to Commence Large Mining Operations**

U.S. Oil Sands, Inc. is herewith transmitting a Revision to our PR Spring Mine NOI, to accommodate planned changes in mine pit footprints and sequencing, which allow us to greatly reduce our overburden/interburden storage areas and facilitate concurrent reclamation. Form MR-REV is attached. Place holders are included in the NOI for additional supporting documentation.

Feel free to contact me if you have any questions on this information. As always, we appreciate your help with our permitting needs.

Kind regards,
U.S. Oil Sands, Inc.

Doug Thornton
HSE & Regulatory Manager

cc: Dan Hall, Utah Department of Water Quality

Suite #1600, 521 – 3rd Avenue SW, Calgary, AB, T2P 3T3 CANADA Office 403-233-9366 Fax 587-353-5373

Form MR-REV-att (DOGM – Revise/Amend Change Form)
(Revised September 14, 2005)

Application for Mineral Mine Plan Revision or Amendment

Operator: U.S. Oil Sands

Mine Name: PR Spring Mine **File Number: M/** 047 /0090

Provide a detailed listing of all changes to the mining and reclamation plan that will be required as a result of this change. Individually list all maps and drawings that are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise or amend the existing Mining and Reclamation Plan. **Include page, section and drawing numbers as part of the description.**

DETAILED SCHEDULE OF CHANGES TO THE MINING AND RECLAMATION PLAN

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	■ REPLACE	☐ REMOVE	all pages
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
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I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments and obligations, herein.

Doug Thornton
Print Name

[signature] HSE/Regulatory Mgr.
Sign Name, Position

Nov. 21, 2014
Date

Return to:

State of Utah
Department of Natural Resources
Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Box 145801
Salt Lake City, Utah 84114-5801
Phone: (801) 538-5291 Fax: (801) 359-3940

FOR DOGM USE ONLY:
File #: M/ /
Approved:
Bond Adjustment: from ($)
to $

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April
Wayne
Leslie
Lynn
6353

Notice of Intention
To Revise Large Mining Operations

U.S. Oil Sands, (Utah) Inc.
PR Spring Mine
M0470090

U.S. OIL SANDS®

November 2014

Submitted by:

U.S. Oil Sands, (Utah) Inc.
Suite 1600, 521- 3rd Avenue SW
Calgary, Alberta T2P 3T3

to:

Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

Prepared in part by:

Stantec

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Sandy, Utah 84093
(801) 943-4144

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Introduction

U.S. Oil Sands, Inc. (USOS) is a publicly held Canadian firm engaged in the extraction of bitumen from naturally occurring oil sands deposits in the U.S. USOS (Utah), a wholly owned United States subsidiary, holds Utah School and Institutional Trust Lands Administration (SITLA) oil sands leases on 32,005 acres (Appendix A) near PR Spring in Utah's Uinta Basin. The leases are located in two areas: the PR Spring block and the Cedar Camp/NW Exploration Area. Phase 1 mine development under this Notice of Intention (NOI) to Revise Large Mining Operations (LMO) will take place predominantly in the central part of the 5,930-acre PR Spring block (**Figure 1**). The total Phase 1 disturbance will be approximately 317 acres (**Figure 2**). This 317-acre area is referred to throughout this NOI as the Affected Area and includes the areas delineated on drawings by the Disturbance Limit Boundary. In general, this includes the mine and plant site, the well and well access road, and the man camp. The Affected Area is equivalent to these combined areas that will be disturbed, bonded for, and reclaimed. Should additional mine development be planned in the future, beyond that described herein, permit amendments or revisions will be obtained.

The Phase 1 mining project, described herein, represents the first commercial phase of operations at the PR Spring Mine. These operations will build on previous exploration, pilot processing, production tests, and initial site preparations previously approved by the Utah Division of Oil, Gas and Mining (DOGM). **Figure 2** shows exploration borehole locations drilled in 2011 and 2012 to supplement prior drilling programs, as well as the permit boundary associated with the approved Amended 2014 LMO. The Phase 1 project incorporates exploration work conducted under E/019/0053 for construction of a seasonal man camp, water well pads, a water pipeline, and an access road.

The geologic characteristics and environmental setting of oil sands in Utah vary significantly from those associated with oil sands deposits in the Athabasca oil sands of Alberta. The Utah deposits contain less sulfur than Alberta oil sands. Also, because the bitumen is directly adhered to the sand grains, traditional steam or hotwater extraction methods are less efficient in recovering bitumen from the Utah deposits. Thus, USOS has patented a chemical method (known as the Ophus Process) for extraction of hydrocarbons from oil sands, which differs from traditional extraction methods commonly used to process Alberta oil sands and enables a higher percentage of bitumen recovery. This production method eliminates the need for tailings ponds, and instead produces inert, "damp-dry" residual sands and fine particles (hereinafter "solids") that can be backfilled into the open pits.

The Phase 1 project includes pits 1, 2 and 3, all of which will be backfilled as mining progresses. In addition, it includes two small overburden/interburden/solids (OIS) storage areas that are necessary initially prior to backfilling; the plant site

that will house the bitumen extraction plant; the production well, water pipeline and access road; and the man camp. All Phase 1 structures, facilities, and operations are described in detail in this NOI.

R647-4. Large Mining Operations

R647-4-104. Operator(s), Surface and Mineral Owner(s)

104.1. Operator Responsible for Mining Operations/Reclamation of the Site

MINE NAME: PR Spring Mine

NAME OF PERMITTEE/ OPERATOR/ APPLICANT: U.S. Oil Sands, (Utah) Inc., a Corporation registered to do business in the State of Utah.

Business License #:	5834125-0142
Registered Agent:	Daniel A. Jensen
Address:	Parr Brown Gee & Loveless 101 South 200 East, Suite 700 Salt Lake City, UT 84111
Phone:	801-532-7840 Fax: 801-532-7750
E-mail address:	djensen@parrbrown.com

PERMANENT ADDRESS:	U.S. Oil Sands, (Utah) Inc. Suite 1600, 521 – 3rd Avenue SW Calgary, Alberta T2P 3T3 Phone: 403-233-9366 Fax: 587-353-5373

COMPANY REPRESENTATIVE:

	Barclay Cuthbert, Vice President, Operations
Address:	Suite 1600, 521 – 3rd Avenue SW Calgary, Alberta T2P 3T3
Phone:	403-233-9366 Fax: 587-353-5373
E-mail address:	barclay.cuthbert@usoilsandsinc.com

LOCATION OF OPERATION: Portions of the following Sections: T. 15 S., R. 23 E., SLB&M, Uintah County, Sections 27, 34, 35 & 36; T. 15.5 S., R. 24 E., SLB&M, Grand County, Sections 31 & 32. Uintah and Grand Counties, Utah. County approvals and related coordination are attached in **Appendix B**.

104.2. Surface and Mineral Owners of All Lands to be Affected

OWNERSHIP OF THE LAND SURFACE: SITLA.

OWNERS OF RECORD OF THE MINERALS TO BE MINED: SITLA

USOS owns lease rights to mine oil sands up to 500-feet below ground surface under SITLA Leases summarized in Appendix A. There are no BLM lease or project file numbers associated with this LMO.

ADJACENT LAND OWNERS:

Red Rock Gathering Company , LLC – Natural Gas Pipeline Right of Way
c/o Summit Midstream Partners
2100 McKinney Avenue, Suite 1250, Dallas, TX 75201

Uintah County - Road 2810 Right of Way
147 East Main St.
Vernal, UT 84078

Bureau of Land Management, Vernal Field Office
170 South 500 East
Vernal, UT 84078

Township 15 South, Range 23 East, SLB&M

Section 26:

Grazing Permit 20905: Lazy 3X Cattle, LLC
561 South Road
Mack, CO 81525

Mineral Lease 49944: National Fuel Corporation
8400 E Prentice Avenue, Suite 735
Greenwood Village, CO 80111

Mineral Materials Permit 52715:
Blue Mountain Crushing, LLC
1859 Connor Street
Salt Lake City, UT 84108

Section 27:

Grazing Permit 20905: Lazy 3X Cattle, LLC
561 South Road
Mack, CO 81525

Grazing Permit 23237: Lazy 3X Cattle, LLC
561 South Road

	Mack, CO 81525
Mineral Lease 51144:	KD Oil, Inc. 1245 Brickyard Road, Suite 110 Salt Lake City, UT 84106-2576
Mineral Lease 52071:	Foundation Energy Fund III-B Holding, LLC 1801 Broadway, Suite 408 Denver, CO 80202
Range Improvement 242:	Utah Division of Wildlife Resources 318 North Vernal Avenue Vernal, UT 84078
Industrial 1329:	Red Rock Gathering Company, LLC c/o Summit Midstream Partners 2100 McKinney Avenue, Suite 1250 Dallas, TX 75201
Section 28:	
Grazing (Special) 21 B09:	Burt De Lambert PO Box 607 Vernal, UT 84078-0607
Grazing Permit 20905:	Lazy 3X Cattle, LLC 561 South Road Mack, CO 81525
Grazing 22777:	Burt De Lambert PO Box 607 Vernal, UT 84078-0607
Grazing Permit 23237:	Lazy 3X Cattle, LLC 561 South Road Mack, CO 81525
Mineral Lease 48183:	Raymond T. Duncan 1777 South Harrison Street, Penthouse 1 Denver, CO 80210
Section 33:	
Easement 919:	National Fuel Corporation 8400 E Prentice Avenue, Suite 735 Greenwood Village, CO
Grazing Permit 20905:	Lazy 3X Cattle, LLC 561 South Road Mack, CO 81525

Grazing Permit 21202:	Burt De Lambert PO Box 607 Vernal, UT 84078-0607
Grazing 22777:	Burt De Lambert PO Box 607 Vernal, UT 84078-0607
Mineral Lease 48183:	Raymond T. Duncan 1777 South Harrison Street, Penthouse 1 Denver, CO 80210
Section 34:	
Grazing Permit 20905:	Lazy 3X Cattle, LLC 561 South Road Mack, CO 81525
Grazing Permit 21202:	Burt De Lambert PO Box 607 Vernal, UT 84078-0607
Section 35:	
Grazing Permit 20905:	Lazy 3X Cattle, LLC 561 South Road Mack, CO 81525
Mineral Lease 51713:	Moose Mountain Land Company B., LLC PO Box 17397 Salt Lake City, UT 84117
Industrial 1697:	Red Rock Gathering Company, LLC c/o Summit Midstream Partners 2100 McKinney Avenue, Suite 1250 Dallas, TX 75201
Section 36:	
Grazing Permit 20595:	Lazy 3X Cattle, LLC 561 South Road Mack, CO 81525
Mineral Lease 51714:	Robert L. Bayless, Producer LLC Suite 2300, 621 17th Street Denver, CO 80293-2023
Right of Way 2895:	Beartooth Oil & Gas Company PO Box 2564 Billings, MT 59103

Township 15.5 South, Range 24 East, SLB&M

Section 31:

Grazing Permit 20905:	Lazy 3X Cattle, LLC 561 South Road Mack, CO 81525
Grazing Permit 21202:	Burt De Lambert PO Box 607 Vernal, UT 84078-0607
Range Improvement 433:	Clay McKeachnie PO Box 1894 Vernal, UT 84078

Section 32:

Grazing Permit 20905:	Lazy 3X Cattle, LLC 561 South Road Mack, CO 81525
Mineral Lease 49572:	Moose Mountain Land Company 4571 South Holladay Boulevard PO Box 17397 Salt Lake City, UT 84117

The adjacent surface and mineral owners (BLM and SITLA) have been notified regarding prior DOGM approvals for earlier site work. They will be notified again in writing once this NOI revision is tentatively approved (those agencies are both currently aware of the project), and those agencies will notify other land users or right-of-way holders as they deem appropriate.

Under the terms and conditions of the leasing agreement(s) of SITLA leases, USOS has the legal right to enter and conduct mining operations on the land covered by this notice.

104.3. Federal Mining Claims or Lease Numbers

There are no Federal mining claims or permits associated with this NOI.

R647-4-105. Maps, Drawings and Photographs

105.1. USGS topographic base maps, as well as other select figures in the NOI (Figures 1-11) provide the following information:

1.11 Property boundaries of surface ownership.
1.12 Water features (including streams and springs), infrastructure, and surface/subsurface facilities within 500 feet of mining operations.
1.13 Access routes.
1.14 Previous mining/exploration impact in the disturbance area is shown on photographs in Appendix H.

105.2. Surface facilities maps (Figures 1-6) include the following information:

2.11 Surface facilities
2.12 Disturbance boundary

105.3. Other maps that may be required:

3.11 There would be no re-graded slopes to be left steeper than 2H:1V
3.12 The road and production well pads to be left as part of post-mining land use are described below under 3.14.
3.13 There would be no water impounding structures >20 feet high.
3.14 The areas that will be left un-reclaimed as part of the post-mining land use are the production water wells and access road shown on Figure 2, excepting that portion of the access road shown as reclaimed on Figure 11.
3.15 There will be no diversion channels constructed.
3.16 Geology, oil sands cross sections, water features and vegetation communities are shown on **Figures 8**, **9**, and **10**, respectively.
3.17 Reclamation treatments are shown on **Figure 11**.
3.18 Mine plan cross sections are provided as Figures **6a-c**.

105.4. Site photographs are included as Appendix H.

105.5. No underground development will occur: Surface mine development is shown on **Figures 2** and **4a-d**.

R647-4-106. Operation Plan

106.1. Mineral to be Mined

The type of mineral to be mined is oil sands which consists of sandstones and siltstones impregnated with a heavy oil called bitumen. The oil sands generally occur in lenticular beds, with interbedded sandstone, siltstone, shale, mudstone and calcareous marl. These oil sand beds have been defined from top to bottom as beds D, C, B, and A. The Phase 1 project will mine Bed D and Bed C, with selective mining of Bed B where economical to do so. Bed A will not be mined in the Phase 1 area.

106.2. Operations to be Conducted

The Phase 1 operating plan focuses on recovery of the oil sands ore from three open pits in a manner that: (1) maximizes efficiency through reduced materials re-handling; (2) minimizes the overall operational footprint; (3) emphasizes concurrent reclamation; and (4) reestablishes topography and vegetation to approximate previous conditions. Pit design, pit backfilling, and placement of OIS are all components of the mining operation described in the following subsections. The Phase 1 project also includes the separation of bitumen from the mined oil sands in a small plant (**Figure 3**) using the Ophus Process. The following subsections describe mining operations and the Ophus process and plant facilities in further detail.

The acreages associated with the individual components of the Phase 1 project are described in Section 106.3. The estimated material volumes and anticipated mining and processing timelines are described in Section 106.4.

SURFACE PREPARATION/STORAGE OF OVERBURDEN AND TOPSOIL

Surface preparation will include the clearing of vegetation and removal of topsoil. Initially, topsoil will be stored in designated topsoil storage areas, as described further in Section 106.5. Later, concurrent reclamation allows topsoil to be live-hauled, in most cases, from an area being prepared for mining directly to OIS storage areas or backfill areas prepared for the topsoil component of reclamation. Larger vegetation would be cleared with bulldozers by pushing into slash piles for use in sediment control. Some vegetative materials may be stockpiled within or beneath the salvaged topsoil, or directly incorporated into or on the reclaimed surface. Sections 106.5 and 106.7 provide estimated volumes of topsoil, describe vegetative matter, and provide additional details on handling and redistribution of these materials.

Where overburden must be removed to expose the oil sands, it will initially be mined and deposited in one of the OIS storage areas shown on **Figure 2**. As mining proceeds, overburden and interburden, along with inert solids from the bitumen separation plant, will be hauled to mined-out pits and re-contoured to

mimic and blend into surrounding topography. These materials and operations are discussed in more detail under the OIS storage areas and pit backfill subheadings below. Estimated material volumes are provided in Section 106.4.

MINE ACCESS ROADS

The main access to the PR Spring Mine site is via Uintah County Road 2810 (**Figures 1 and 2**). Onsite access and haul roads provide access to the plant site and in some cases are integral to other surface features such as pits and OIS storage areas (**Figures 3 and 4a-d**). Many of these haul roads are for temporary use and will be consumed by the advancement of mine pits over time. Therefore temporary haul roads located within pit crest outlines are not considered standalone features with associated disturbances. The east haul road that provides access from the plant site along the southeast edge of the project area will be in use throughout Phase 1 and is external to the pit areas. Where necessary, roads will be surfaced with crushed overburden or sub-grade ore (described below under 'Mining') and will be maintained so as to promote efficient mine haulage as well as appropriate surface water control and dust suppression. All haul and access roads will be constructed to minimize grade and allow safe operation of the equipment.

MINING

Mining of oil sand beds will be conducted using a self-contained mobile surface mining/milling machine (i.e., Wirtgen Surface Miner). Additional mining equipment will consist of trackhoes, scrapers, dozers, graders, rock drills, haul trucks, loaders, water trucks, and service trucks. A list of anticipated mining equipment is included in **Appendix D**. Mobile mining equipment will be fueled directly at the stationary fuel storage area within the plant site containment area or by a fueling truck as necessary.

Overburden and interburden will be removed by conventional drill/blast/muck or rip/muck methods. Initially, overburden will be removed from a small box cut in Pit 1 to expose the uppermost layer of oil sands (Bed D). The surface miner will then mine through the first layer of oil sand by successively milling 8 to 10 inches of oil sand per pass. Pit 1 will only intercept a small area of Bed C and will not intercept Bed B. When the initial layer of oil sand has been mined, the interburden layer will be exposed and mined using conventional mining methods to expose the next layer of oil sands (Bed C). As mining progresses through Pit 1 to Pit 2 and Pit 3, the same mining activities will continue, with the interburden between beds C and B removed as necessary. **Figures 4a-d** show the progression of the Phase 1 project and **Figure 5** shows the Phase 1 ore removal sequence by year.

Concurrent with oil sands removal, conventional mining equipment will remove overburden or interburden to expose new areas of the oil sand beds and allow mining to progress sequentially through all three Phase 1 pits. As sufficient area comes available, the mining operation will transition to multiple bench mining, where oil sand mining occurs on the top layer of newly exposed areas while interburden removal on lower benches exposes the next bed of oil sand. After all

targeted oil sand beds have been mined in a given cut area, backfilling will commence in the respective cut area (**Figures 4a-d**).

Some of the oil sand ore will have bitumen concentrations below the economic cutoff grade (subgrade ore). This determination will generally be made at the pit, and subgrade ore will be hauled directly to either the OIS or backfill areas. In some instances, subgrade ore may be rejected at the ore stockpile area and stockpile reclaim hopper; in these cases, it would be stockpiled temporarily with other 'reject' materials for eventual hauling back to OIS or backfill areas or it would be used to suppress dust on roads or other areas.

Overburden and/or interburden may be sufficiently friable to allow removal by dozers, without the need for blasting. However, where blasting is required to facilitate material removal, shot patterns and delays will be designed with adequate stemming to minimize fly-rock, vibration and dust, while generating aggregate size material conducive to removal from the mine area. Blast hole size, spacing and depths, as well as the frequency of blasting, will vary depending upon the situation, but in all cases will be in accordance with local, state and federal rules. Blasting should not result in fly rock landing on the adjacent county road. However, as a precaution, the county road will be temporarily barricaded at the north and south ends for the duration of the blast and post-blast inspection. In addition, all access roads to the blast area will be blocked and posted with warning signs. All loading, blasting and explosives handling will follow Mine Safety and Health Administration (MSHA) safety and security regulations and guidelines as well as other relevant federal regulations.

Regular and routine inspections will occur throughout the mine area. This will ensure operating conditions remain safe and in compliance with MSHA regulations. It will also ensure the mining plan stated herein is being followed.

Pit Design

Phase 1 mining will begin in Pit 1, and progress sequentially through Pit 2 and Pit 3.

Pit highwalls are designed to have an overall slope of 1H:1V which has been determined to be geotechnically stable. Use of 1H:1V pit slopes is supported by technical studies (Seegmiller 2013) including rock mechanics tests on representative core samples from planned highwalls. Stability analyses to evaluate proposed highwalls and bench slope angles state that "highwalls and benches should be stable using the planned slope profile for up to 150 feet maximum overall slope height". Site-specific information indicates that steeper slopes could be justified: numerous existing road cuts and excavations in the area (including USOS's 2005 production test pit) are stable with slopes steeper than 1H:1V. Any required blasting along highwalls will be accomplished with controlled blasts to eliminate over-break and weakening of the remaining material on the face of the slope.

Pit sequencing is designed to reduce the area outside of pit footprints where OIS storage areas will be needed. The pit design allows for direct backfilling to a nearby mined out area as early in Phase 1 as feasible. It also enables pit backfilling to be done at near-final topography, which reduces re-handling and facilitates concurrent reclamation.

Hauling

Initially, overburden and interburden removed from Pit 1 will be hauled from the active pit area to an OIS storage area. Once there is a sufficient mined out area in Pit 1, overburden and interburden will be hauled and placed directly as pit backfill. Placement is described further below in the pit backfill and OIS storage area subsections.

Mined oil sands will be hauled to the plant site (**Figure 3**) and discharged to a scraper/truck underflow dump conveyance system. From the scraper/truck dump, oil sand ore is distributed via a conveyor to the radial stacker into one of two plant feed stockpiles. Loaders will tram the oil sand ore from these stockpiles and feed the hopper where the ore starts into the plant through the front end ore conditioning screener/crusher. Oil sand ore can also be stored in the auxiliary storage area of the plant site in the event the plant feed stockpiles are at capacity. Generally, a two-week supply of ore will be maintained in the plant feed stockpiles at the plant site.

Oil sand ore determined at the pit to be subgrade ore will be hauled directly to either the OIS or pit backfill areas. Some subgrade ore will be used to pave the processing plant area and cover haul roads for dust suppression.

Once separated from the bitumen, solids will be hauled from the plant site back to an OIS storage area or to a mined out pit and placed as backfill. Solids handling details are given below in the pit backfill and OIS storage area subsections.

PROCESSING

General Facility Description

The plant site will be located adjacent to Uintah County Road 2810 (Seep Ridge Road) in the area shown on **Figure 3**. As shown on this plant site diagram, the major features will include:

- an administrative building complex with an attached lab and associated parking area;
- a mine operation maintenance shop warehouse;
- equipment warehouse;
- an electrical generation area;
- equipment staging and auxiliary storage area;
- the process plant, with associated process water tanks, de-watering equipment, etc.;
- a tank farm and tank truck loading area;

- a lined process sump;
- a storm water retention pond; and
- stockpiles for solids, reject materials (materials that contain too much interburden or overburden to be viable for processing), and ore.

Each unit or module of the plant will have a collection sump with an associated pump to pump any upset of fluids to a centralized lined sump. The unit or module sump pumps will also have the ability to pump any upset of fluids directly back into the appropriate unit or module. The centralized lined sump is designed to contain 2.0 times the combined volume of the primary separation vessels (PSV #1 and PSV #2), which is approximately 70,000 gallons not including freeboard. Any fluids collected in the sump system will be promptly returned to appropriate units or modules in the plant system.

Sized secondary containment for the hydrocarbon tanks (bitumen and the extraction solvent) will be sized to comply with the current Spill Prevention Control and Countermeasure Plan requirements (40CFR112).

The secondary containment will be sized to contain the volume of the largest single container and sufficient freeboard to contain precipitation. Tanks, whose material and conditions of storage are compatible with the material stored, will be erected on compacted gravel bases with a liner also compatible with the hydrocarbons being stored. Liners will be integrated with the secondary containment berms.

Non-hydrocarbon liquids, including process water, will be managed to prevent release. The clarifier, and process water tanks will be located next to the process plant within a secondary containment structure. Process water will consist of approximately 96% recycled water and 4% make-up water; due to the percentage of recycled water, the process water would contain minimal amounts of solvent and remnant hydrocarbons from prior use in the plant.

The remainder of the plant site is constructed to be internally draining, wherein precipitation incident to the plant site, with the exception of that falling within the tank farm and non-hydrocarbon liquids containment areas, is directed to and collected at the storm water retention pond. The pond will be located at the low point of the plant site (See **Figure 3** for pond location) and will collect only runoff generated from precipitation falling upon the plant site itself. No process water will be routed to this pond, but water may be pumped out of it via a sump pump for use back in the plant. Sediments collected in the pond will be removed as needed in order to maintain its design capacity. The total depth (not including freeboard) will be approximately seven feet. Berms and ditches directing runoff to the storm water retention pond are shown on **Figures 3**. Standard engineering practices are used to determine specifications that provide for structure integrity and off-site protection. More details are provided in various other sections of this NOI as well as the Storm Water Management Plan (SWMP) located in **Appendix G**.

The administrative building and small lab are modular buildings designed to be set on gravel pads. The parking areas will be graveled. The process equipment will sit on skids within secondary containment. The mine operations maintenance shop is a steel building bolted to a cement footing/foundation and a poured cement slab floor. Prominent features including equipment, buildings, and tanks in the facilities area are shown on **Figure 3**.

The plant will operate 24 hours per day, approximately 350 days per year, not including unscheduled shutdowns/outages. The Occupational Safety and Health Administration (OSHA) will have jurisdiction for employee health and safety in the areas of the process operation beyond the feeder/hopper.

Plant Flow Details

USOS's Ophus process is a proprietary extraction method that uses d-limonene, a biodegradable and non-toxic solvent derived from citrus products, for the separation of bitumen from sand. The non-proprietary components of the separation process are described in the following paragraphs.

The plant is designed to accommodate approximately 4,300 tons/day of ore, producing approximately 2,000 bbl/day of bitumen. The extraction process begins when the mined ore is sent through a crusher and reduced to a 0.75 inch minus size. The crushed ore is then conveyed to a heated slurry mixer where the solvent is introduced and the ore is slurried. The oil sands slurry is then pumped to two primary separation vessel (PSV #1 and PSV #2) where the separation of bitumen from the sand occurs. The liberated bitumen is captured and further cleaned in a centrifuge. The centrifuge removes fine particles from the bitumen. The bitumen is then transferred to a solvent recovery unit where solvent is recovered from the bitumen and recycled to the front of the process. The clean bitumen from the solvent recovery unit is pumped to the product (sales) tank for storage prior to transport.

The separated solids are dewatered on a screen filter and the recovered water is pumped back into the process water tank for reuse in the plant. To recover additional water, process streams are fed to a clarifier which uses flocculent to produce a thick solids slurry and recover clear water. The solids slurry is fed to another centrifuge and a dryer to recover all the possible water and solvent. Solids are then conveyed to a stockpile for loading and backhaul to the OIS or mine pit. There are no water losses to the bitumen product. Approximately 4% of the water goes out of the system with the solids being hauled back to the OIS or mine pit.

The plant flow diagram is included in **Appendix D**.

Solvent Storage & Handling

The solvent (d-limonene) is a stable, colorless liquid that evaporates when exposed to air, and has negligible solubility in water (Florida Chemical Co.,

2011). It presents low risk to humans and has been determined to biodegrade rapidly in the environment, similar to related chemicals that are known to be biodegradable.

The solvent will be stored as required in an approved storage tank with appropriately designed secondary containment. From the tank, the solvent will be pumped through closed piping to the mixer where it is blended with the incoming oil sands and water. After separation of bitumen in the solvent recovery unit, the solvent (without additives) will be pumped through closed piping back into the original storage tank.

Power Source

Two natural gas generators located at the plant site will be used to supply all the electrical requirements for the process train. A three conductor, heavy gauge, armored power supply cable will be buried in the water line trench (described below) to convey power to the two nearby water wells.

Water Source

360 acre-feet of water from water right number 41-3523 has been allocated to USOS from the Uintah County Water Conservancy District to supply water for the Phase 1 project. USOS completed two wells to water, located approximately one half and one mile west of the plant site on SITLA land, under approval order 49-2274. Correspondence with SITLA and the State Engineers Office regarding right-of-way and approval to drill the wells is included in **Appendix B**.

These two wells will supply water for the plant. The easternmost well (former USOS exploration well #5) is completed to a total depth of 2,200 feet below ground surface in a deep aquifer. The finished casing diameter is 5.5 inches. The westernmost well (former USOS exploration well #6) is a 10-inch diameter well completed at 2,550 feet below ground surface.

To provide improved access to the well pad locations, the existing road was widened and re-routed in places. The road corridor is 30 feet wide inclusive of ditches. A supply pipeline will be installed on the south side of the road in an 11-foot wide corridor to convey water from the production wells to the processing plant site. The water line will be approximately 9,300 feet in length and constructed of HDPE pipe, buried to a minimum depth of 5 feet for insulation and protection. An armored power supply cable and pipe identification tag will also be buried in the trench to supply power to the well. The pipeline corridor construction disturbance will be reclaimed upon completion of construction.

At the terminal end of the pipeline (the plant site, **Figure 3**), water will feed directly to the raw water tank for storage. The raw water tank will then supply water to the process as needed. There will also be a pump to transfer collected storm water from the storm water retention pond to either of the two process water tanks to supply a portion of the make-up water.

OVERBURDEN/INTERBURDEN/SOLIDS STORAGE AREAS

During initial mine development, overburden and interburden removal will be completed by conventional mining methods. Overburden and interburden will be hauled to one of two OIS storage areas (**Figure 2**). This material will primarily consist of broken sandstones and shales. Grain sizes will vary from fine to coarse rock rubble (run-of-mine) materials potentially as large as one cubic yard. Once mining has opened a large enough excavation to allow equipment movement and backfilling, mined overburden and interburden, along with the clean processed solids, will be placed in mined out areas of the pits (**Figures 4a-d**)(discussed in the next subsection).

The processed solids will contain less than 20 percent water and less than 4,000 ppm residual hydrocarbons and will contain approximately 80-85 percent coarse particles and 15-20 percent fine particles. The material will be hauled back to the OIS or pit backfill in trucks. The coarser fraction of the processed solids can be characterized as primarily quartz material in the 80-1,000 µm range (d_{50} = 117 µm), and the finer fraction is the sub-80 µm (d_{50} = 18 µm) material comprised of quartz, shale and clays. The density of the damp processed solids is roughly 2,850 pounds per cubic yard.

Index tests on sands and clays, and direct shear tests on sand and various blends of sand and clay were conducted by IGES in 2014 (Seegmiller 2014) on samples originating from representative site materials. Follow up work included triaxial strength testing on processed solids samples from USOS pilot plant work. Tests were conducted on a sand fraction and a clay or fine fraction. A blend of clays or fines and sands was tested under triaxial conditions. Conclusions of the stability analyses led to the conservative design for stable solids slope angles of 3H:1V (Seegmiller 2014).

Outfacing OIS storage area slopes will be graded no steeper than 3H:1V angle. Outfacing OIS storage area slopes will be reshaped and concurrently reclaimed as mining progresses. The toes of the outfacing OIS storage area slopes will tie into the existing topography and in some locations will contain interceptor ditches to sequester and contain sediment during the revegetation process. Erosion control BMP's will be used as needed on areas of high sediment transport risk while vegetation is being reestablished. Erosion control BMP's may include rip-rap, straw wattles, erosion control blankets, silt fence and rock/log checks. Surface armoring with rock may be needed in areas where water pathways may develop.

In addition to outfacing slope design at 3H:1V based on the above-noted stability analyses, and to ensure OIS storage area stability for perpetuity, coarse overburden/inter-burden rock will be strategically placed to promote drainage. These internal rock corridors within the OIS are designed to promote drainage of meteoric infiltration on the storage areas. This is described further under backfill storage areas.

BACKFILL STORAGE AREAS

Once mining has opened a large enough excavation to allow equipment movement and backfilling in Pit 1, the overburden, interburden, and processed solids can be placed in the mined out pit as backfill (**Figures 4a-d**). Haul truck dump points will vary as needed in order to backfill the pits at the desired sequence. Mined out pit areas will be utilized to contain overburden, interburden and solids from the extraction plant similar to the OIS storage areas. Outfacing backfill slopes will be graded no steeper than 3H:1V angle. Outfacing backfill slopes will be reshaped and concurrently reclaimed as mining progresses. The toes of the outfacing backfill slopes will tie into the existing topography and in some locations will contain interceptor ditches to sequester and contain sediment during the revegetation process. Erosion control BMP's will be used as needed on areas of high sediment transport risk while vegetation is being reestablished. Erosion control BMP's may include rip-rap, straw wattles, erosion control blankets, silt fence and rock/log checks. Surface armoring with rock may be needed in areas where water pathways may develop. Natural drainage of the backfilled pits will be encouraged through the placement of internal course rock drainage corridors during construction of the backfill areas.

These drainage corridors will be constructed in strategic areas of the backfill, such as low areas on the pit floor, where water will naturally migrate. The void spaces in the coarse rock used to construct these drainage corridors will provide water a pathway to drain from and exit the backfill. This prevents water from building up in the backfill over time due to meteoric water infiltration. Water build up over time can cause increases in pore pressure in the backfill and OIS areas which reduces the stability of the slopes (Seegmiller 2014). Due to the minor flow rates anticipated, waters exiting the backfill or OIS areas through these drain corridors are anticipated to dissipate rapidly either through infiltration into the native soils or evaporation. Sediment control using straw wattles or similar BMPs may be used to protect the backfill slopes and to prevent transport of eroded material off the site. See the SWMP in **Appendix G** for more detail.

The estimated capacity associated with the three open pits, as well estimated volumes associated with the materials (i.e., mined overburden and interburden, and the processed solids) that will eventually be placed as backfill are provided in Section 106.4. A conservative bulkage factor of 30 percent has been applied to the solids material and a 15 percent bulkage factor applied to the overburden/ interburden materials in volume calculations. Material compaction may reduce these bulking factors. Final bulkage factors will be determined after actual field measurements can be completed. **Figures 4a-d** show the annual sequential development and concurrent backfill, and demonstrate that only a portion of the pit areas will remain open at any one time. As described in the Reclamation Section below, backfilled final pit slopes angles will be no greater than 3H:1V and will be sloped to this angle during filling to minimize re-grading efforts.

MAN CAMP

USOS operates a man camp on an as-needed basis to house seasonal employees and contractors. It is located within the PR Spring lease block, approximately two miles northwest of the plant site (**Figure 1 and 2**) along Seep Ridge Road. The man camp may include office trailers, housing, kitchen areas and space for personnel to park self-contained travel trailers. As needed, the man camp will be supplied with potable water and toilet/shower facilities where the waste water will be contained and serviced from a commercial source offsite. The man camp is accessed directly from Seep Ridge Road by a short access road.

106.3. Disturbance

The following acreages will be disturbed by mining and related operations, as based upon the full Phase 1 development (see **Figure 4d, Figure 1,** and **Figure 2**):

Table 1: Disturbance Areas

Facility	Area (acres)
Phase 1 Mining and Processing Area	
Plant site including office and processing facilities	20.6
Haul Roads	11.3
Pit 1	25.5
Pit 2	136.2
Pit 3	73.8
OIS storage areas	27.5
Storm Water Management Areas	6.9
Topsoil storage area adjacent to plant site	1.0
Topsoil storage area on pit*	3.8
Subtotal	302.8
Ancillary Areas	
Man camp	4.0
Production Well Area	
- 2 well pads	2.7
- road/pipeline	6.7
Sub-total well area	9.4
Sub-total ancillary area	13.4
Total disturbance	316.2

* not included in total, since this is a movable feature integral to the pit acres

Roads other than the east haul road and the production water well road are not provided separately in the above acreage table because they are temporary and integral to other disturbed areas such as the pits. The short access road to the man camp is included in the disturbance acreage listed for the man camp. Storm water management areas referred to in the table and shown on **Figures 4a-d** consist of a series of ditches and small storm water retention ponds to contain

erosion and manage runoff. These are described further in the SWMP (**Appendix G**).

Phase 1 disturbance will occur over an estimated 5-year time period wherein mining will progress sequentially from pit 1 through pit 3, with sequential construction of the OIS storage areas and the pit backfilling, as shown on **Figures 4a-d**. Table 2 provides an approximate cumulative disturbance acreage estimate by year, to correspond to this mining process. The actual acreage disturbed in a given time frame may vary from the information below, but in no case will exceed the total given for the year 5 disturbance.

Table 2: Cumulative Disturbance by Year (Approximate)

Year	Cumulative (running total) Disturbance (acres)	Estimated Reclamation (acres)	Approximate net disturbance (acres)
Year 1	95		95
Year 2	133	10	123
Year 3	223	30	183
Year 4	280	40	200
Year 5	316	120	116
Year 6	316	107	9

106.4. Nature and Amount of Materials to be Mined

The materials to be mined are oil sands. In the Uinta Basin of Utah, the oil sands deposits are overlain by the Green River Formation. They contain lenticular beds of lacustrine sandstone saturated with bitumen separated by intervals of barren sandstone, siltstone, shale, mudstone and calcareous marl. The overburden materials are comprised of siltstone and sandstone with interbedded shale; interburden layers between the oil sand deposits are expected to generally have the same characteristics as the overburden materials. **Figure 8** provides a geology map showing surface formations in the area, and **Figures 6a-c** provide cross sections through the Phase 1 area showing the oil sands beds.

Table 3 provides total Phase 1 volumes, by mining year, of material to be mined, for each material type. While these numbers are given to the cubic yard, they should be considered as approximate, as the mining conditions and exact timing cannot be known with certainty. Annual reports submitted to DOGM will contain the actual quantities mined, as required. The mining areas have been characterized by layers including overburden, oil sand layers in the beds known from top to bottom as D, C, B, and A, and interburden. Overburden varies from 0 to 50 foot depth and averages 20 foot depth. Interburden thickness, where known, averages 30 feet. Bed D averages 11 feet in thickness, Bed C averages 23 feet in thickness, and Bed B bed averages 24 feet in thickness. Bed A is shown on cross

sections but has been determined to be uneconomical to mine within the Phase 1 area. Oil sands ore is further subdivided into ore and sub-grade in Table 3. Sub-grade ore has grade values less than the economic cutoff grade, but will be mined in order to recover the economical ore in the deeper beds. Sub-grade ore handling is described in Section 106.2.

Table 3: Material to be Mined (Approximate) During Phase 1

Material		Year 1 (Pits 1,2)	Year 2 (Pit 2)	Year 3 (Pit 2)	Year 4 (Pits 2,3)	Year 5 (Pit 3)	Total (All Pits)
		Volume Moved (yd^3)					
Overburden		325,578	670,983	5,868,646	1,669,366	437,709	8,972,282
D-Bed	Ore	738,472	591,684	676,580	719,650	677,413	3,403,798
	Sub-Grade	207,692	88,324	590,072	381,990	115,017	1,383,094
Interburden C/D		13,855	84,393	331,474	364,327	80,751	874,799
C-Bed	Ore	64,733	255,844	3,153,870	2,798,131	2,427,812	8,700,390
	Sub-Grade	30,918	404,633	1,717,415	1,414,150	935,249	4,502,365
Interburden B/C		-	626	293,013	591,797	175,471	1,060,906
B-Bed	Ore	-	-	245,222	835,277	240,191	1,320,690
	Sub-Grade	-	-	323,192	610,153	328,711	1,262,056
Interburden A/B		-	-	20,547	2,544	-	23,090
Total Ore		803,205	847,528	4,075,671	4,353,058	3,345,416	13,424,878
Total Non-Ore		578,043	1,248,958	9,144,358	5,034,325	2,072,908	18,078,592

As shown in the table, the 5-year Phase 1 project will mine approximately 31.5 million cubic yards of material.

106.5. Existing Soil Types/Location and Extent of Topsoil

EXISTING SOIL TYPES

Soil types in the Affected Area include the: (1) Seeprid-Utso complex, 4 to 25 percent slopes, on the upper flats including the plant site, production well and pipeline, and man camp areas;(2) Tosca gravelly sandy loam, 25 to 40 percent slopes, where the terrain starts to drop off into the drainages; and (3) Gompers-Rock Outcrop complex, 50 to 80 percent slopes, on the steep, lower sideslopes.

The *Seeprid-Utso complex* is found from 8,100 to 9,200 feet elevation and occurs on the shoulders and summits of hills in the Mountain Stony Loam (browse) ecological site. It is derived from Aeolian deposits over residuum derived from sandstones and shales. Bedrock is generally 40-60 inches from the surface. The top 4 to 18 inches are loam to clay loam. Below 18 inches the soil becomes very channery. The soil is well drained and pH ranges from 6.6 to 7.8 in the top 18

inches. There is some calcium carbonate accumulation below 24 inches. Sodium levels and SAR are very low. The soil supports shrubs with a grass understory.

The *Tosca gravelly sandy loam*, 25 to 40 percent slopes occurs from 7,500 to 8,200 feet elevation on the backslopes of plateaus in the Mountain Stony Loam (browse) ecological site. It is derived from slope alluvium derived from sandstone and shale. Bedrock is generally 40-60 inches deep. Topsoil includes up to 2 inches of organic material underlain by a gravelly sandy loam to 11 inches. Below this the soil is very gravelly to cobbly. The pH ranges from 5.1 to 8.4 in the top 11 inches and from 7.9 to 9.0 below this. Calcium carbonate increases with depth, with the highest percentage between 11 and 39 inches. This soil has very little sodium.

The *Gompers-Rock outcrop complex*, 50 to 80 percent slopes is found from 6,500 to 7,400 feet elevation on cliffs, erosional remnants, escarpments and ledges in the Upland Very Steep Shallow Loam. It is derived from colluvium over shale residuum. Bedrock is within 4-8 inches of the surface. The top 8 inches is a very channery silt loam to loam. It is well-drained; the pH is 7.9 to 9.0. It has a calcium carbonate percent up to 30, and an SAR up to 10.

Table 4: Soil Types

Soil Series	Ecological site	Topsoil depth (inches)	pH	CaCO3 %	Gypsum %	SAR	Precipitation (inches)
Seeprid-Utso complex, 4- to 25% slopes	Mountain Stony Loam (browse)	4-18 *(avg. salvage depth 6 inches, assumed)*	6.6 to 7.8	To 75%	0	0	16-22
Tosca gravelly-sandy loam, 25-40% slopes		0-11 *(avg. salvage depth 4 inches, assumed,)*	5.1 to 8.4	To 40%	0	5.0	16-22
Gompers-Rock outcrop complex, 50-80% slopes	Upland Very Steep Shallow Loam	0	7.9 to 9	To 30	0	5-10	12-16

LOCATION AND EXTENT OF TOPSOIL

Topsoil will be salvaged prior to mining from all areas where it is practical to salvage topsoil (slopes flatter than or equal to than 2H:1V), and it will be stored for reclamation. The topsoil pile(s) will be needed for short and long term storage. They may be frequently be depleted and regenerated as replacement and salvage are ongoing. The plant topsoil stockpile will be recovered when the plant site is reclaimed. For the purposes of the topsoil volume summary discussed below, Phase 1 in its entirety is discussed here. It is assumed that topsoil will be

salvaged from 121 acres of Seeprid-Utso complex soils and 158 acres of Tosca soils. The conservative assumption is that topsoil will not be salvaged from the 24 acres of Gompers-Rock outcrop complex due to the zero-depth thickness estimated above and/or due to its occurrence on slopes steeper than 2H:1V. Depending upon field conditions and true slope angles some of the Gompers soil may be salvageable.

Topsoil from the development of the man camp is stored in two piles within the man camp along the periphery of the site. Topsoil from the production well and pipeline/road is segregated and stockpiled on the back slopes of the bar ditches along the road.

Estimated topsoil salvage depths and volumes for the PR Spring mine and plant site are contained in Table 5 below.

Table 5: Soil Salvage Information (Phase 1 Mining and Processing Area)

Soil Series	Estimated Salvaged Topsoil depth (inches)	Estimated Area (acres)	Estimated Volume (cubic yards)
Seeprid-Utso complex, 4- to 25% slopes	6	121	97,607
Tosca gravelly-sandy loam, 25-40% slopes	4	158	84,884
Gompers-Rock outcrop complex, 50-80% slopes	0	24	0
Total	N/A	303	182,491

However, it is important to note this is an estimate only; actual soil salvage volume could be more or less than this amount. The actual amount salvaged would be dependent upon what is encountered in the field: all available topsoil would be salvaged, which in some areas may reflect a lesser thickness than assumed and in other areas may be a greater thickness than assumed. The amount calculated above is the amount upon which reclamation is based and for which bonding will be in place.

106.6. Plan for Protecting and Re-depositing Existing Soils

Salvaged topsoil will likely be collected with a scraper and a dozer used in combination depending upon the gradient and the presence of rock. It will be stored in topsoil storage areas shown on **Figures 4a-d**. Only limited topsoil will

need to be stockpiled long-term due to the sequential mining and concurrent reclamation. Most topsoil will be stockpiled for a very short time period, or will be directly hauled to areas prepared for immediate reclamation. Topsoils will be protected by seeding with a fast growing cover grass, such as slender wheatgrass and/or Sandberg bluegrass seeded at a total of 10 PLS (pure live seed) pounds per acre. Topsoil piles will have straw wattle or similar means of sediment control. A sign will be placed at each topsoil storage area, indicating the stockpile is topsoil. The salvaged vegetation will be placed adjacent to or beneath the salvaged soil.

Most topsoil will be deposited on areas prepared for immediate reclamation once mining and/or backfilling is complete in an area and the surface is at final grade. The estimated topsoil salvage balance was provided in Table 5 above.

106.7. Existing Vegetative Communities

Existing vegetation in and near the Affected Area includes mixed shrub and sagebrush/grassland communities on the ridgetops, with Utah juniper (*Juniperus osteosperma)* on upper slopes, trending to a Dougulas fir (*Pseudotsuga menziesii*) community as elevation decreases. There are some aspen (*Populus tremuloides*) patches in the drainages. The Affected Area itself is primarily within the mixed shrub and sagebrush/grassland communities.

On August, 16, 2007 a quantitative vegetation survey utilizing 13 one-meter-square quadrats was conducted on plateaus and slopes located between 7,720 feet and 8,880 feet elevation, in the PR Spring lease block including within and immediately adjacent to the Affected Area (See **Figure 10** for quadrat locations, and **Appendix C** for vegetation survey data). On May 16, 2007 a qualitative vegetation survey listing all species noted was conducted on plateaus, slopes, and upper canyon sites located between 7,440 feet and 8,840 feet elevation on hilltops and hillsides within the mine area. Results of the vegetation surveys are summarized in Tables 6 and 7 below.

Table 6: Results of 13 cover transects surveyed August 17, 2007 to determine revegetation success standards

Life Form	Average Cover (percent)
Shrubs & Trees	*50.3*
Grasses	*14.7*
Forbs	*2.7*
Total vegetation cover	*67.7*
70% of cover value	***47.4***
Litter	*12.7*
Rock	*16.7*
Bare Ground	*21.0*
TOTAL	***100.0***

These results indicate that the post-reclamation vegetative cover for upland areas must be at least 47 percent to meet bond release standards.

Table 7: Species List of all species noted on May and August 2007 field trips

Scientific name	Common name	Relative abundance
Shrubs, Trees, and Sub Trees		
Quercus gambelii	Scrub oak	Common at mid-hi elev
Cercocarpus montanus	Birchleaf mountain mahogany	Common at mid-hi elev
Purshia tridentate	bitterbrush	Common at mid-hi elev
Amelanchier alnifolia	Utah serviceberry	Abundant at mid-hi elev
Symphoriocarpus albus	Snowberry	Abundant at mid-hi elev
Artemisia tridentate	Big sagebrush	Abundant at mid-hi elev
Artemisia filifolia	Fringed sage	Occasional at mid-hi elev
Artemisia ludoviciana	Herbaceous sage	Occasional at mid-hi elev
Chrysothamnus nauseosus	Rubber rabbitbrush	Occasional at mi-hi elev
Juniperus osteosperma	Utah juniper	Common at mid elev
Pinus edulis	Pinyon pine	Occasional at mid elev
Pseudotsuga menziesii	Douglas fir	Common at lower elev.
Populus tremuloides	Aspen	Common in drainages
Berberis repens	Oregon grape	Occasional at lower elev
Rosa woodsii	Woods rose	Occasional at lower elev
Ribes sp.	Currant	Occasional at lower elev
Pachistima myrsinites	Mountain boxwood	Occasional at lower elev
Forbs		
Opuntia sp.	Prickly pear	Occasional at mid-hi elev
Collinsia parviflora	Blue-eyed Mary	Occasional at mid-hi elev
Taraxicum officionale	Dandelion	Occasional at mid-hi elev
Astragalus beckwithii	Beckwith astragalus	Occasional at mid-hi elev
Phlox longifolia	Long-leafed phlox	Occasional at mid-hi elev
Erigeron pumulis	Shaggy daisy	Occasional at mid-hi elev
Senecio sp.	Senecio	Occasional at mid-hi elev
Delphinium bicolor	Larkspur	Occasional at mid-hi elev
Aquilegia sp.	Columbine	Occasional at lower elev
Frasera speciosa	Monument plant	Occasional at mid-hi elev
Lithospermum incisum	Puccoon or Fringed gromwell	Occasional at mid-hi elev
Stanleya pinnata	Wallflower	Occasional at mid-hi elev
Cryptantha glomerata	Popcorn flower	Occasional at mid-hi elev
Phacelia linearis	Narrow-leafed phacelia	Occasional at mid-hi elev
Antennaria sp.	Pussy toes	Occasional at mid-hi elev
Saxifraga sp	Brook saxifrage	Occasional at mid-elev
Osmorhiza beteroi	Mountain sweet cicely	Occasional at mid-elev
Erodium cicutarium	Red stem filaree	Common under aspen
Achillea millefolium	Yarrow	Occasional under aspen

Scientific name	Common name	Relative abundance
Maianthemum stellatum	False Solomon's seal	Occasional under aspen
Urtica dioica	Stinging nettle	Occasional under aspen
Descurainia pinnata	Flixweed	Common under aspen
Circium arvense	Canada thistle	Occasional under aspen
Grasses & Grass-likes		
Poa sandbergii	Sandberg bluegrass	Common at mid-hi elev
Pseudoroegneria spicata	Bluebunch wheatgrass	Common at mid-hi elev
Achnatherum hymenoides	Indian ricegrass	Occasional at mid-hi elev
Pascopyron smithii	Western wheatgrass	Common at mid-hi elev
Carex sp.	Dry-land or mountain sedge	Common under firs
Calamagrostis purpurascens	Purple Reedgrass	Occasional under firs
Bouteloua gracilis	Grama grass	Occasional at mid-elev
Poa pratensis	Kentucky bluegrass	Common under aspen
Leymus cinereus	Ryegrass	Occasional under aspen
Carex aquatilis	Water sedge	Seasonally
Scirpus sp.	Rush	Seasonally

106.8. Depth to Groundwater

The depth to the regional groundwater table in the vicinity of the PR Spring Mine is expected to be 1,500 feet or more (Price and Miller 1975). USOS's two production wells confirm this depth. The westernmost well is located at a ground surface elevation of 7,880 feet and is 2,550 feet deep. The easternmost well is located at a ground surface elevation of 8,043 feet and is 2,200 feet deep. The static water level in each is at approximately 6,400 feet in elevation, according to information on file with the State Engineer's Office.

No USGS mapped springs or seeps are located within the Phase 1 project area (see **Figure 9**). Further, a June 2014 site visit by USOS, DOGM, and DWQ, to specifically look for known and unknown seeps and springs, found no indication of springs, seeps, or other groundwater expressions within the Phase 1 area. In 2011 USOS conducted extensive geologic exploration drilling at the site. USOS drilled 59 exploration holes, at maximum depths of approximately 150 feet below ground surface, throughout the Phase 1 Project area and did not encounter groundwater (See **Figure 2**). These investigations confirm an absence of shallow ground water in the Phase 1 Project area. Groundwater is discussed further in Section 109.1 and in **Appendix B**, within correspondence supporting Permit-by-Rule coverage under the Utah DWQ's groundwater protection program.

Extent of Overburden Material

The oil sands beds outcrop in PR Canyon to the northeast of the mine area, and in Main Canyon to the southwest of the mine area (Murphy, Leonard A., 2003 private report). Based upon several coring programs in and near the Phase 1 project area, USOS estimates that average depth to mineable ore (and thus overburden

thickness) is approximately 20 feet, with areas near the outcrop having virtually no overburden, and areas on the southwest side having up to 50 feet of overburden.

Interburden extent is also a consideration in the Phase 1 project because multiple oil sands beds will be mined (**Figures 6a-c**). Between Bed D and Bed C there is a layer of interburden that averages 30 feet in thickness; between Bed C and Bed B, interburden averages 25 feet in thickness. Bed D averages 11 feet thickness and the Bed C averages 23 feet in thickness. Bed B averages 24 feet in thickness. Volumes associated with overburden, interburden, and ore were provided in Table 3 above (see Section 106.4).

Geology

Bedrock on SITLA lands leased by USOS includes thick, buff-to-cream, rim-forming, cross bedded sandstone cropping out in the bottom of Main Canyon. These rocks were mapped by Gaultieri (1988) as the Renegade Member of the Wasatch Formation consisting of medium to thick, indistinctly banded sandstone with sparse shale. These beds are overlain by the Green River Formation containing lenticular beds of lacustrine sandstone saturated with bitumen separated by intervals of barren sandstone, siltstone, shale, mudstone and calcareous marl. Five distinct asphalt impregnated sands, labeled A, B, C, D and E, with E the highest strata, occur in the upper portion of the Douglas Creek Member of the Green River Formation (Byrd, William D. 1970) and (Clem, K. 1984). The E bed is regionally known, but is not present locally in or near the Phase 1 project area. The beds crop out in PR Canyon to the northeast and Main Canyon to the southwest of County Road 2810 (Seep Ridge Road). All four of the local beds occur in an interval 240 to 290 feet thick (Murphy, Leonard A., 2003 private report). **Figure 8** provides a geology map. In the area of the opening pit, the strike of the beds is N 20° E, and the dip is 1.2-1.7° NW. The axis of the San Arroyo Anticline trends N 60° W veering to a S 45° W trend 1-2 miles east of the Affected Area. The strike and dip of the ore beds vary slightly throughout the planned mine area as the host formations are part of a gentle anticlinal structure, but dip probably averages about 1.5°.

106.9. Ore and Waste Stockpiles

The mined oil sands will be stockpiled at the plant site in areas shown on **Figure 3**. Generally, the operator will maintain a two-week supply of ore at the plant site, which means that approximately 60,000 cubic yards of raw oil sands will be stockpiled at any one time, awaiting processing. This material would be piled with the radial stacker within loader tram distance of the inlet feed hopper. Additional ore and processed solids (awaiting backfill) may be stockpiled in the auxiliary storage area. In addition, up to 2,500 cubic yards of reject material (oversized rock barren of bitumen rejected from the plant as well as any subgrade ore rejected at the ore stockpile) will be piled at any one time in a location near the solids stockpiles, prior to being returned to the pit as backfill or disposed of in the

OIS storage areas. Specific storm water management practices for the plant site will be detailed in the SWMP.

TAILINGS FACILITIES

There will be no liquid tailings ponds associated with this mining operation. The separated solids will be placed in OIS storage areas and in pit backfills, as described above in Section 106.2.

WATER STORAGE/TREATMENT PONDS

Water pumped from the previously described production wells and piped to the plant site will be stored in a raw water tank until needed. The capacity of this tank will be approximately 26,250 gallons (625 barrels). In addition, recycled process water will be stored in four insulated, 42,000 gallon (1,000-barrel), storage tanks.

There will be no treatment ponds located on the site. However, a storm water retention pond will be located at the low point of the plant site, and will collect all plant site storm water runoff and runoff-transported sediments. Any sediments that collect in this pond will be removed as needed to maintain design capacity. Water can also be pumped out to supply process plant make-up water as needed. Pond details were described above and in the SWMP (**Appendix G**).

Two additional small storm water retention ponds will be located in the storm water management area down gradient of Pit 1 and the associated OIS storage areas. These ponds will be fed by interceptor ditches which will collect haul road runoff and overland flow that may exit the OIS storage areas adjacent to Pit 1 **(Figure 7**). Additional small storm water retention ponds and interceptor ditches may be constructed within the Affected Area as needed to control storm water.

106.10. Amount of Material to be Extracted, Moved

Table 3 (Section 106.4), above, provides the volumes of overburden, interburden, and oil sands ore that will be removed from the mine during Phase 1. Table 5 provided the estimated volume of topsoil that will be removed from disturbed areas and stockpiles or directly used for reclamation purposes.

R647-4-108. Hole Plugging Requirements

All ore sands exploration holes that were previously drilled by USOS under other DOGM approvals have been plugged according to the requirements of R647-4-108. All of the water exploration holes, with the exception of the two completed production wells that will be used to supply Phase 1 water, were also closed. Future closure of the water wells is not part of this NOI. Any additional exploration drill holes, if proposed, would be plugged as required.

R647-4-109. Impact Assessment

109.1 Surface and Ground Water Systems

SURFACE WATER

The PR Spring lease block is located on the Tavaputs Plateau along the southeastern rim of the Uinta Basin. Hydrologically, it is within the Green River watershed (in HUC 14060005), which is part of the Colorado River system. It includes the relatively flat interfluve between PR Canyon and Main Canyon, as well as the headwaters of those canyons and adjacent tributaries. **Figure 9** shows watershed boundaries in the area, as well as other water features such as streams and springs or seeps. The Phase 1 project area is located on the drainage divide between PR and Main Canyons and extends southwestward into the Main Canyon watershed. Main Canyon and several of its tributaries (including Trail and Meadow Canyons) drain the majority of the PR Spring lease block area. There are no USGS-mapped springs or seeps in the Phase 1 project area. A May 28, 2014 site visit by USOS, DOGM, and DWQ, to look for known and unknown seeps and springs, found no indication of springs, seeps, or other groundwater expressions within the Phase 1 project area. Main Canyon flows generally west and northwest, entering Willow Creek several miles to the west. Willow Creek in turn flows into the Green River near Ouray. PR Canyon and a tributary named Jacks Canyon drain northward, conveying snowmelt and runoff from the northeast part of the area. Although there is a small spring complex located in PR Canyon, flow in these channels is intermittent or ephemeral. PR Canyon is tributary to Sweet Water Canyon, Bitter Creek, and the White River, prior to the White River entering the Green River near Ouray.

Precipitation in this area is estimated at about 12 inches annually (Price and Miller 1975), which is generally not sufficient to sustain perennial flow in the smaller watersheds in this region. Instead, much of the area is dissected by numerous ephemeral drainages that, although channels themselves are small, are located within larger canyons with steep slopes. Because the majority of mining and mining-related surface disturbance will be located on the relatively flat interfluve, there is negligible up-gradient watershed area that could contribute run-on.

The plant site will be constructed to be a self-contained area, through the use of perimeter berms or ditches where needed, as well as a storm water retention pond. All precipitation incident on the plant site (except that falling within other containment as described above in Section 106.2) will be collected in the storm water retention pond located at the low point of the plant site (**Figure 3**). If sediments accumulate in the pond, it will be cleaned as needed to maintain its design capacity. The SWMP (**Appendix G**) provides more information on runoff and sediment management.

Prior to reestablishment of vegetation on reclaimed backfill and OIS slopes, sediment control BMP's such as straw wattles, erosion matting, rip-rap and rock/log checks will be employed to reduce sediment transport from runoff. Areas forming drainage ways on these slopes will be armored with rip-rap. Interceptor ditches, placed in strategic locations, will transport water and sediment to storm water retention ponds. These storm water retention ponds will collect sediment and runoff from the haul road and adjacent areas. Their design and operation is described in more detail in the SWMP (**Appendix G**). Vegetation, once established, will be the primary sediment control and soil stability measure.

SPCC

An SPCC Plan will be prepared according to good engineering practices under the requirements of 43 CFR 112 to address all hydrocarbons that will be produced, stored, or used on site. The intent of the SPCC Plan is to comply with requirements for oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters. The SPCC Plan will include all containers, 55 gallons or greater, that contain oil; including fuels, oils and lubricants. Spill response procedures for the facility will be addressed in the SPCC Plan as well. When completed, the SPCC Plan will be submitted for inclusion in the NOI as **Appendix F**.

Storm Water Management Plan

According to DWQ, USOS does not need to obtain coverage under the State of Utah Multi-Sector General Permit for Industrial Discharges (see letter in **Appendix B**). All reasonable attempts will be made to implement and maintain BMPs to minimize impacts to downstream waters from the Phase 1 project. BMPs are described in a Storm Water Management Plan, which is attached in **Appendix H**. The Plan has been prepared to reduce the likelihood of inadvertent discharges of process waters or erosion-produced sediments. This subject is discussed further in Section 109.4 below.

GROUNDWATER

The oil sands deposit that would be mined during this project is located in the Green River Formation. The Parachute Member of the Green River Formation is the uppermost bedrock formation found throughout the region. This Formation includes various water bearing zones (including the Birds Nest and Douglas Creek aquifers), though they are apparently of limited extent and yield. The State Water Plan (Utah Division of Water Resources 1999) doesn't include any Green River Formation aquifers as significant enough to be targets for groundwater development, and information from wells and springs indicates generally low yields (Price and Miller 1975).

Underlying the Green River Formation at depth are the Wasatch Formation and the Mesa Verde Group. Price and Miller (1975) indicate that the potentiometric surface in the general area is 1,500 feet or greater below ground surface, with a

gradient to the north. As noted above, this was confirmed by USOS's two production wells, located within about one mile of the Phase 1 project area. (One of those wells intercepted a small amount of water at a depth of about 670 feet, which is about the same elevation as the nearby Main Canyon floor.)

At their maximum depth of approximately 150 feet below ground surface, none of the three Phase 1 pits are expected to encounter or approach this regional groundwater table. Further, because mining occurs on the hydrologically isolated interfluve between PR and Main Canyon, the Phase 1 mining will not affect groundwater gradient or quality. Litigation challenging the definition of ground water in this area was eventually dismissed by the Secretary who determined that there was only a limited amount of shallow, localized ground water at the site that is not part of a regional aquifer system (Supreme Court of the State of Utah opinion 2014 UT 25).

USOS's use of up to 360 acre-feet per year of groundwater obtained from the two production wells that intercept the deep regional aquifer will not adversely impact the local groundwater regime. The wells draw from the deep, low quality regional aquifer that is not a source for natural surface expressions or other wells in the region. The State Engineer confirmed this absence of connectivity in early 2014 in resolving a protest on a temporary change application to allow additional uses and places of use associated with the water right. The State Engineer found that neither production well is impacting a spring in the bottom of Main Canyon located approximately 3/4 mile south of one of the production wells and which discharges at an elevation of 7,440 (approximately 1,000 feet higher than the static water level in the wells).

USOS and DWQ have reviewed the project's Permit by Rule coverage under DWQ's Groundwater Protection Program. DWQ continues to support the *de minimus* impact of the project (including the planned pit backfills with processed solids) on groundwater resources. Copies of related correspondence are included in **Appendix B**.

WATER RIGHTS

According to online records of the State Engineer's Office, (Utah Division of Water Rights) there are a number of water rights in the region, as shown in Table 8 and on **Figure 9**. None of these would be affected by USOS operations.

Table 8: Water Rights

Water Right No.	Water Source	Quantity (cfs)	Use	Water Right Owner
49-55	Unnamed Spring	0.002	Stock watering	John S. Purdy
49-57	PR Springs	0.002	Stock watering	John S. Purdy

Water Right No.	Water Source	Quantity (cfs)	Use	Water Right Owner
49-193	Unnamed Spring	0.025	Stock watering	Alameda Corp.
49-196	PR Springs	0.021	Stock watering	Alameda Corp.
49-262	PR Springs	0.011	Domestic & stock watering	BLM
49-495*	Meadow Spring	0.015	Stock watering & wildlife	SITLA
49-496*	South PWR Meadow Spring	0.015	Stock watering & wildlife	SITLA
49-497*	North PWR Meadow Spring	0.015	Stock watering & wildlife	SITLA
49-498*	West Willow Reservoir #3	0.25	Stock watering & wildlife	BLM
49-499*	West Willow Reservoir #2	0.25	Stock watering & wildlife	BLM
49-500*	PR Reservoir	0.25	Stock watering & wildlife	BLM
49-504*	Jacks Canyon Spring	0.015	Stock watering & wildlife	BLM
49-1504	Unnamed Spring	0.05	Stock watering	SITLA
49-1505	Unnamed Spring	0.05	Stock watering	SITLA
49-1506	Unnamed Spring	0.05	Stock watering	SITLA
49-1508	Unnamed Spring	0.05	Stock watering	SITLA
49-1512	Horse Canyon Unnamed Spring	0.05	Stock watering	SITLA
49-1513	Horse Canyon Unnamed Spring	0.05	Stock watering	SITLA
49-1514	Horse Canyon Unnamed Spring	0.05	Stock watering	SITLA

Online water right records indicate that these claims "[have] not been established in accordance with statute and [their] validity is in question.*"

In addition, USOS, through an agreement with the Uintah Water Conservancy District, will use approximately 360 acre feet of water originally allocated under Water Right No. 41-3523 via a water rights transfer to Water Right No. 49-2274. The two previously discussed production wells are associated with this water right.

109.2 Wildlife Habitat and Federally Listed Species

Habitats in the Phase 1 mine area and surroundings are characterized by the flat-lying plateau above Main Canyon and PR Spring Canyon. Ephemeral drainages drop steeply off the plateau into these canyons. Existing vegetation includes mixed shrub and sagebrush/grassland communities on the ridge tops, with juniper on

upper slopes and side slopes, trending to a Douglas fir community as elevation decreases. There are some aspen patches in the drainages.

The Utah Division of Wildlife (DWR) Utah Conservation Database (UCD) lists plant and animal species that are federally designated as Threatened, Endangered, or are Candidates for Designation in Utah, or are listed as Sensitive Species by the DWR. Those that are listed as present in the southern portions of Uintah and/or the northern portions of Grand Counties are listed below in Table 9 (with the exception of listed fish species, since there is not adequate live water to support fish on or near the Affected area). The information was taken from the UCD website on April 24, 2014.

On August 6, 2014 the U.S. Fish and Wildlife Service (USFWS) withdrew the proposal to list Graham's beardtongue (*Penstemon grahamii*) and White River beardtongue (*Penstemon scariosus* var. *albifluvis*) as threatened species throughout their ranges or to designate critical habitat for these species. This is noted below in Table 9. The withdrawal was based on the conclusion that threats to these species and their habitats have been reduced.

The Utah Natural Heritage Program (NHP) of the DWR was contacted directly for information about known occurrences of species of concern. Their response letter, attached in the correspondence section (**Appendix B**), listed occurrences of the Mexican spotted owl (*Strix occidentalis lucida*) and greater sage-grouse (*Centrocercus urophasianus*) in the vicinity of PR Spring lease block. Species accounts are provided in the following sections.

Table 9: Threatened, Endangered, and Candidate Species that may be present at USOS PR Spring Mine

Common Name	Scientific Name	Status	Elevation in Feet / Habitat	Chance of Presence at Project Site
Shrubby reed-mustard	*Hesperidanthus suffrutescens*	E	6,000-7,000	None due to elevation
Clay reed-mustard	*Hesperidanthus argillacea*	T	4,725-5,750	None due to elevation
Uinta Basin hookless Cactus	*Sclerocactus wetlandicus*	T	4,500-6,500	None due to elevation
Graham's beardtongue	*Penstemon grahamii*	Withdrawn from listing	4,600-6,700	None due to elevation
White River beardtongue	*Penstemon scariosus* var. *albifluvis*	Withdrawn from listing	5,000-6,680	None due to elevation
Jones cycladenia	*Cycladenia Humilis var Jonesii*	T	4,000-6,800	None due to elevation
Black-footed ferret	*Mustela nigripes*	T	Prairie dog	None due to

Common Name	Scientific Name	Status	Elevation in Feet / Habitat	Chance of Presence at Project Site
			towns	lack of prairie dogs
Brown (grizzly) bear	*Ursus arctos*	T - Extirpated	Mountain timber	None
Southwestern willow flycatcher	*Empidomax traillii extimus*	E	Riparian areas with willows	None due to lack of riparian habitat
Greater sage-grouse	*Centrocercus urophasianus*	C	Sagebrush, rangelands	Unlikely due to lack of suitable habitat
Mexican spotted owl	*Strix occidentalis lucida*	T	Forests; steep rocky canyons	Unlikely due to lack of suitable habitat

PLANT SPECIES

Shrubby reed-mustard, *Hesperidanthus suffrutescens,* is a federally listed Endangered plant. This perennial, clump-forming mustard produces yellow flowers in May and June. It grows on shaley, fine textured soils of the whitish, semi-barren Green River Formation, Evacuation Creek Member. It is associated with mixed desert shrub and pinyon-juniper communities at elevations of 6,000 to 7,000 feet. The elevations in the PR Spring lease block are generally above, and the soils thicker and deeper than those noted above, making it highly unlikely that this species would be encountered within the immediate area.

Clay reed-mustard, *Hesperidanthus argillacea,* is a federally listed Threatened plant. This mustard produces white, purple-veined flowers that bloom from mid-April to mid-May. The plant is hairless with a stout, woody base. It occurs on the Green River Formation, Evacuation Creek Member, where it prefers precipitous slopes consisting of bedrock or scree mixed with fine-textured soils in mixed desert shrub communities at elevations of 4,725 to 5,750 feet. It is unlikely that this plant would be present within the PR Spring lease block due to elevation and site characteristics.

Uinta Basin hookless cactus, *Sclerocactus glaucus,* is a federally listed Threatened plant that is known to occur in central and southern Uintah county north of the PR Spring lease block. This cactus has a solitary, egg-shaped stem that is 3-12 inches long. Pink flowers are produced late April to late May. It is found on xeric, fine textured soils overlain by cobbles and pebbles on river benches, slopes, and rolling hills of the Green River and Mancos formations from 4,500 to 6,500 foot elevation. It is associated with salt desert shrub and pinyon-juniper communities. It is highly unlikely that this plant would occur on the area due to the higher elevation and moister site characteristics of the mine site.

Graham's beardtonque, *Penstemon grahamii*, was recently withdrawn as a Candidate for Federal listing. It occurs in the Uinta Basin of northeastern Utah and adjacent western Colorado. It exhibits thick leathery leaves, and large, tubular, light to deep lavender flowers that bloom from late May to early June. Graham's beardtongue grows directly on the weathered exposures of oil-shale strata associated with the Parachute Creek Member and Evacuation Creek Member of the Green River Formation at elevations between 4,600 to 6,700 feet. It is highly unlikely that this plant would occur i the PR Spring lease block due to the higher elevation and moister site characteristics of the site.

White River beardtongue, *Penstemon scariosus* var. *albifluvis,* was recently withdrawn as a Candidate for Federal listing. It is found in Duchesne and Uintah counties in Utah and Rio Blanco County in Colorado. This figwort has lavender to pale blue flowers that bloom in late May to June. It is found on semi-barren areas on white (infrequently red) soils that are xeric, shallow, fine-textured, and usually mixed with fragmented shale from 5,000 foot to 6,680 feet elevation. It is highly unlikely that this plant would occur in the PR Spring lease block due to the higher elevation and moister site characteristics of the mine site.

Jones cycladenia, *Cycladenia humilis var. Jonesii*, is a federally listed Threatened plant restricted to the canyonlands of the Colorado Plateau in Emery County, Garfield County, Grand County, and Kane County, Utah, as well as in immediately adjacent Coconino County, Arizona. A member of the dogbane family, it has somewhat succulent leaves with small rose-pink hairy flowers that bloom from mid-April to early June. Jones' cycladenia grows at elevations between 4,000 to 6800 feet in gypsiferous soils that are derived from the Summerville, Cutler, and Chinle formations; they are shallow, fine textured, and intermixed with rock fragments. It is highly unlikely that this plant would occur in the area due to the higher elevation and moister site characteristics of the mine site.

ANIMAL SPECIES

The **black-footed ferret**, *Mustela nigripes*, is federally listed as Endangered. Thought to be extinct, the species was re-discovered near Meteetse, Wyoming in the 1980's. Since then a captive breeding program has allowed introduction of populations classified as "non-essential-experimental" by the U.S. Fish and Wildlife Service (USFWS) in the Coyote Basin area of Uintah County in 1999, as well as at other locations in the west. There are also unconfirmed sightings of naturally occurring black-footed ferrets in eastern Utah.

Black-footed ferrets are nocturnal and rely on prairie dogs for their primary food, thus they are closely associated with prairie dog towns. Loss of prairie dogs (i.e., by plague, poisoning, or habitat loss) directly threatens the survival of the ferrets. Due to the lack of prairie dog colonies in the Affected Area, no black-footed ferrets would be expected to occur.

The **grizzly** or **brown bear,** *Ursus arctos,* was extirpated (eliminated) from Utah in the 1920s. Because of the drastic decline in brown bear numbers and distribution, the USFWS has listed it as threatened in the lower 48 states. The last known sighting of a grizzly bear in the state of Utah was over 50 years ago, thus the grizzly bear in not expected to occur in the state or Affected Area and no evaluation is necessary.

The **southwestern willow flycatcher**, *Empidonax traillii*, is federally listed as Endangered. It is a rare summer resident of southern Utah up to the northern border of Grand County. It prefers riparian habitats with willows and breeds in late spring and early summer. The Affected Area is at the northern boundary of the southwestern willow flycatcher's range; the lack of developed riparian habitat in the Affected Area makes it unlikely that this bird would occur in this area.

The **greater sage-grouse** is a Candidate for Federal listing. On January 12, 2005, the USFWS announced a 12-month finding for three petitions to list greater sage-grouse as Threatened or Endangered, as not warranted. On December 4, 2007 the U.S. District Court of Idaho ruled that the 12-month petition finding was in error. The USFWS also determined that a new status review was appropriate in order to address new information that had become available since the 2005 finding (specifically, information published since Connelly et al. 2004). The USFWS found on March 5, 2010 that listing the greater sage-grouse (range-wide) was warranted, but that listing was precluded by higher-priority listing actions. The greater sage-grouse was assigned a Candidate Listing Priority Number of 8, where 1 is the highest priority (FR 75(55) [March 23, 2010]: 13910-14014).

These birds inhabit sagebrush plains, foothills, and mountain valleys. Sagebrush is the predominant plant of quality habitat. Where there is no sagebrush, there are no sage-grouse. An understory of grasses and forbs and associated wet meadow areas are essential for optimum habitat. The birds are found at elevations ranging from 4,000 to over 9,000 feet and are highly dependent on sagebrush for cover and food.

Although greater sage-grouse are not protected by federal law, but as a "wildlife species of concern"; it is expected that conservation actions are needed to preclude the need to list sage-grouse under the Endangered Species Act. Greater sage-grouse are also currently listed as a Sensitive Species by the Utah DWR. Utah's Conservation Plan for greater sage-grouse (2013) includes incentive-based programs for private, local government, and SITLA projects. The goals of this plan are to protect, maintain, improve, and enhance greater sage-grouse populations and habitats within the established Sage-grouse Management Areas (SGMAs). The PR Spring lease block is not within or adjacent to any of the State's SGMAs. As noted in section 3.02 of the 2013 Conservation Plan for Greater Sage-grouse in Utah, "Sage-grouse habitat outside the SGMA's is not required for long-term conservation of the species. Much of this habitat has already been disturbed by human and natural causes and is not suitable for

enhancement or improvement." It is unlikely that sage-grouse would inhabit the Affected Area for the PR Spring Mine project due to lack of suitable habitat.

The **Mexican spotted owl** was listed as a threatened species on 15 April 1993 (USFWS 2007). The Mexican spotted owl is found in the southern and eastern parts of Utah on the Colorado Plateau, where it is a rare permanent resident. The spotted owl occupies a variety of habitats in different parts of its range, including various forest types and steep rocky canyons, this last habitat being the primary habitat used in Utah. Mexican spotted owls are non-migratory. They feed mainly on rodents and use nests in trees (especially those with broken tops), trunk cavities, or on cliffs.

Critical Habitat has been designated for the Mexican spotted owl, however, it is not in the region of concern for this project. Mexican spotted owl nesting habitat, as acquired from the BLM Vernal Field Office indicate that there is no known nesting habitat within 1.5 miles of the PR Spring lease block. Mexican spotted owls may use areas adjacent to known nesting habitat for foraging and other behaviors. Concurrent gas well development in the area may have already impacted Mexican spotted owl behaviors and use of habitats in the region. Avoidance of the area would be generally short-term, as foraging habitats would be ultimately reclaimed.

The DWR UCD was also reviewed to determine the presence of other important big game wildlife habitats in the area. The PR Spring lease block is within summer habitat for elk and mule deer.

109.3 Existing Soil and Plant Resources

SOILS

Existing soil types in the vicinity of the Phase 1 project are described in Section 106.5 above and are shown in **Appendix C**. Phase 1 mine disturbance will require the removal of soils within the Seeprid-Utso complex, located on the tops and shoulders of the plateau and within the shallower Tosca soils, located on the slopes below the plateau. All of this soil will eventually be replaced on top of reclaimed areas to facilitate revegetation. Soils within the Gompers-Rock Outcrop complex may also be removed if feasible, but based upon current understanding of lack of soil present and slopes steeper than 2H:1V, the material balance assumes that this soil type may not be salvaged and thus would be permanently lost.

Reclamation will remain as concurrent as possible as mining advances and processed solids are replaced in the excavated pits. This will allow regrading, topsoiling, and seeding of some lands including portions of the mined-out pits. Thus, to the extent possible, direct placement of topsoil will be done, or interim storage will be short term. All salvaged soils will be used on-site in reclamation.

PLANTS

The area intersects four plant communities: Sagebrush-grass, Mixed tall shrub, Pinyon-juniper-Douglas fir, and Aspen glade (**Figure 10**), as discussed in Section 106.7, Table 3, and in **Appendix C**. Revegetation, discussed below in Section 110.5, will not provide an exact replica of vegetation removed, but will provide replacement vegetation to provide for a functioning post-mining land use.

109.4 Slope Stability, Erosion Control, Air Quality, Cultural Resources, Public Health & Safety

SLOPE STABILITY

All aspects of the Phase 1 project are designed to minimize slope stability risks. Each mining pit will be constructed predominantly on the relatively flat-lying terrain of the plateau top, minimizing slope-related risks. The OIS storage areas will also be constructed on relatively flat topography near the plateau top, intercepting only very small areas at the upper reaches of two small catchments. All mined or filled slopes, both interim and final, have been designed to be stable.

Regular and routine inspections will occur throughout the mine and extraction plant area to ensure the operating conditions remain safe, MSHA/OSHA safety guidelines are being followed, and the mining plan stated herein is being followed. This will include inspecting to verify the pit wall slopes are at the correct angles and they remain stable.

PITS

All three open pits will be excavated into the terrain, with highwalls maintained at approximately 1H:1V. Numerous existing road cuts and excavations in the area (including USOS's 2005 production test pit) are stable with slopes steeper than 1H:1V, providing evidence of the conservative nature of USOS's design. Geotechnical analyses support the use of 1:1 pit wall slopes (Seegmiller 2013). Any required blasting along the walls of the pit will be accomplished with small controlled blasts to eliminate over-break and weakening of the remaining material on the face of the slope.

As noted above, regular and routine inspections will occur to verify that the pit wall slopes are at the correct angles and remain stable.

OVERBURDEN/INTERBURDEN STORAGE AREAS

Two small overburden/interburden storage areas will be constructed during the initial mining to store materials prior to sufficient area being opened so that backfilling can occur. The storage areas will be located on the ridge plateau and upper hillslopes above Main Canyon. As constructed, the slopes associated with the overburden/interburden storage areas will be at a maximum grade of between 2.5H:1V to 3H:1V, to facilitate reclamation.

EROSION CONTROL

Runoff and erosion control is expected to be necessary at certain locations to prevent off-site erosional impacts. The SWMP in **Appendix G** discusses this in

more detail. Generally, surface water will be restricted to that generated by on-site precipitation: little or no up-gradient runoff will enter the site. What surface water runoff does occur will be controlled such that erosion is minimized. Mine site storm water control is shown on **Figure 7**.

Some of the specific means of handling runoff and controlling erosion are described below, with more detail contained in the SWMP. In addition, should any specific means of handling runoff and controlling erosion be found to be ineffective, USOS would replace them with another type of BMP. These structures will be industry standard, using similar materials, installation techniques, and maintenance protocols as specified in DOGM's reclamation guide (DOGM 2008).

As recognized by Seegmiller International (2013), saturated conditions in process solids lend to reductions in slope stability. In addition to initial moisture present in process solids, meteoric water may infiltrate the backfill. To prevent material saturation and promote backfill stability for perpetuity, course overburden/ interburden rock will be used internally in the construction of the backfill to create small drainage corridors in areas where free drainage can be promoted. As backfill areas reach their final configuration and blend with natural topography, these areas will be covered with topsoil and revegetated as reclamation is completed. Sediment control using straw wattles or similar BMPs may be used to protect the backfill slopes. Their intent will be to catch eroded material and prevent transport via storm water off the site.

Most of the haul roads will be integral or adjacent to the pits, OIS storage areas, and backfill areas. Additional erosion control is not required in these areas. As needed, however, some haul roads may be ditched, to intercept and transport water to appropriate storm water ponds. The SWMP (**Appendix G**) provides more details on these road runoff and erosion control features.

The plant site will be constructed to be internally draining through the use of perimeter berms or ditches as needed to direct runoff. All precipitation incident on the site (except for precipitation that falls directly into one of the secondary containment structures for the tank farm and non-hydrocaron liquid storage areas or the process sump) will be collected in the storm water retention pond located at the low point of the plant site (**Figure 3**). Sediment production from the plant site will be negligible, due to gradient and surfacing. Any sediment transported in runoff would eventually make its way to the storm water retention pond, which will be cleaned of sediments as needed. Sediment will be hauled to the backfill or OIS areas.

The man camp location is crowned such that the living areas are at the high point of the camp. Drainage is generally to the southeast and the site is designed so that no high velocity runoff channels would promote erosion of the camp area or adjacent land. Camp staff will monitor the perimeter of the camp area for signs of erosion or other water damage. The northwest side of the camp pad and access

road are each constructed with drainage ditches along the perimeter of the structures to prevent water from pooling on the access road or along that side of the camp.

All BMPs will be regularly inspected, and maintained in operable condition. These above-noted types of BMPs are also described in the SWMP, which is included in **Appendix G**.

AIR QUALITY

The Phase 1 project is designed to minimize potential air quality impacts, including mechanisms or best management practices to minimize the following:

- Fugitive dust from stripped lands, the mine pit, OIS storage areas, backfill, and topsoil stockpiles.
- Fugitive dust from the plant site area and ore stockpiles.
- Emissions from the equipment used to mine, haul and separate bitumen from the ore.
- Fugitive dust from newly reclaimed lands.

Fugitive dust will be minimal from ore piles as the oily consistency of raw ore does not allow it to readily become airborne. Overburden and interburden may or may not be moist, depending on current weather conditions.

Once the oil is removed from the ore, clean processed solids remain. As the solids from the plant will be damp-dry (less than 20 percent moisture), wind generated airborne particles are expected to be minimal but will be actively monitored; if necessary, water trucks will be utilized to reduce and control any fugitive dust.

Haul roads will be sprayed regularly with water from a water truck. Water will be obtained from one of the production wells, in-pit storm water sumps or the processing plant storm water pond. Roads that are in use during most or all of the Phase 1 project may be covered with sub-grade ore to aid in dust suppression. Portions of the plant site may be similarly paved with sub-grade ore.

USOS will continue to coordinate with EPA on air permitting to sufficiently address the above air quality issues, including those associated with equipment emissions. USOS intends to comply with the conditions set forth by EPA.

CULTURAL RESOURCES

Cultural resources were reviewed and inventoried onsite during surveys completed in April 2014 for the water wells and road/pipeline, April 2014 and May 2007 for the PR Spring Mine and plant site, and May 2011 for the man camp. No previously documented or new cultural resources were recorded (**See Appendix B**).

PUBLIC HEALTH AND SAFETY

The following measures are in place to protect public health and safety:

- MSHA safety guidelines will be followed in all aspects of the mining portion of the project.
- OHSA safety guidelines will be enforced for all aspects of the extraction plant downstream of the reclaim feed hopper as well as office, maintenance, and ancillary support facilities.
- There are no shafts or tunnels within the Affected Area and therefore none that require closing or guarding.
- All trash, scrap metal, and wood, and extraneous debris will be discarded in appropriate receptacles at a designated location prior to being routinely hauled offsite to a licensed facility. Further, volumes of material such as bitumen product and waste oil will be periodically removed from the site as needed so their allocated storage is not exceeded.
- Any exploratory or other drill holes will be plugged or capped as set forth in Rule R647-4-108.
- Warning signs will be posted in locations where public access to operations is readily available, including at the points of exit/entry from the main access road (Co. Road 2810) to the open pit and plant site.
- All blasting materials will be under the control and care of certified blasting contractors.
- Warning signs advising the public of blasting protocols will be posted at the access road to the pit area and at the appropriate locations as required by MSHA.
- All pit highwalls and areas where there is a leading edge embankment will be bermed.
- Adequate factors of safety will be maintained.
- During all USOS mining work in the vicinity of the Summit Midstream natural gas pipeline, USOS would operate safely and in cooperation with Summit Midstream to ensure safety of both operations and the public.
- Containers stored on-site will be labeled so that all materials are clearly identified. Salvageable materials and other wastes will be stored at the plant site within the fenced area. Small quantities of necessary chemicals, lubricants, and fuels will be stored in appropriate containers according to appropriate building and fire codes.

R647-4-110. Reclamation Plan

110.1 Current Land Use and Post Mining Land Use

The current land use is mining, grazing, exploration, and wildlife habitat/open space. Due to the nature of exploration and ongoing activity in the Uinta Basin, the post mining land use may include exploration but is currently planned as wildlife habitat and open space. In order to ensure an environmentally safe and stable condition for the wildlife in the area that meets the objectives of the Utah Mined Land Reclamation Act 40-8-12, USOS will leave safe, stable topography; remove man-made structures including tanks, ponds, and containments; and establish suitable native vegetation.

110.2 Reclamation of Road, Highwalls, Slopes, Etc.

If economics allow, mining may continue in other portions of USOS's leases. In this case, facilities, and some roads may be maintained for access, and all new disturbances and operations would require additional approvals from DOGM. At this time, however, the mine/reclamation plan and associated bond estimate are based upon Phase 1 mining and the associated disturbance.

The overall objective of the reclamation plan described herein is to reclaim the entire Affected Area other than the wells and well access road, so as to allow post-mining land uses of oil and gas exploration and development, wildlife habitat and open space to resume. This objective will be met in part by removing facilities and structures that have been brought to the site, topsoiling, and reseeding, as described in more detail below. The intent is to meet the requirements of the Utah Rules at R647-4, as stated in Section 110.6 below, and to meet the objectives of 40-8-12 of the Utah Mined Land Reclamation Act which include provisions for a safe, stable, environmentally functioning site. Concurrent reclamation of open pits, via backfill disposal of overburden, interburden, and processed solids will spread the reclamation obligation over the life of the project.

Throughout the reclamation activities, visual inspections will regularly be made at the site, focusing on erosion and sediment control, further ensuring the reclamation goals can be met. It is anticipated further visual inspections will be made by DOGM, and will include ensuring that all reclamation activity obligations under the Utah Mined Land Reclamation Act and associated rules are being met. These inspections will continue until such time as DOGM approves the reclamation work and releases the surety.

Various types of equipment will be used to accomplish the reclamation objectives, as detailed in the surety calculations (**Appendix E**). This equipment includes, among others: dozers, graders, scrapers, cranes, hand power tools, dump trucks, loaders, semi- and low-boy trailers, water trucks, trackhoes, backhoes, and

seeders. The water truck will be used to provide dust suppression as needed, and water will come from one of the two production wells.

ROADS

Through final reclamation, USOS will maintain roads as needed to minimize erosion and off-site sedimentation. Such road maintenance will continue until the roads are fully reclaimed.

Roads needed for maintenance access to the water well/pipeline will not be reclaimed. The road segment to the man camp would be deep-ripped to relieve compaction, regraded to blend with site topography, and seeded.

Roads that are not integral to the pits, backfills or OIS storage areas would be reclaimed during final reclamation. These roads would be deep-ripped to relieve compaction, regraded to blend with site topography, topsoiled, and seeded. Roads that are integral to the pits, backfills and OIS storage areas will be reclaimed as part of those features.

HIGHWALLS

No highwalls would remain at the end of mining as pits would be backfilled and/or graded off to blend with the existing surrounding topography.

SLOPES

All OIS storage areas will be graded during placement to a 3H:1V or flatter slope to achieve a stable, natural-looking landscape. While short segments may exceed this overall slope, no portion of the reclaimed slopes will be steeper than 26° and no areas will be so steep as to be unstable, cause safety hazards, encourage erosion, or hinder successful revegetation. The OIS storage areas and backfill areas will be re-contoured to blend with the surrounding terrain, provide a site amenable to revegetation, and minimize runoff and erosion. Concurrent reclamation will take place as portions of these OIS storage and backfill areas are completed. Any surface expression of rock from construction of internal rock drainage corridors will become part of the reclaimed surface, and be similarly topsoiled and seeded.

Safety and erosion control will be of primary focus during reclamation activities. As described further in Section 110.5, available salvaged topsoil will be applied to all areas with the exception of the armored drainage channels. The entire area will be seeded with native species to stabilize the soil, and provide for the post-mining land use.

PITS

Pits would be backfilled to their original volume or higher, with processed solids, and overburden/interburden. Since the pit floors will be backfilled concurrently as part of the mining process, they will not need to be ripped.

The resulting backfill contours will be graded to blend with surrounding topography, topsoiled, and seeded. Thus pits will not be impounding features upon final reclamation.

DRILL HOLES

Any additional exploration holes drilled during Phase 1 mining activities will be plugged and closed as prescribed in R647-4-108.

FACILITIES AND MATERIALS

All of the structures on the plant site will be taken apart and hauled away for reuse, resale or disposal (**Appendix E**). Inert materials, such as gravel, foundations, and small quantities of solids and reject materials would be integrated into the plant area recontouring efforts.

The man camp would be dismantled and all facilities removed. The site would be ripped, topsoiled, and seeded.

The production well and pipeline will be maintained until USOS determines these assets are of no further value to the company, at which time USOS may elect to transfer ownership of these assets including infrastructure, water rights, maintenance and reclamation responsibilities to another appropriate entity.

Residual materials in the extraction plant equipment will be removed. The equipment will then be removed from the containment areas, disconnected from individual skids, and hauled away. All of the residual material will be separated into solid, aqueous, or hydrocarbon phases. The solid phase can be discharged on site to the mined-out pits, as it consists of the same materials that have already been placed in that area. The aqueous phase will be pumped to a tank or container for off-site disposal. Any remaining bitumen that is not sold to a refinery will be recovered with a vacuum and hauled off-site and disposed of appropriately. No hazardous materials presenting an impact to public health and safety will be disposed on site.

The re-bar reinforced concrete foundation under the warehouse and shop will be fractured to eliminate meteoric water ponding before being covered with native materials.

Non-geologic based liners will be removed from the site and disposed of at an appropriate disposal facility. Retention ponds will be filled or reshaped to blend into the surrounding topography and to prevent future water retention. Reserve, processed solids, and reject rock stockpiles will be loaded into trucks and hauled back to pit where an opening will be made to place unused ore in the backfilled pit. The plant site area will then be regarded, ripped, topsoiled, and reseeded.

Trash removal will occur after all buildings and facilities are removed; it will involve collection of all refuse, litter, stray metal, pipe, wood, insulation, and other debris. The area will be inspected to check for and collect trash.

There will be no shafts or adits, or similar structures that would require reclamation. As noted above under the "Pits" subheading, the pits will not be impounding after backfilling and reclamation.

110.3 Surface Facilities to Remain

The process plant, all associated support facilities, and mining equipment would be removed from the site, unless economic conditions allow for continued mining, in which case the plant site facilities and man camp would remain intact and require separate permitting. The production well and access road/pipeline as shown on **Figure 11** would remain in place as stated above.

110.4 Treatment, Location and Disposition of Deleterious Materials

During operations, all new and spent fuel, oil, and lubricants will be stored within secondary containment as required by the SPCC Plan, as further described in the operations - processing, Section 106.2 and **Appendix F**. Any containers and their contents remaining at the end of operations will be removed to a licensed disposal facility prior to reclamation of the plant site. Any hydrocarbon spills that occur during mining operations will be dealt with as outlined in the SPCC Plan, and will not be a consideration during reclamation. Any fuel spills that occur during the reclamation process will be similarly managed.

Any other chemicals, including the solvent, present during operations, will be consumed during operations. Any of the stored substances remaining onsite at the end of mining will be properly removed and disposed of, prior to final reclamation. Any remaining fuels will be used to fuel equipment used in reclamation work. Fuels and liquids remaining after reclamation will be removed for disposal or re-use in accordance with relevant regulations. No acid forming or deleterious material will be left on-site.

110.5 Revegetation Planting Program and Topsoil Redistribution

Table 10, below, shows that all of the Affected Areas other than the well pads and road will be reclaimed by various methods. This includes redistributing topsoil on all areas except those associated with the armored drainage channels and the topsoil storage areas (soils will not have been salvaged on those areas, so original topsoil will remain).

Table 10: Reclamation Treatment Acres

Facility	Affected Area (acres)	Acres to be graded	Acres to be ripped	Acres to be topsoiled	Seeded Acres
Plant Site including Office and Processing facilities	20.6	20.6	20.6	20.6	20.6
Haul roads	11.3	11.3	11.3	11.3	11.3
Pit 1	25.5	25.5	0	25.5	25.5
Pit 2	136.2	136.2	0	136.2	136.2
Pit 3	73.8	73.8	0	73.8	73.8
OIS storage areas	27.5	27.5	0	27.5	27.5
Storm Water Management Areas	6.9	0	0	0	6.9
Topsoil storage adjacent to plant site	1.0	0	0	0 (topsoil already in place)	1.0
Topsoil storage area on pit*	0	0	0	0	0
Subtotal	302.8	294.9	31.9	294.9	302.8
Man camp	4.0	0	4.0	4.0	4.0
Production Well Area					
- 2 well pads	2.7	0	0	0	0
- road/pipeline	6.7	0.8	0.8	0.8	0.8
Sub total well area	9.4				
Sub total ancillary area	13.4				
Total disturbance treatment	316.2	295.7	36.7	299.7	307.6

*Areas are integral to pits or OIS storage areas and reclamation treatments are included within those facilities.

SOIL MATERIAL REPLACEMENT

Once final grading is complete on each area that is ready for concurrent reclamation, as described above, topsoil will be replaced using scrapers/trucks and dozers. The majority of the area would have the benefit of either a short storage period or a direct placement from one area where mining is preparing to begin to another area where reclamation is proceeding. This will eliminate the need to store large quantities of topsoil long-term and will preserve its quality. Topsoil would be placed on the backfilled surfaces of the pit and OIS storage areas (with exceptions as noted previously) as the mining/processing/backfilling sequence allows. Topsoil will be redistributed to about a 4-inch depth with a scraper and/or dozers. Topsoil storage areas will not be topsoiled.

Topsoil will be replaced on the water pipeline disturbance as soon as construction is complete.

Vegetative matter gathered during the topsoil salvage operations and stockpiled as a component of those piles would also be spread along with the topsoil, providing organic matter and helping with soil moisture retention. Any additional salvaged vegetation that was stored in slash piles will be placed and redistributed on reclaimed areas in order to provide organic matter and surface roughness.

Equipment used for this task is likely to be a dozer, scraper, grader, and farm tractor/implements.

SEED BED PREPARATION

After the topsoil has been placed a range land seeder will be used to drill the seed mix into the soils. Alternatively, if a range land seed drill is not available, broadcast seeding will be followed by disking the area to roughen the soils and work the seed into the soils. This roughening from a seed drill or disk will also loosen soils to promote root penetration. The salvaged topsoil will provide a reasonable growth medium for the site. No mulch or fertilizer will be used in reclamation efforts. The final surface will be rough, creating small depressions for water retention sites and habitat niches.

Seed Mixture

A single seed mix (Table 11) will be used for all reclaimed surfaces and is based on sampling results and NRCS ecological site data. Any alterations beyond what is included in the list would require agency approval. All affected acres will be seeded. .A tractor-pulled broadcast seeder or a range land seed drill will be used on all accessible areas. Smaller broadcast seeding may be required in some areas.

Table 11: Seed Mix

SPECIES	SEEDS/LB	PLS* LB/AC
Forbs -		
Blue flax (*Linum lewisii*)	293,000	0.50
Rocky Mountain penstemon var. Bandera (*Penstemon strictus*)	592,000	0.25
Small burnet (*Sanguisorba minor*)	55,000	1.00
Lupine (*Lupinus caudatus* or *L. alpestris*)	27,600	1.00
Total forbs in seed mix		2.75
Grasses -		
Muttongrass (*Poa fendleriana*)	890,000	2.00
Canby bluegrass (*P. canbyi*)	926,000	1.00
Indian ricegrass (*Achnaetherum hymenoides*)	150,000	2.00
Great basin wildrye var. Magnar (*Leymus cinereus*)	130,000	2.00
Bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*)	140,000	3.00
Western wheatgrass (*Pascopyrum smithii*)	110,000	3.00
Total grass in seed mix		13.00
Shrubs -		
Sagebrush – Wyoming or Mountain (*Artemisia tridentata wyomingensis or vaseyana*)	2,500,000	0.25
Bitterbrush var. Lassen (*Purshia tridentata*)	15,000	2.00
Serviceberry (*Amelanchier alnifolia*)	25,800	1.00
Snowberry (*Symphoricarpos oreophilus* or *S. albus*)	75,000	1.00
Total in shrubs in seed mix		4.25

Total pounds of seed applied per acre: 20.0 PLS lb/ac

* PLS = Pure Live Seed

Seeding Method

The seed mix will be drilled with a range land seeder or be broadcast seeded on all areas that will be reclaimed, including OIS storage area slopes and pit slopes. Revegetation work, including both seedbed preparation and seed application will take place in the late fall season and seed would be spread as soon as possible following seedbed preparation.

Other Revegetation Procedures

As noted throughout this document, all reclaimed slopes will be stabilized by leaving them at a 3H:1V or flatter and leaving them in a very roughened form to maximize infiltration and minimize runoff. It is important to note that there will be little to no run-on on these reclaimed surfaces.

USOS will monitor for noxious weeds, and would provide weed control measures according to County directives should noxious weeds pose a potential problem. This will be done in the early summer months each year after reclamation until bond release has occurred. The monitoring would consist of a site visit by a person familiar with the potential noxious weeds, and a simple visual walk around the reclaimed areas. If any Noxious weeds are identified, the County would be informed of their extent, and actions taken as directed by them.

Further, USOS would qualitatively and visually monitor revegetation success for the first two years after reclamation, during the growing season. During the third summer, quantitative surveys, following the appropriate Division guidelines, will be conducted to assess revegetation success. This will determine whether revegetation has achieved 70 percent of the pre-mining cover, and survived after three growing seasons, as required by R647-4-111.13.11.

110.6 Statement

USOS would conduct reclamation as required under the Utah Rules R647-4.

R647-4-112. Variance

No variances are being requested for this mining operation.

R647-4-113. Surety

A reclamation surety estimate will be provided to the Division and placed in **Appendix E.** The calculated bond is for the Affected Area delineated by the "Disturbance Limit Boundary" and described in text and as shown on the figures.

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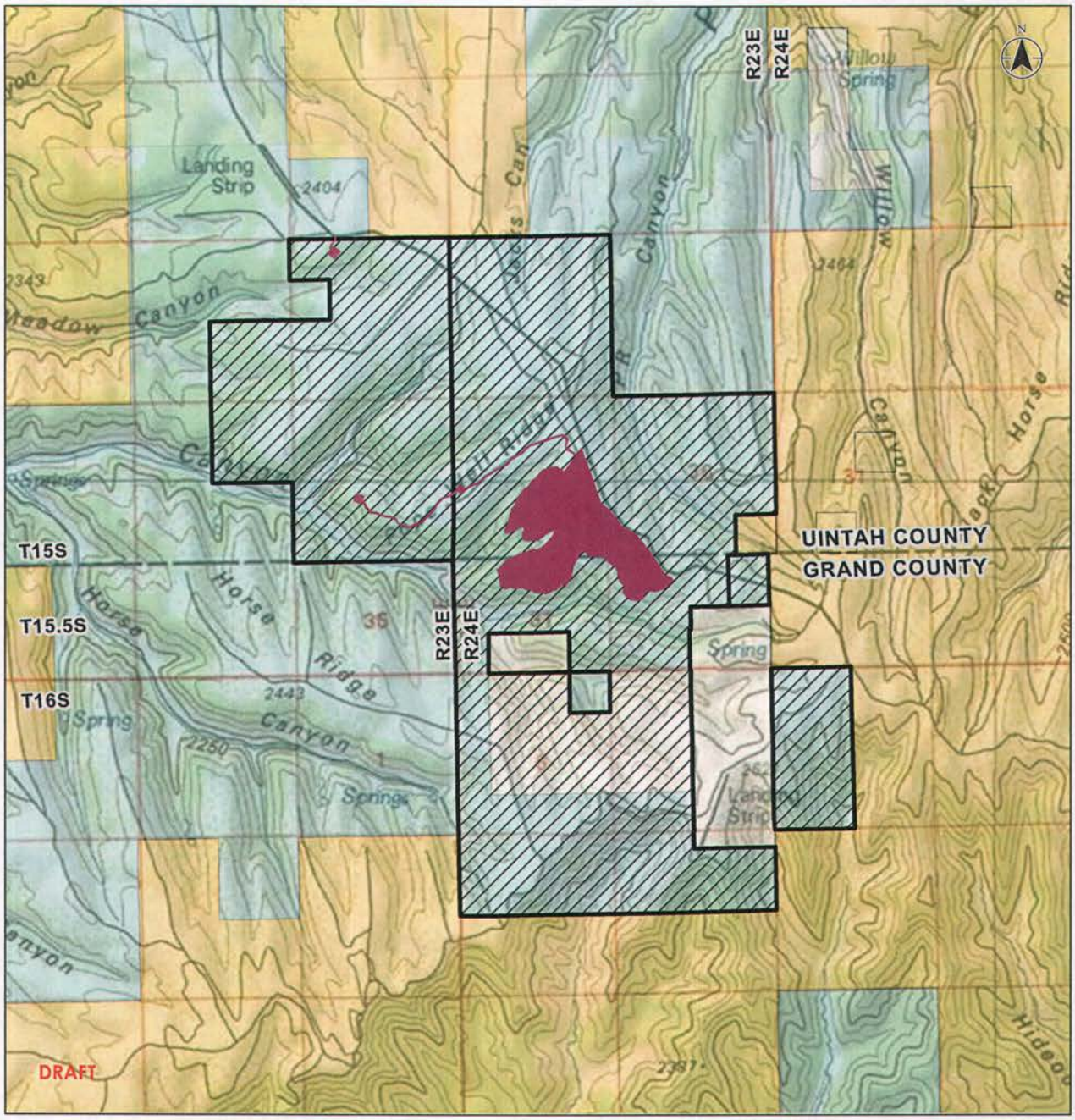
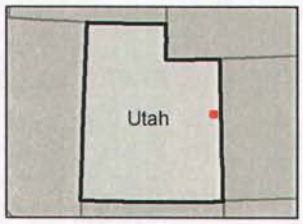
FIGURES

X:\UT\Clients\US_OilSands\Utah\Inc\PRSpringMine\Project_203714048\MXDs\Figure 1 Project Location Map r1.mxd Revised: 2014-11-03 By: cpalton





Legend

- PR Sping Lease Block
- Affected Area

Ownership

- BLM
- Private
- State

0 0.4 0.8 miles

1:60,000 (at original document size of 8.5x11)

Stantec U.S. OIL SANDS

Project Location	203714048
Portions of T15S R24E, T15.5S R24E, and T16S, R24E Uintah and Grand Co., UT	Prepared by CLP on 2014-10-07 Technical Review by KK on 201410-10 Independent Review by LM on 2014-10-30

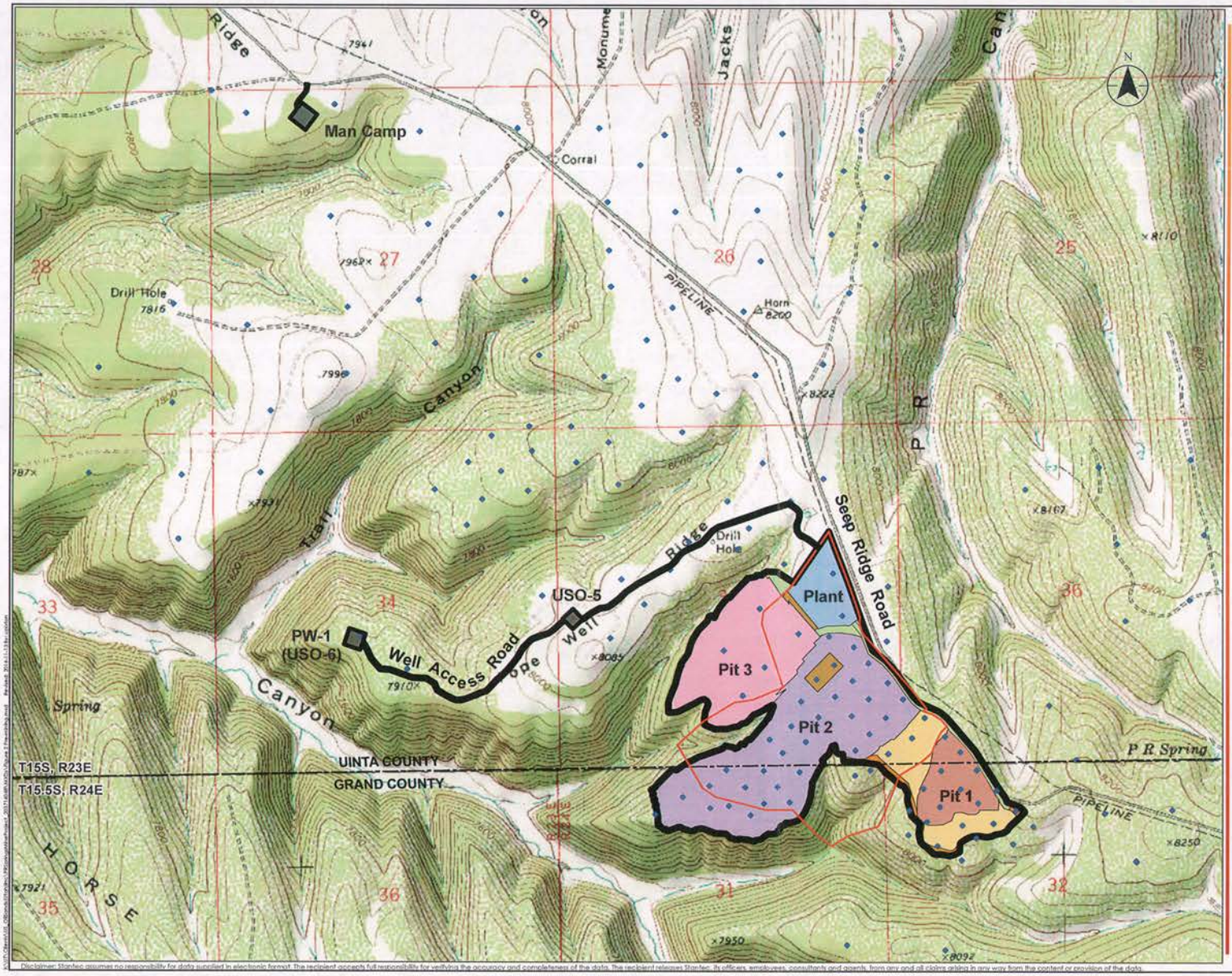
Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
1

DRAFT

Title
Project Location Map

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Copyright © 2013 National Geographic Society, i-cubed



Stantec

U.S. OIL SANDS

Legend

- Previously Approved Permit Boundary
- Disturbance Limit Boundary
- County Line
- Drill Hole
- Pit 1
- Pit 2
- Pit 3
- Plant
- Stormwater Management Area
- OIS Storage Area
- Topsoil Stockpile
- Haul Road Disturbance
- Well, Well Access Road, and Man Camp

Notes

1. Coordinate System: NAD 1927 UTM Zone 12N
2. Modified from Norwest Corporation, 08/04/2014, T:\USOilSands\384-6

Project Location
Portions of T15S R24E, T15.5S R24E, and T16S R24E
Uintah and Grand Co., UT

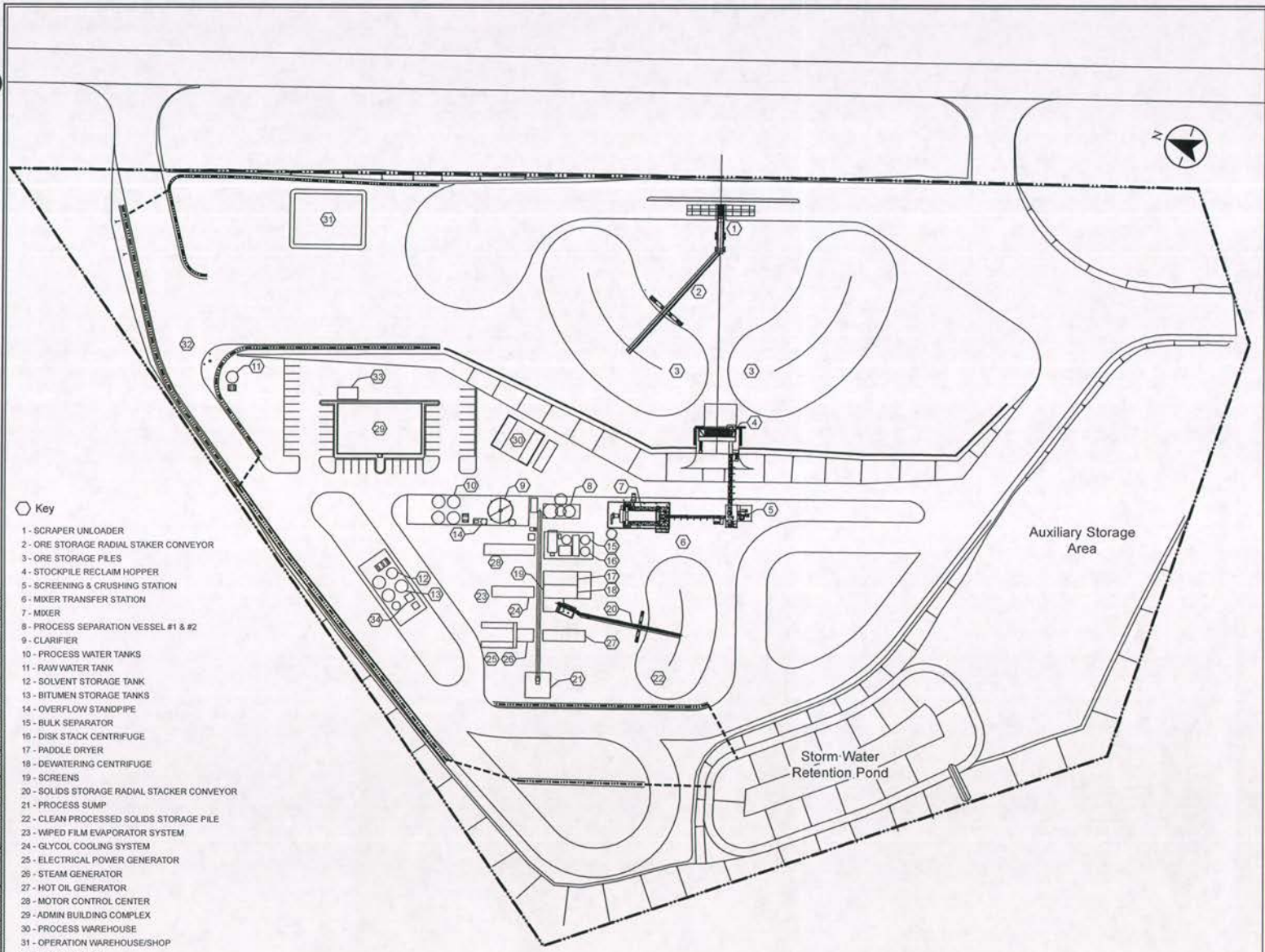
203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-11-12

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
2

DRAFT

Title
Pre-mining Map



Key

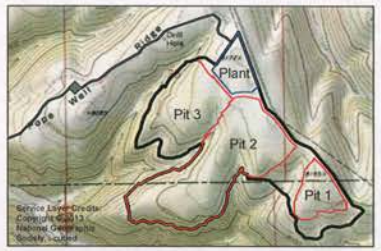
1 - SCRAPER UNLOADER
2 - ORE STORAGE RADIAL STAKER CONVEYOR
3 - ORE STORAGE PILES
4 - STOCKPILE RECLAIM HOPPER
5 - SCREENING & CRUSHING STATION
6 - MIXER TRANSFER STATION
7 - MIXER
8 - PROCESS SEPARATION VESSEL #1 & #2
9 - CLARIFIER
10 - PROCESS WATER TANKS
11 - RAW WATER TANK
12 - SOLVENT STORAGE TANK
13 - BITUMEN STORAGE TANKS
14 - OVERFLOW STANDPIPE
15 - BULK SEPARATOR
16 - DISK STACK CENTRIFUGE
17 - PADDLE DRYER
18 - DEWATERING CENTRIFUGE
19 - SCREENS
20 - SOLIDS STORAGE RADIAL STACKER CONVEYOR
21 - PROCESS SUMP
22 - CLEAN PROCESSED SOLIDS STORAGE PILE
23 - WIPED FILM EVAPORATOR SYSTEM
24 - GLYCOL COOLING SYSTEM
25 - ELECTRICAL POWER GENERATOR
26 - STEAM GENERATOR
27 - HOT OIL GENERATOR
28 - MOTOR CONTROL CENTER
29 - ADMIN BUILDING COMPLEX
30 - PROCESS WAREHOUSE
31 - OPERATION WAREHOUSE/SHOP
32 - FIRE HYDRANT
33 - LAB
34 - FUEL STORAGE TANKS

Stantec U.S. OIL SANDS

Legend
- Plant Boundary
- Berm
- Culvert
- Ditch

0 120 240 Feet
1:1,440 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1927 StatePlane Utah Central FIPS 4302
2. Modified from KBR, Figure 3 Overall Site Plan, 09/30/2014, F714-400-SP-NOI



Project Location
Portions of T15S R24E, T16.5S R24E, and T16S, R24E
Uintah and Grand Co., UT

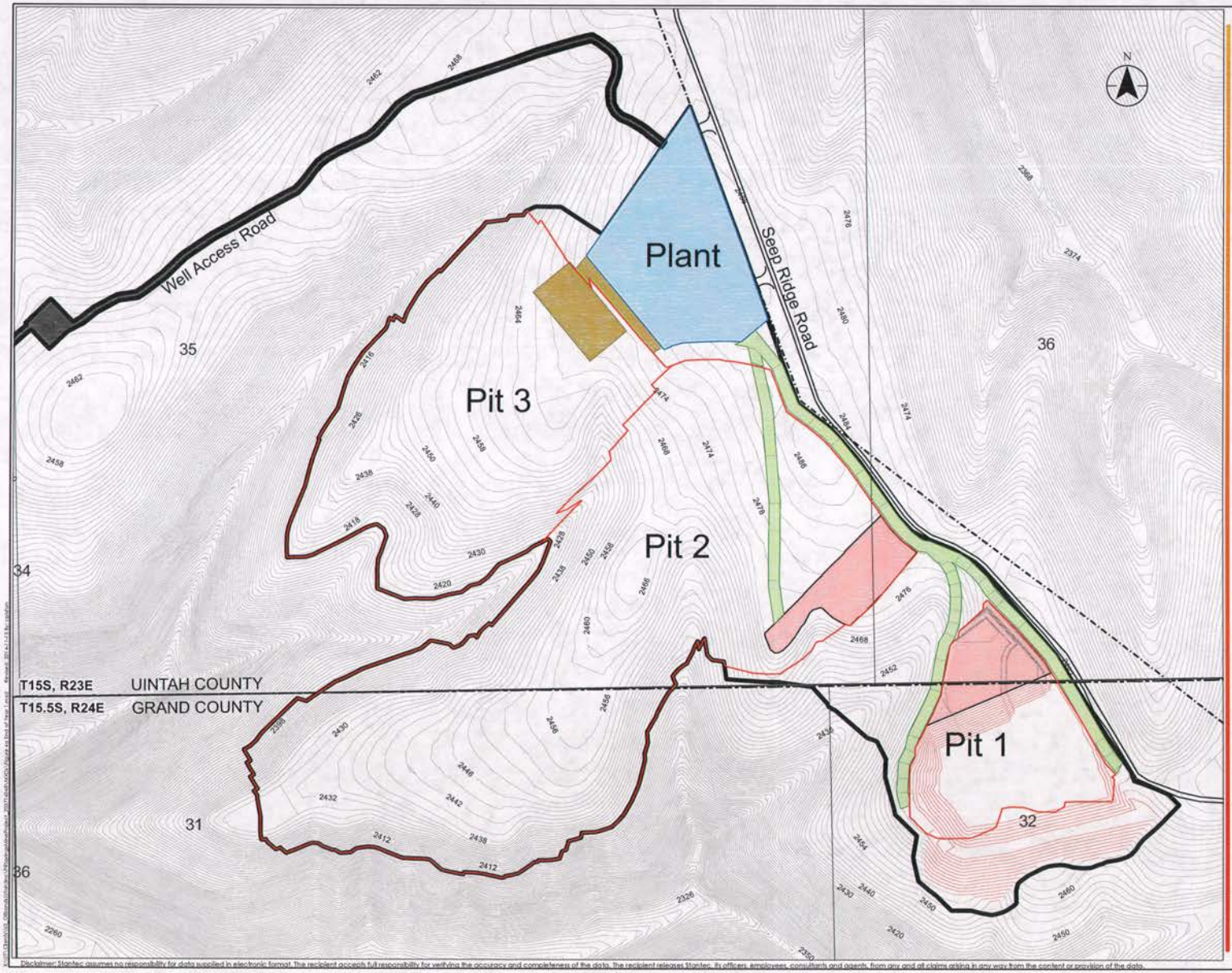
2037 14048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
3

DRAFT

Title
Overall Site Plan



Stantec

U.S. OIL SANDS

Legend

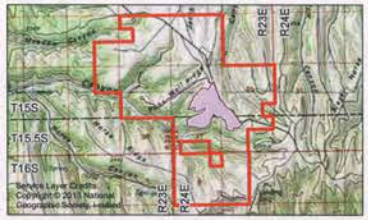
- Disturbance Limit Boundary
- County Line
- Gas Lines
- Roads
- Topo Contours (2 meters)
- Pit Boundary
- Plant
- Topsoil Stockpile
- Well and Well Access Road
- Active Mining Pit
- Haul Road
- Backfill Contours (2 meters)

0 600 1,200 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1927 UTM Zone 12N
2. Modified from Norwest Corporation, Quarter 4 Year 1, 08/04/2014, T:\USOilSands\384-6



Project Location
Portions of T15S R24E, T15.5S R24E, and T16S R24E Uintah and Grand Co., UT

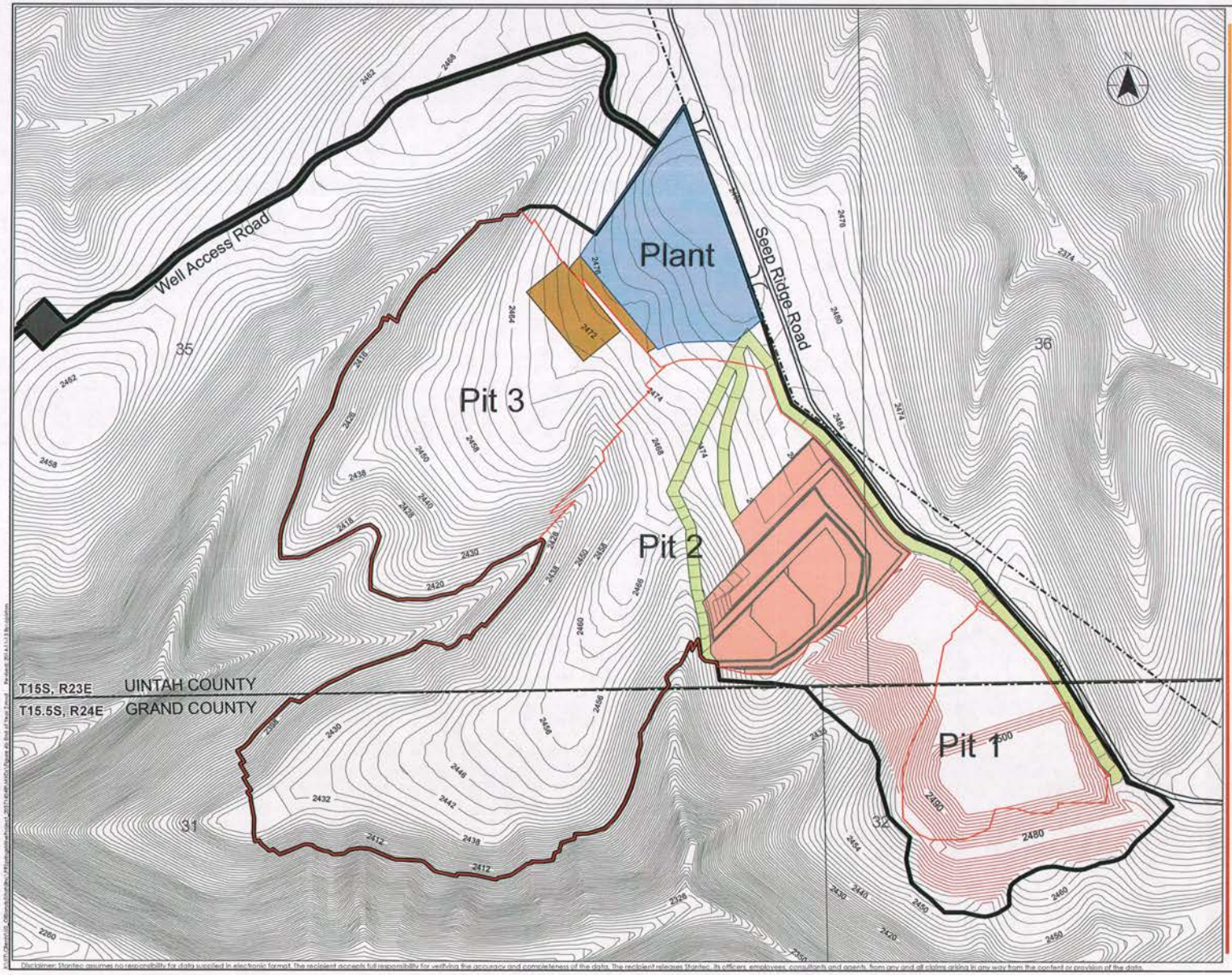
203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
4a

DRAFT

Title
End of Year 1



Stantec

U.S. OIL SANDS

Legend

- Distrubance Limit Boundary
- County Line
- Gas Lines
- Roads
- Topo Contours (2 meters)
- Pit Boundary
- Plant
- Topsoil Stockpile
- Well and Well Access Road
- Active Mining Pit
- Haul Road
- Backfill Contours (2 meters)

0 600 1,200 Feet

1:7,200 (A1 original document size of 11x17)

Notes

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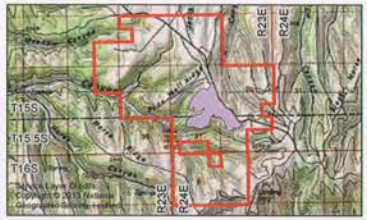
2. Modified from Norwest Corporation, End of Year 2, 08/04/2014, T:\USOilSands\384-6



Project Location
Portions of T15S R24E, T15.5S R24E, and T16S R24E Uintah and Grand Co., UT

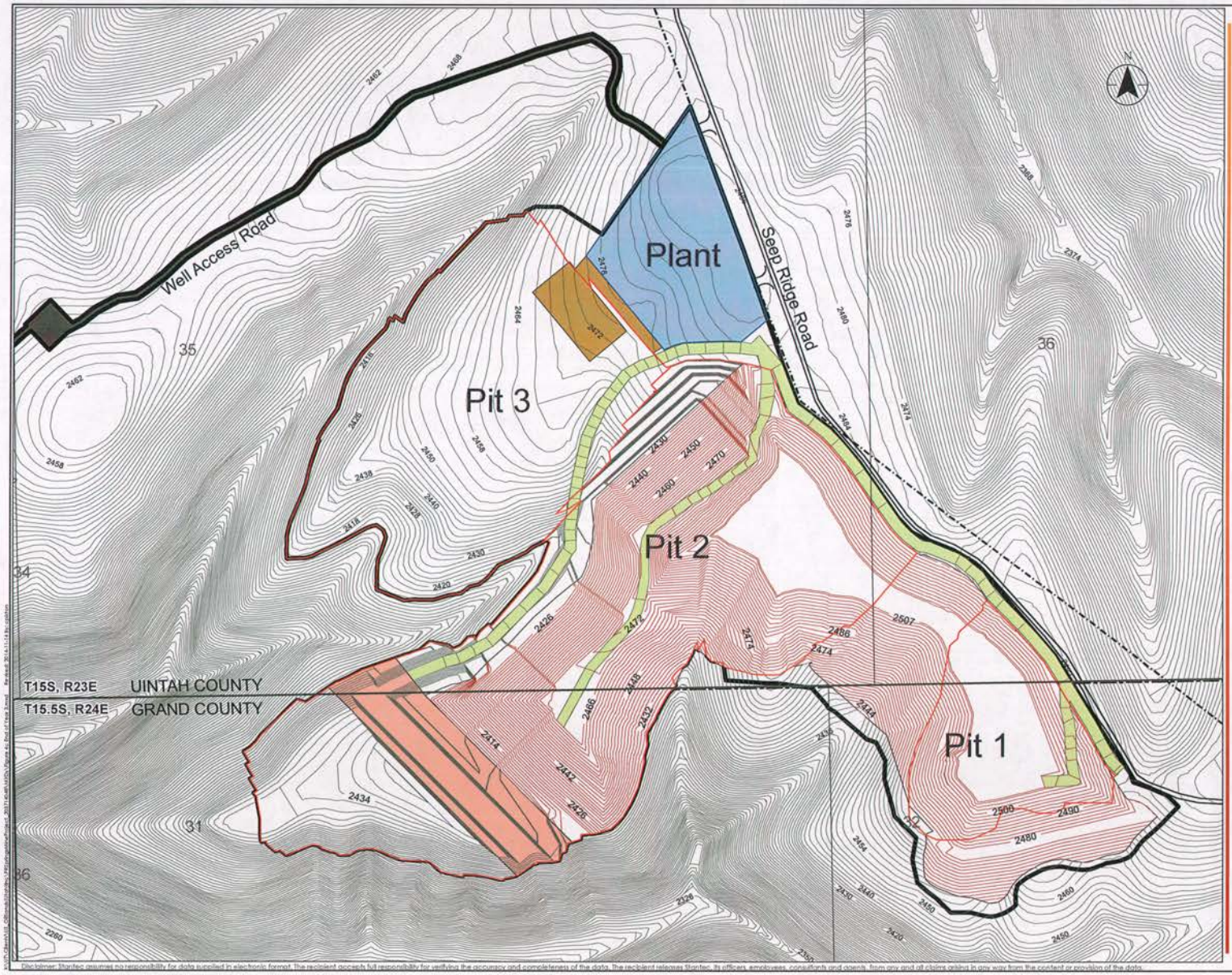
203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
4b

DRAFT

Title
End of Year 2



Stantec

U.S. OIL SANDS

Legend

- Disturbance Limit Bounday
- County Line
- Gas Lines
- Roads
- Topo Contours (2 meters)
- Pit Boundary
- Plant
- Topsoil Stockpile
- Well and Well Access Road
- Active Mining Pit
- Haul Road
- Backfill Contours (2 meters)

0 600 1,200 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1927 UTM Zone 12N
2. Modified from Norwest Corporation, End of Year 3, 08/04/2014, T:\USOilSands\384-6

Project Location
Portions of T15S R24E, T15.5S R24E, and T16S R24E
Uintah and Grand Co., UT

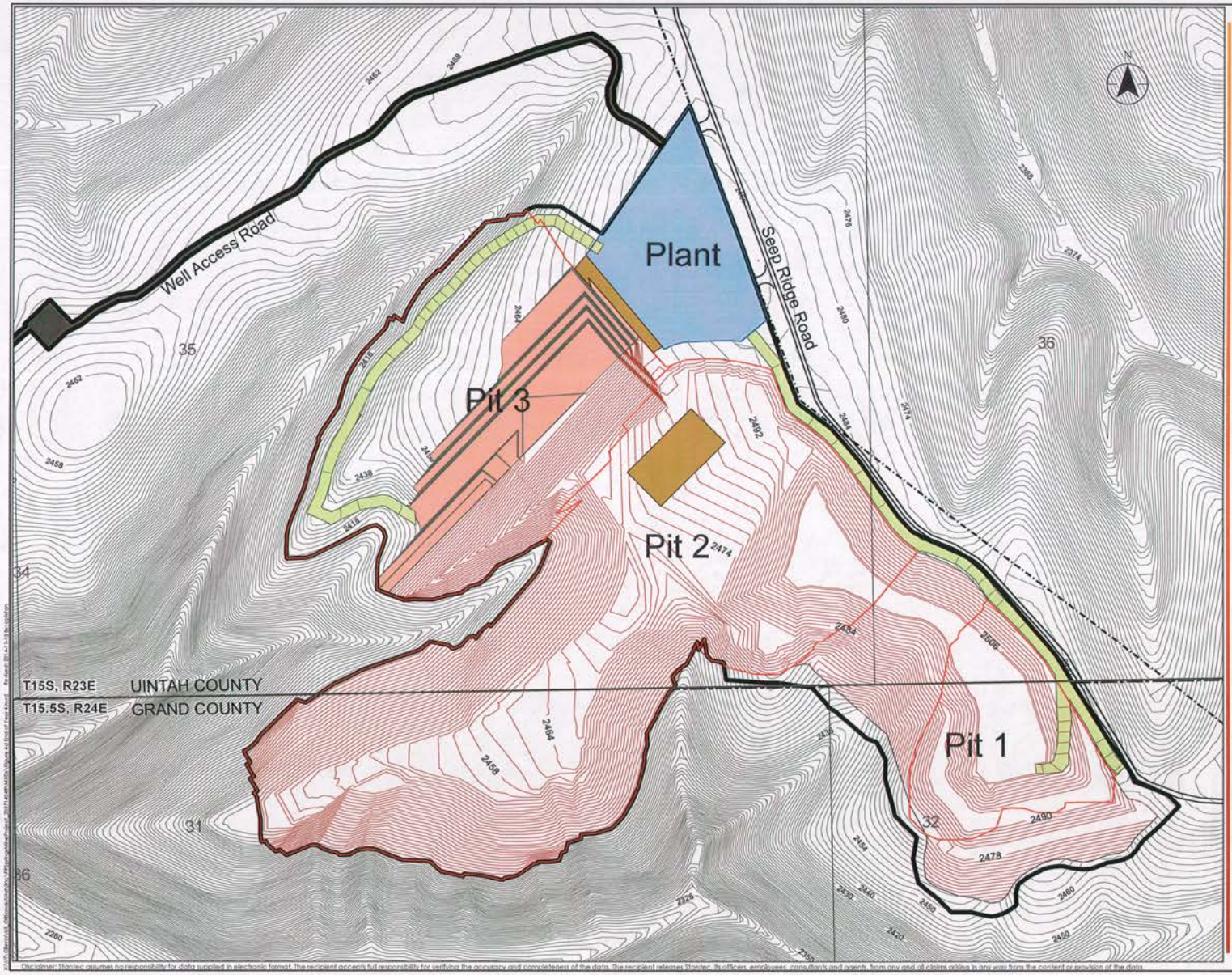
203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 201410-30

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
4c

DRAFT

Title
End of Year 3



Stantec

U.S. OIL SANDS

Legend

- Disturbance Limit Boundary
- County Line
- Gas Lines
- Roads
- Topo Contours (2 meters)
- Pit Boundary
- Plant
- Topsoil Stockpile
- Well and Well Access Road
- Active Mining Pit
- Haul Road
- Backfill Contours (2 meters)

0 600 1,200 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1927 UTM Zone 12N
2. Modified from Norwest Corporation, End of Year 4, 08/04/2014, T:\USOilSands\384-6

Project Location
Portions of T15S R24E, T15.5S R24E, and T16S R24E
Uintah and Grand Co., UT

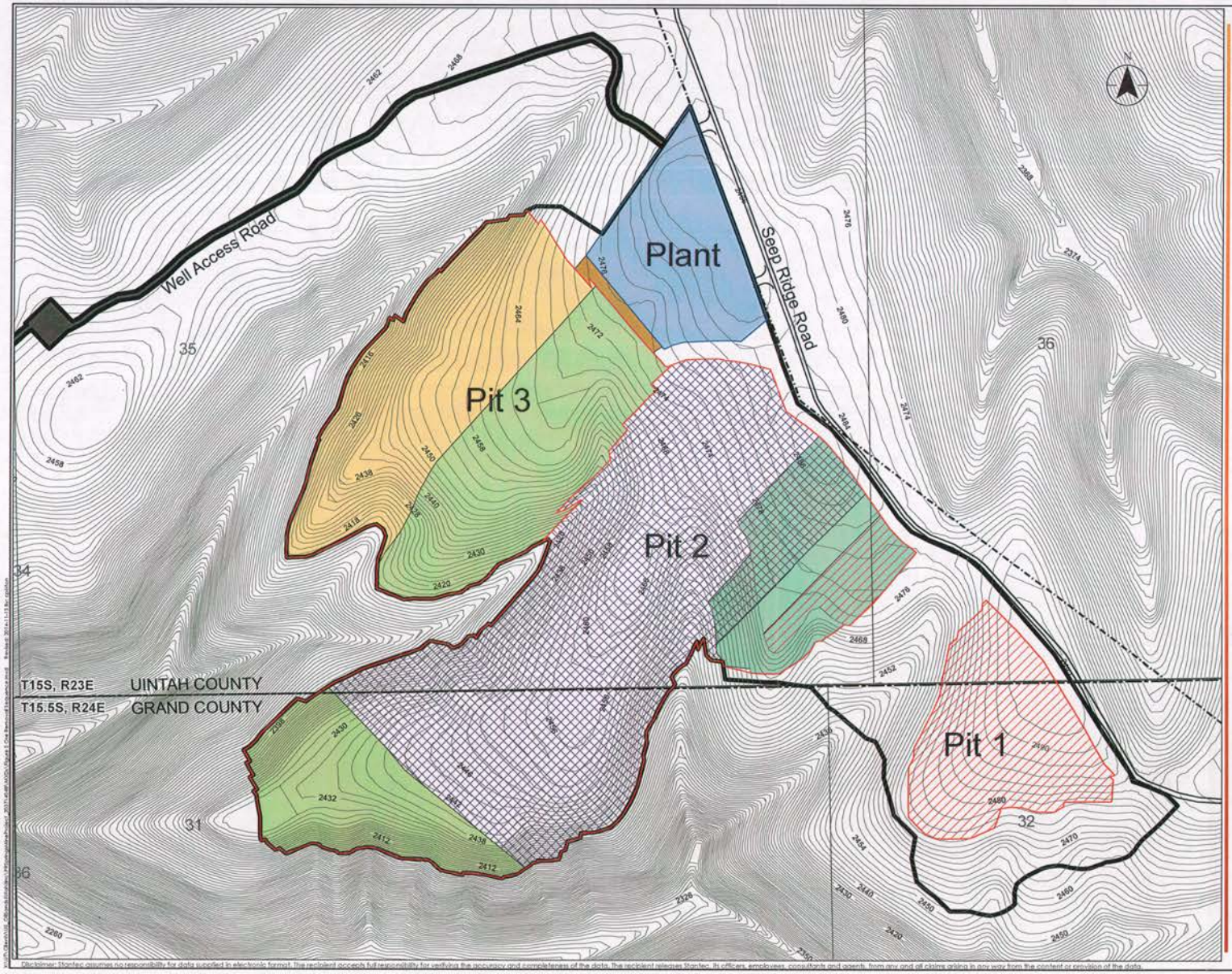
203714048
Prepared by CLP on 2014-10-07
Technical Review by KE on 2014-10-10
Independent Review by LM on 2014-10-30

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
4d

DRAFT

Title
End of Year 4



Stantec

U.S. OIL SANDS

Legend

- Disturbance Limit Boundary
- County Line
- Gas Lines
- Roads
- Topo Contours (2 meters)
- Pit
- Plant
- Topsoil Stockpile
- Well and Well Access Road
- Ore Removal Year 1
- Ore Removal Year 2
- Ore Removal Year 3
- Ore Removal Year 4
- Ore Removal Year 5

0 600 1,200 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1927 UTM Zone 12N
2. Modified from Norwest Corporation, Ore Removal Sequence, 08/04/2014, T:\USOilSands\384-6

Project Location
Portions of T15S R24E, T15.5S R24E, and T16S, R24E Uintah and Grand Co., UT

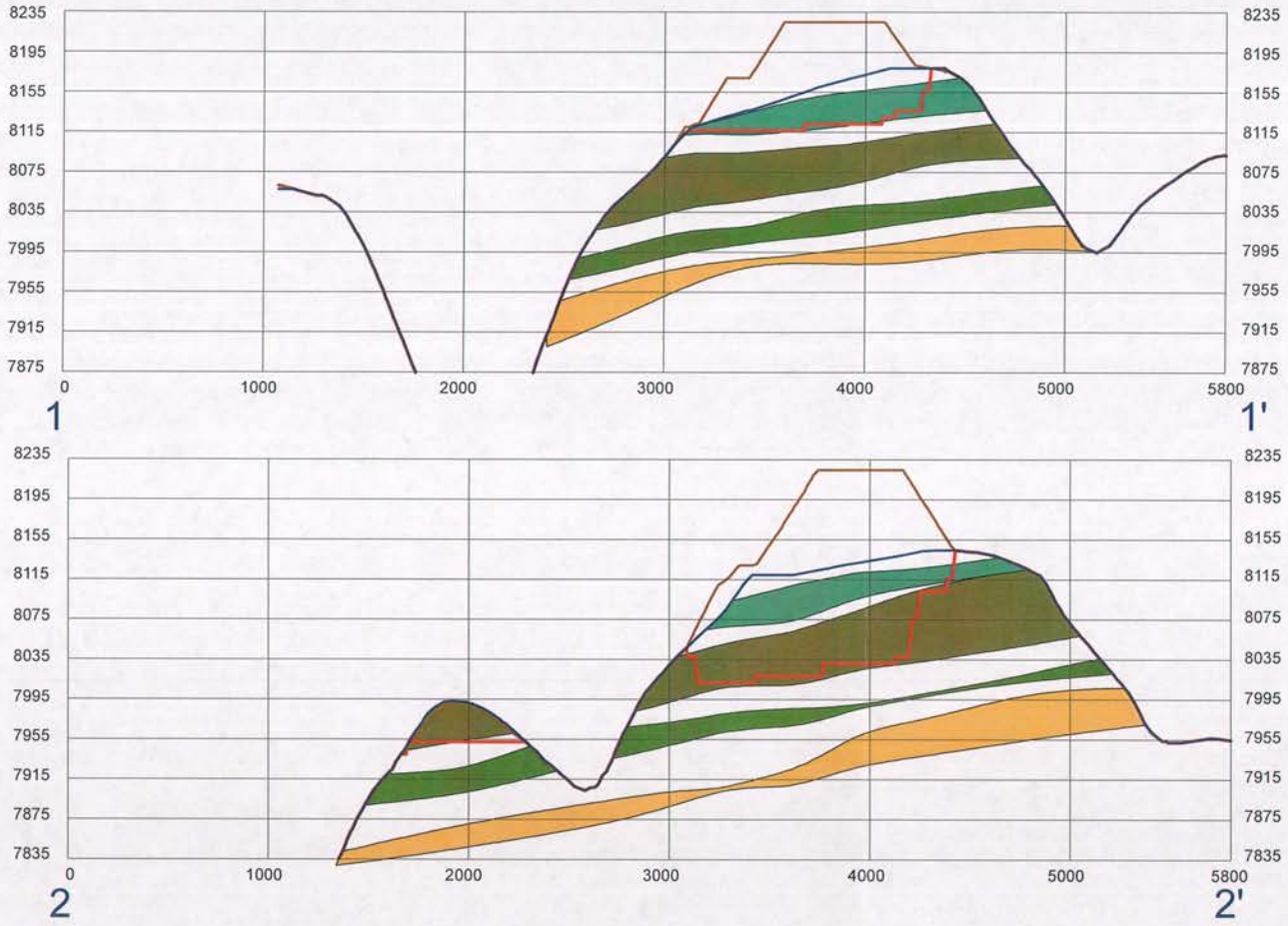
203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
5

DRAFT

Title
Ore Removal Sequence



SCALE: 1 Horizontal:5 Vertical

Stantec

U.S. OIL SANDS

Legend
- Post Mining Reclaimed Topography
- Original Topography
- Ultimate Pit Limit
- Oil Sand Bed D
- Oil Sand Bed C
- Oil Sand Bed B
- Oil Sand Bed A

0 600 1,200 Feet
1:7,200 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1927 BLM Zone 12N
2. Modified from Norwest Corporation, End of Year 4, 09/18/2014, T:\USOilSands\384-6

Project Location
Portions of T15S R24E, T15.5S R24E, and T16S, R24E
Uintah and Grand Co., UT

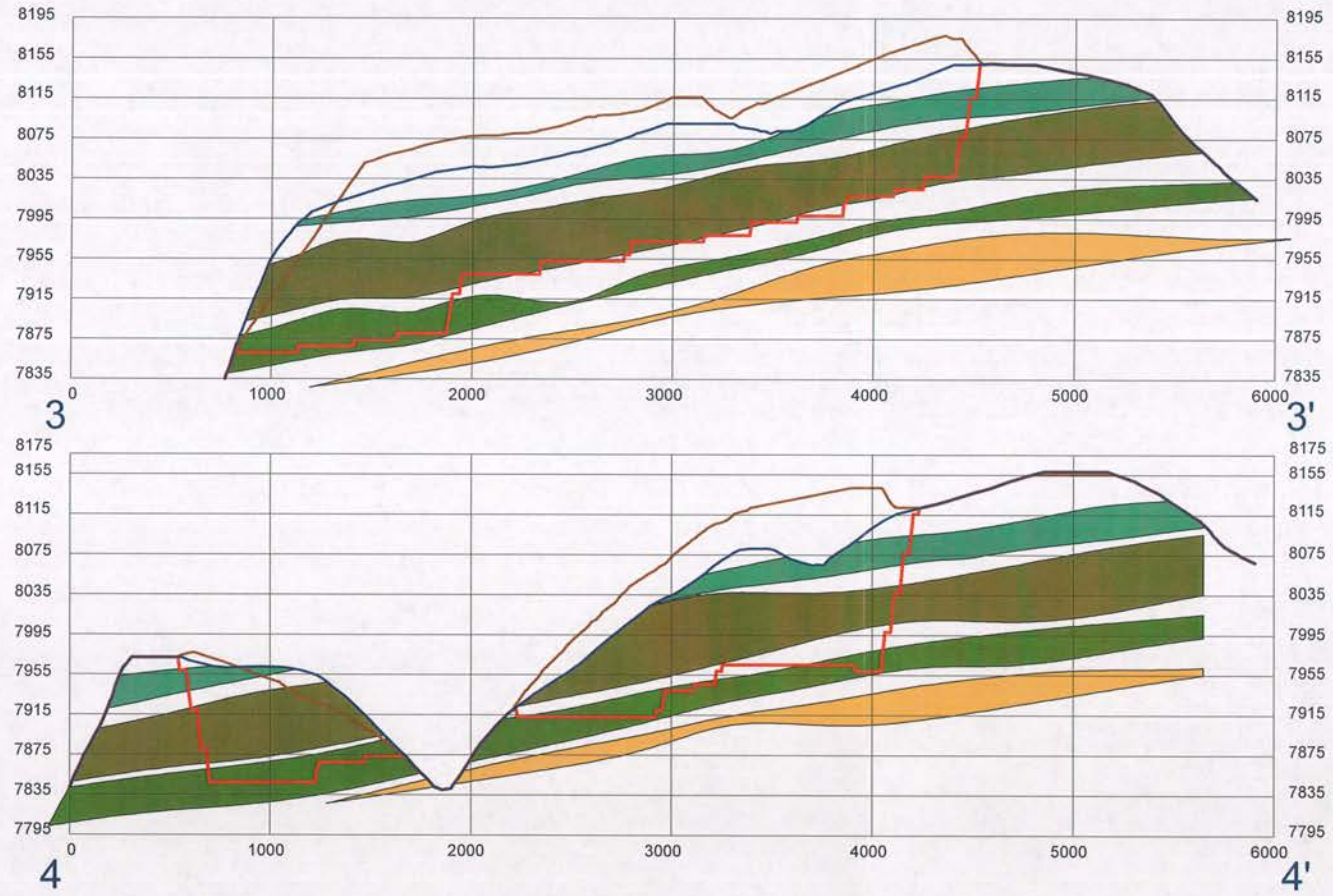
203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
6a

DRAFT

Title
Cross Section 1



SCALE: 1 Horizontal:5 Vertical

Stantec

U.S. OIL SANDS

Legend

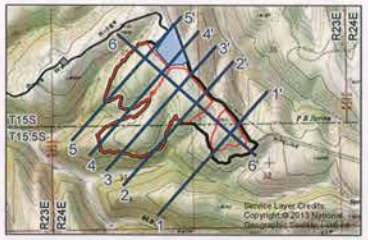
- Post Mining Reclaimed Topography
- Original Topography
- Ultimate Pit Limit
- Oil Sand Bed D
- Oil Sand Bed C
- Oil Sand Bed B
- Oil Sand Bed A

0 600 1,200 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1927 BLM Zone 12N
2. Modified from Norwest Corporation, End of Year 4, 09/18/2014, T:\USOilSands\384-6



Project Location
Portions of T15S R24E, T15.5S R24E, and T16S, R24E
Uintah and Grand Co., UT

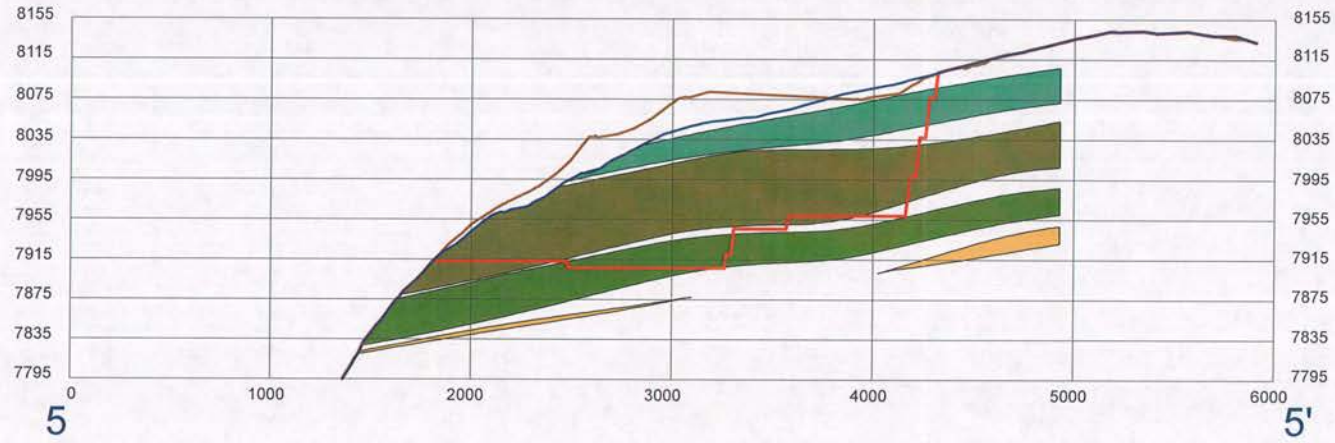
203714048
Prepared by CLF on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

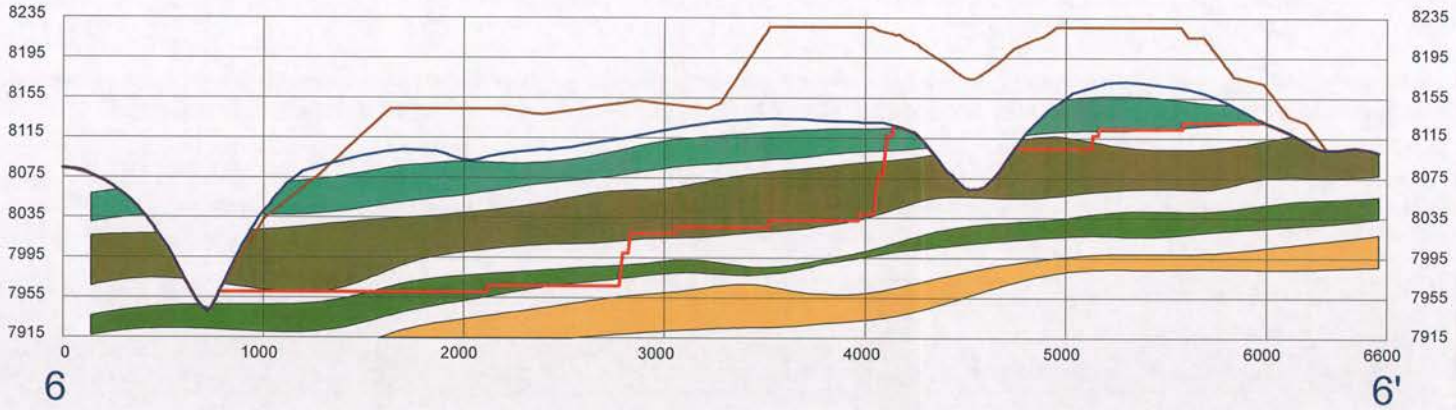
Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
6b

DRAFT

Title
Cross Section 2





SCALE: 1 Horizontal:5 Vertical

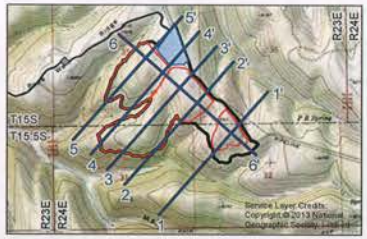
Stantec

U.S. OIL SANDS

Legend
- Post Mining Reclaimed Topography
- Original Topography
- Ultimate Pit Limit
- Oil Sand Bed D
- Oil Sand Bed C
- Oil Sand Bed B
- Oil Sand Bed A

0 600 1,200 Feet
1:7,200 (A1 original document size of 11x17)

Notes
1. Coordinate System: NAD 1927 BLM Zone 12N
2. Modified from Norwest Corporation, End of Year 4, 09/18/2014, T:\USOilSands\384-6



Project Location
Portions of T15S R24E, T15.5S R24E, and T16S, R24E Uintah and Grand Co., Ut

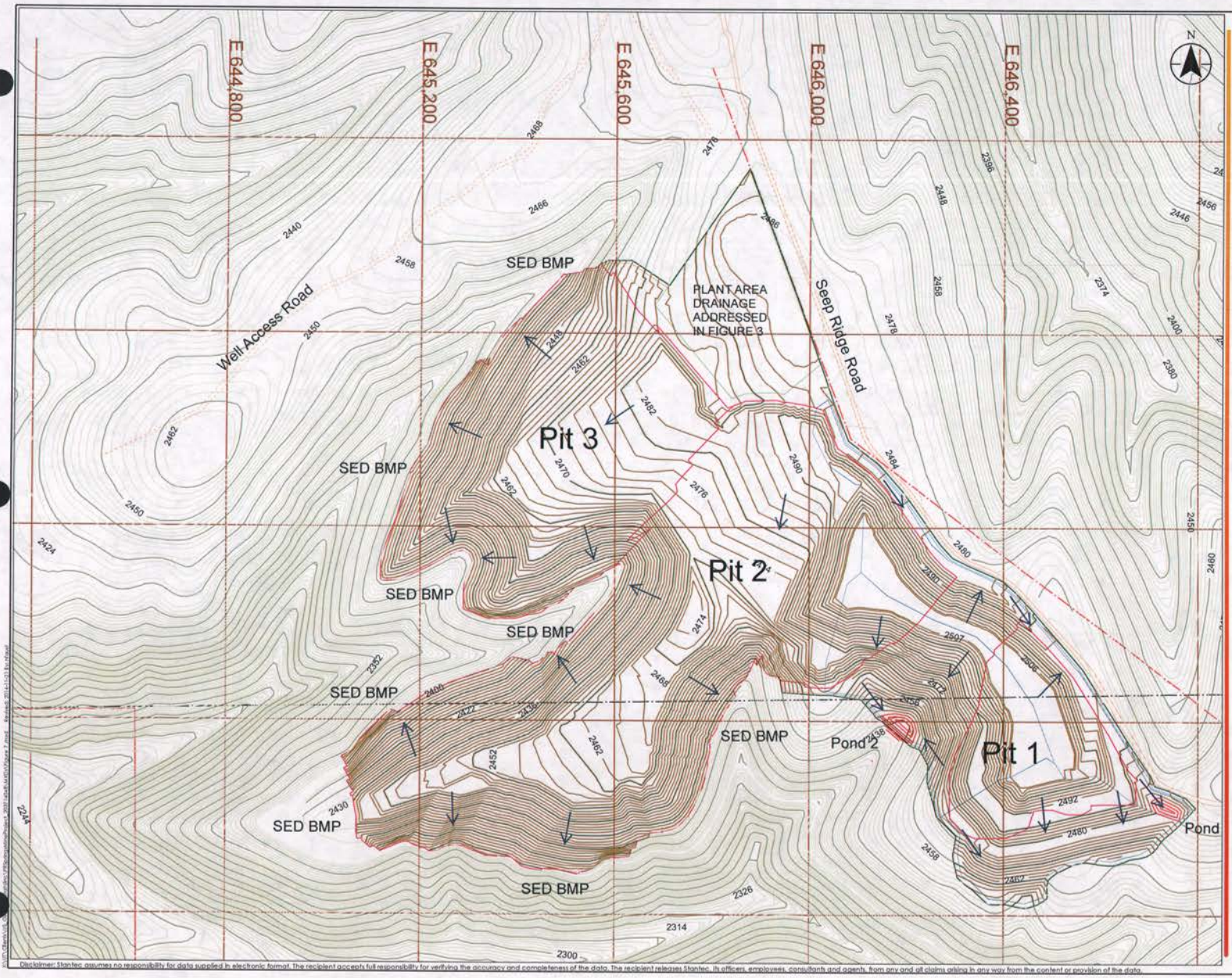
203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
6c

DRAFT

Title
Cross Section 3



DISTURBANCE LIMIT BOUNDARY
COUNTY LINE
GAS LINES
ROAD
TOPO CONTOURS (2m Interval)
POST MINING RECLAMATION TOPOGRAPHY CONTOURS (2m Interval)
PIT BOUNDARY
LEASE BOUNDARY
PLANT AREA
DITCH/BERM
SED BMP
DRAINAGE BOUNDARY
FLOW ARROWS
POND CONTOURS

1:2,400 (At original document size of 11x17)

Notes
1. Modified from Norwest, Figure 5.1 Mining Drainage Control, 08/08/2014

Project Location
Portions of T15S R24E, T15.5S R24E, and T16S, R24E Uintah and Grand Co., UT

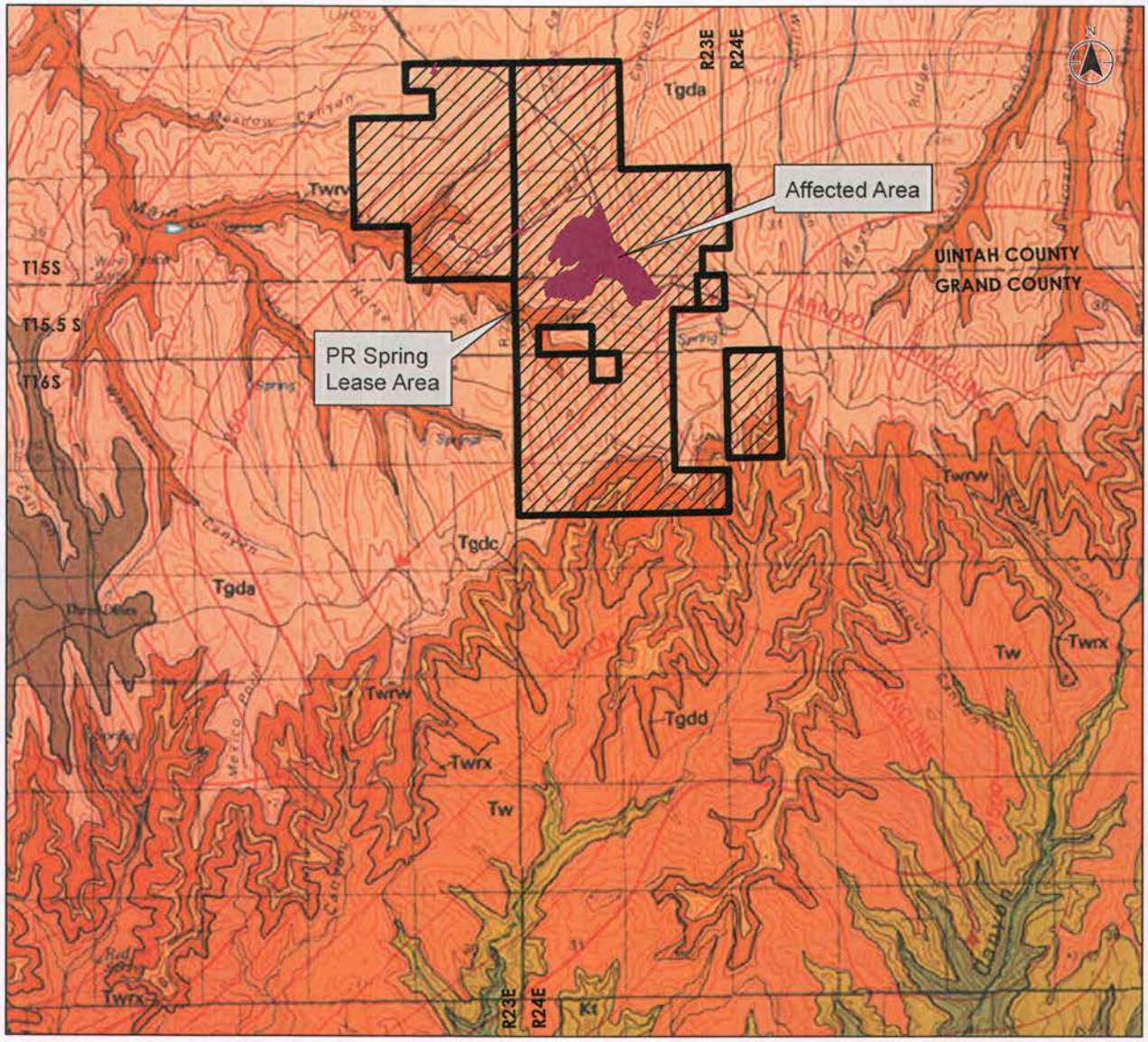
203714048
Prepared by NF on 2014-11-21
Technical Review by LM on 2014-11-21
Independent Review by LM on 2014-11-21

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
7

DRAFT

Title
Mining Drainage Control



Descripton of Map Units

Green River Formation (Eocene)

- Tgpl — Parachute Creek Member, lower part
- Douglas Member
  - Tgda — Tongue a
  - Tgdc — Tongue c

Wasatch Formation (Eocene and Palocene)

- Twrw — Unit w of Renegade Tongue
- Twrx — Unit x of Renegade Tongue
- Tw — Wasatch Formation, main body,

- Kt — **Tuscher Formations (Upper Createous)**
- Kf — **Farrer Formation (Upper Creataceous)**

- Contact
- Fault
- Anticline
- Syncline
- 1000 — Structure Contour

0 4,000 8,000 Feet

1:96,000 (at original document size of 8.5x11)
Contour Interval 50 Meters

Notes

1. Coordinate System: NAD 1927 UTM Zone 12N
2. Geology from J. L. Gualtieri, Geologic Map of the Westwater 30'x60' Quadrangle Grand and Uintah Counties, Utah, and Garfield and Mesa Counties, Colorado, 1988

Stantec

U.S. OIL SANDS

Project Location
Portions of T15S R24E, T15.5S R24E, and T16S, R24E Uintah and Grand Co., UT

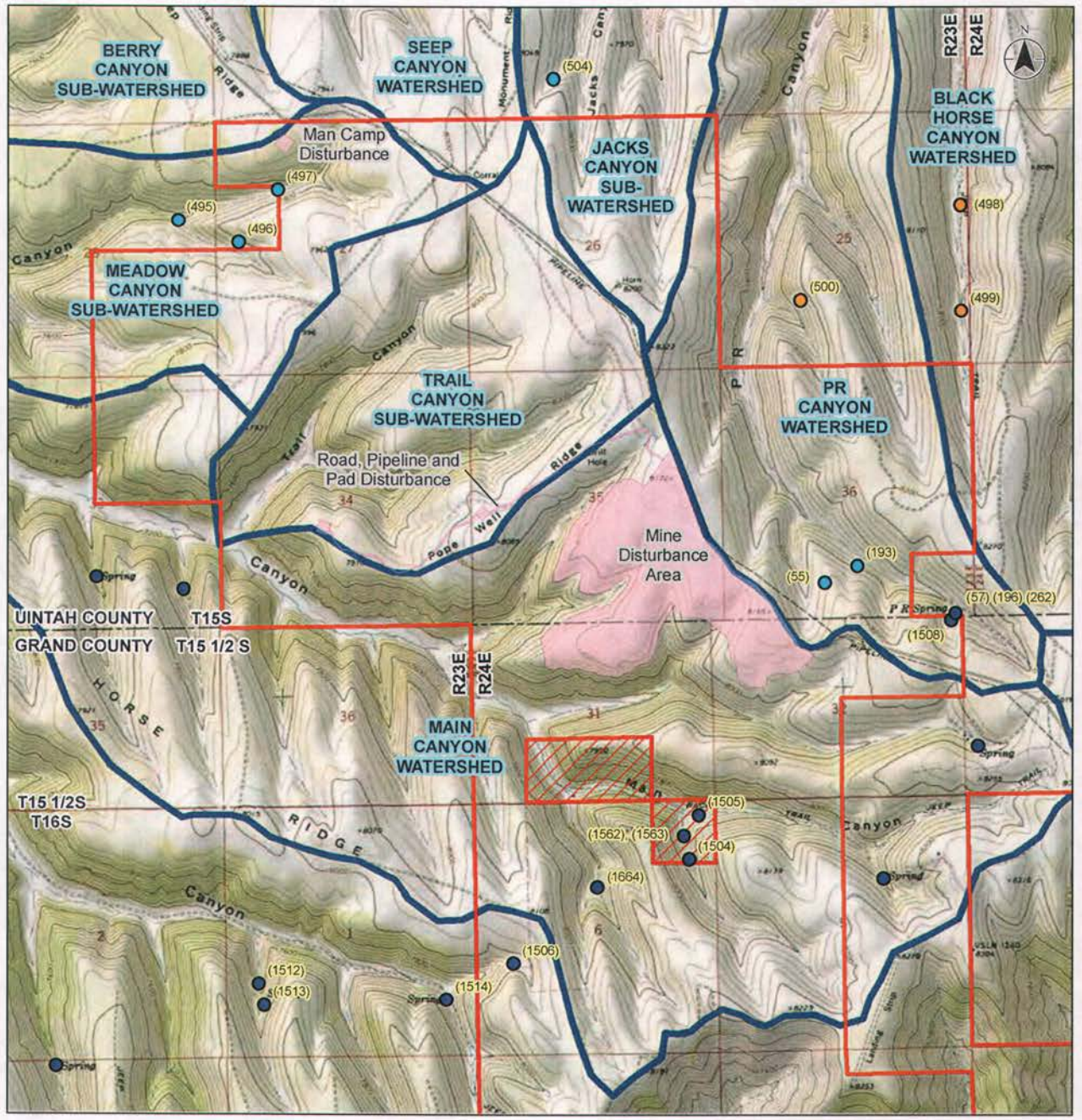
20371404B
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
8

DRAFT

Title
Geology Map



Legend

- PR Spring Lease Boundary
- Excluded from Lease
- Affected Area
- Watershed Boundary
- USGS Mapped Spring
- Water Right Filing for Seep or Spring
- Surface Water Right Point of Diversion
- (1506) Water Right Number

0 3,000 Feet

1:38,400 (at original document size of 8.5x11)

Stantec

U.S. OIL SANDS

Project Location
Portions of T15S R24E, T15.5S R24E, and T16S, R24E
Uintah and Grand Co., UT

2037 14046
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

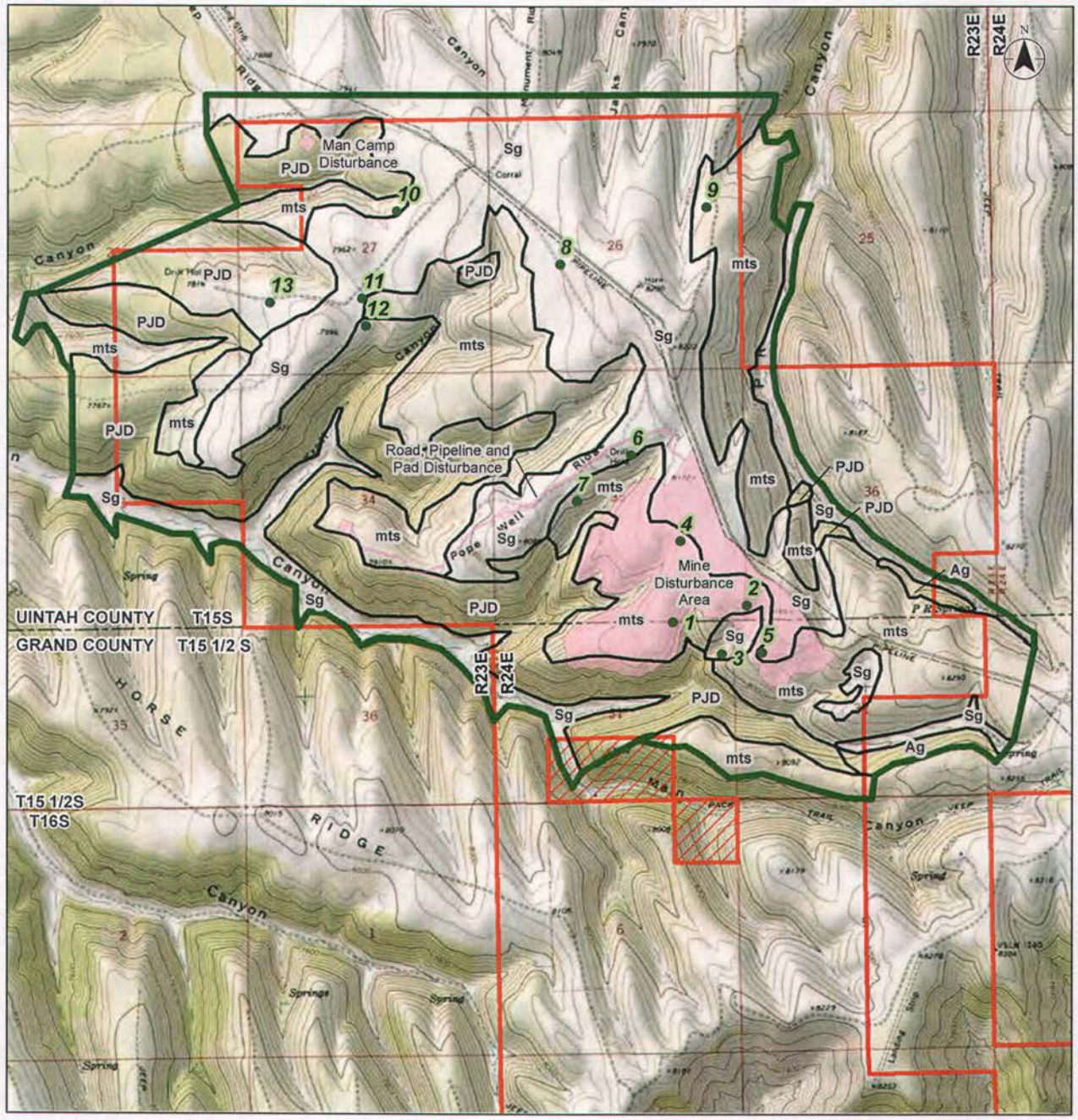
Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
9

DRAFT

Title
Water Features Map

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Copyright © 2013 National Geographic Society, i-cubed



Legend

- PR Spring Lease Boundary
- Excluded from Lease
- Affected Area
- Limit of Vegetation Survey
- ●6 Quadrat Location and Number
- Vegetation Community Boundary

Vegetation Types

- Ag Aspen glade
- PJD Pinyon-Juniper-Douglas fir)
- Sg Sagebrush - grass
- mts Mixed tall shrub

0 3,000 Feet

1:38,400 (at original document size of 8.5x11)

Stantec U.S. OIL SANDS

Project Location
Portions of T15S R24E, T15.5S R24E, and T16S, R24E Uintah and Grand Co., UT

2037140.48

Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-10-30

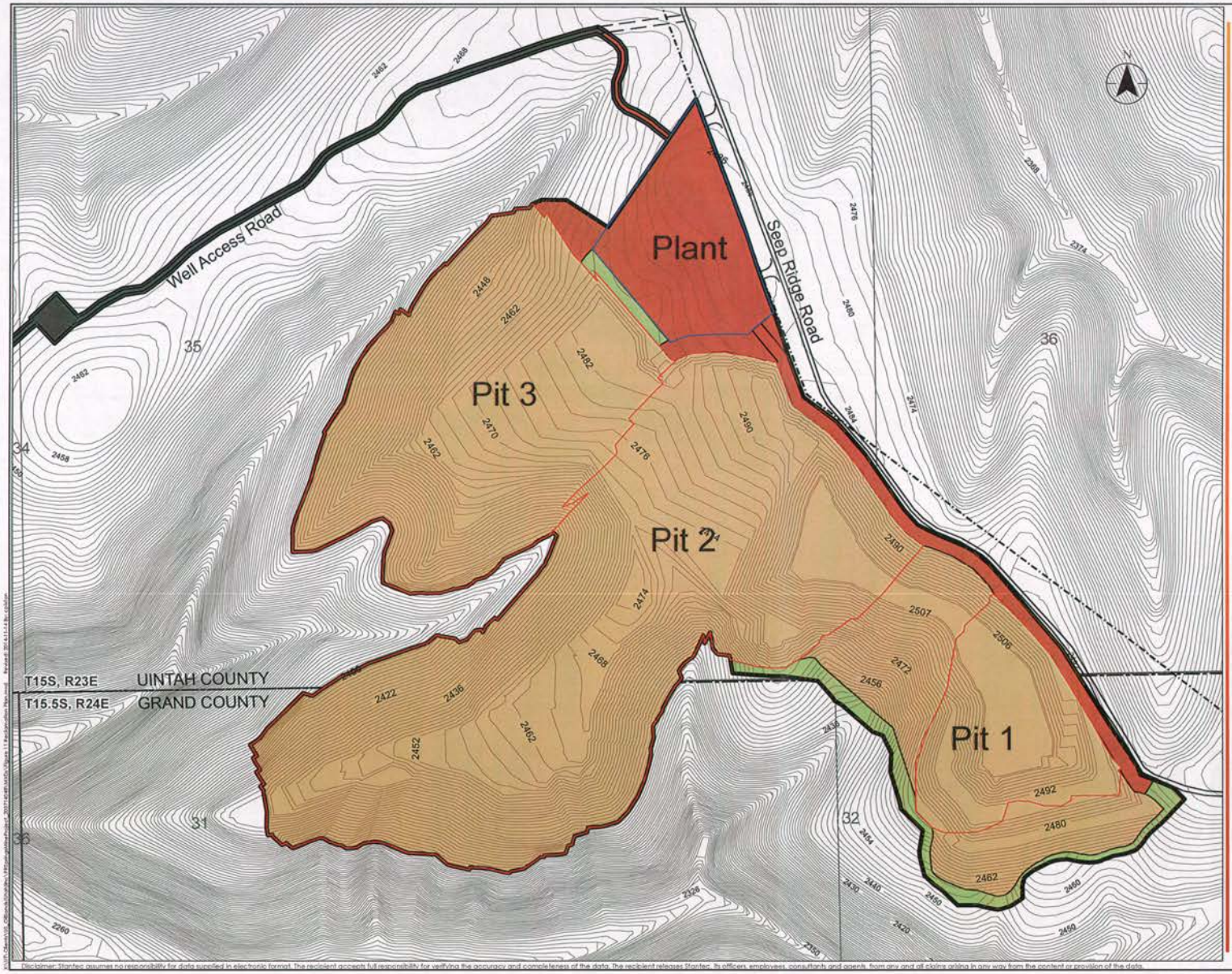
Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

Figure No.
10

DRAFT

Title
Vegetation Communities Map

Notes
1. Coordinate System: NAD 1983 UTM Zone 12N
2. Service Layer Credits: Copyright © 2013 National Geographic Society, i-cubed



Stantec

U.S. OIL SANDS

Legend

- Disturbance Limit Boundary
- County Line
- Gas Lines
- Roads
- Topo Contours (2 meters)
- Pit Boundary
- Plant
- Well and Well Access
- Post Mining Reclamation Topography Contours (2 meters)

Reclamation

- Area to be graded, ripped, topsoiled, and seeded
- Area to be graded, topsoiled, and seeded
- Man camp area to be ripped, topsoiled, and seeded (not shown on this map)
- Area to be seeded

0 600 1,200 Feet

1:7,200 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1927 UTM Zone 12N
2. Modified from Norwest Corporation, Post Mining Reclamation Topography, 08/04/2014, T:\USOilSands\384-6

Project Location
Portions of T15S R24E, T15.5S R24E, and T16S, R24E
Uintah and Grand Co., UT

203714048
Prepared by CLP on 2014-10-07
Technical Review by KK on 2014-10-10
Independent Review by LM on 2014-11-13

Client/Project
U.S. Oil Sands, (Utah) Inc.
PR Spring Mine

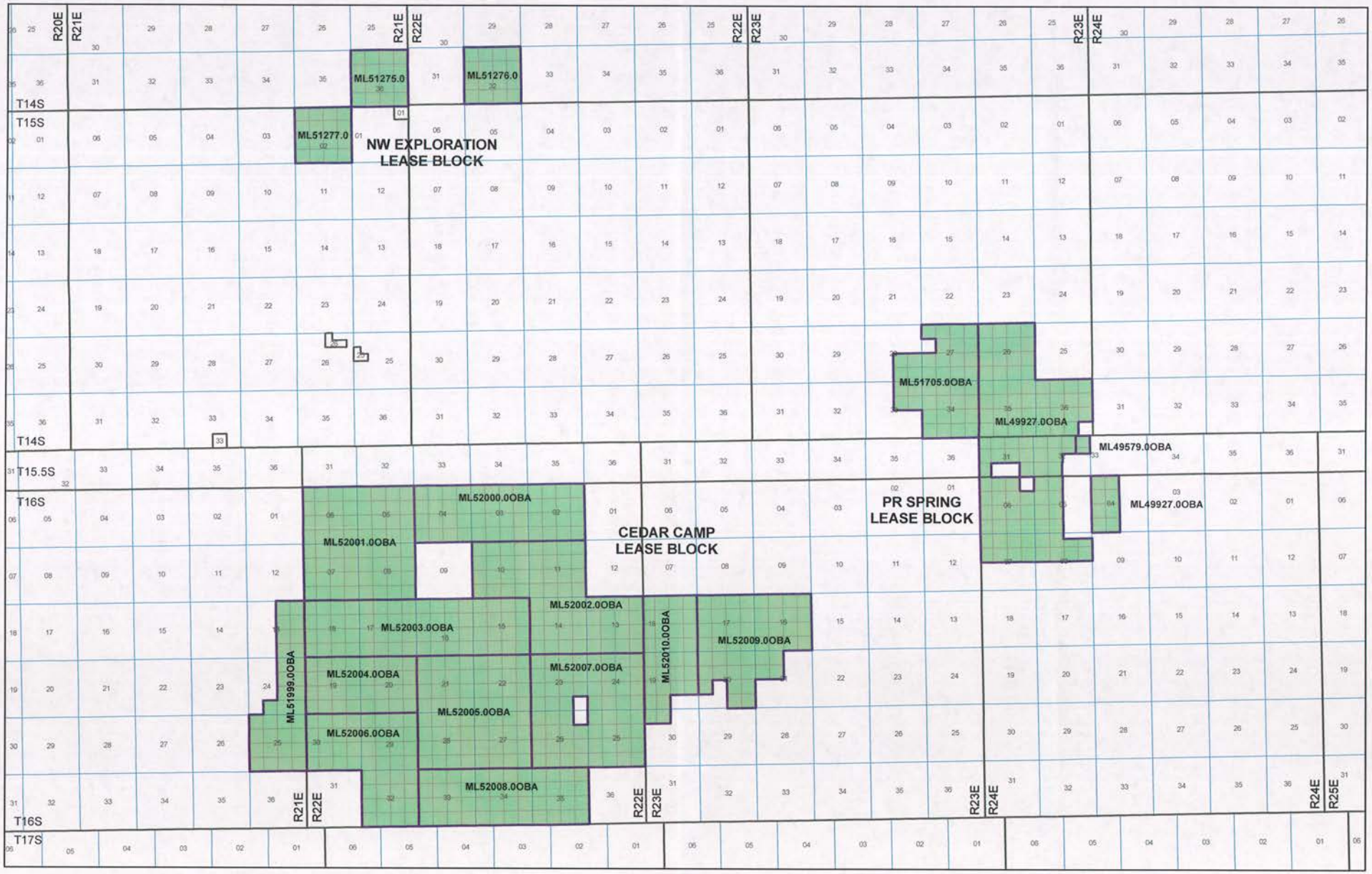
Figure No.
11

DRAFT

Title
Reclamation Plan

APPENDIX A

Site Exploration & Summary of Lands Under Lease



Document Path: X:\UT\Client\US_OilSands(Utah)Inc\PR Spring\MineProject_20371404B\MXDs\Lease Blocks.mxd

PR Spring Lease Block						
Lease	Begin Date	Expired Date	Location		Description	Acres
49579	1/1/2005	12/31/2014	Grand County, Utah	T15.5S, R24E	Section 32: Lots 1 and 6	50.42
49927	7/1/2005	6/30/2015	Uintah County Utah	T15S, R23E	Section 26: All	4319.86
					Section 35: All	
					Section 35: N1/2, SW1/4, N1/2SE1/4, SW1/4SE1/4	
			Grand County, Utah	T15.5S, R24E	Section 31: Lots 1-6, N1/2SE1/4. SESE. NESW	
					Section 32: Lots 2-5, SW 1/4	
				T16S, R243	Section 4: Lots 3-7, SENW, E1/2SW1/4	
					Section 5: Lots 1-5, SWNW, W1/2SW1/4	
					Section 6: Lots 2-7, S1/4NE1/4, SENW, SE1/4, E1/4SW1/4	
					Section 7: Lots 1 and 2, NE1/4, E1/2NW1/4	
					Section 8: Lots 1 and 2, S1/2NE1/4, NW1/4	
51705	2/1/2010	1/31/2020	Uintah County Utah	T15S, R23E	Section 27: NE1/4, N1/2NW1/4, SENW, S1/2	
					Section 28: SE1/4	
					Section 33: NE1/4	
					Section 34: All	1560

NW Exploration Lease Block						
Lease	Begin Date	Expired Date	Location		Description	Acres
51275	3/1/2008	2/28/2018	Uintah County, Utah	T14S, R21E	Section 36: All	640
51276	3/1/2008	2/28/2018	Uintah County, Utah	T14S, R21E	Section 32: All	640
51277	3/1/2009	2/28/2018	Uintah County, Utah	T15S, R21E	Section 2: Lots 1-4, S1/2N1/2, S1/2	624.88

Cedar Camp Lease Block						
Lease	Begin Date	Expired Date	Location	Description		Acres
51999	7/1/2011	6/30/2021	Grand County, Utah	T16S, R21E	Section 13: W1/2	1320
					Section 24: W1/2, SESW	
					Section 25: All	
52000	7/1/2011	6/30/2021	Grand County, Utah	T16S, R22E	Section 2: All	1925.64
					Section 3: All	
					Section 4: All	
52001	7/7/2011	6/30/2021	Grand County, Utah	T16S, R22E	Section 5: All	2517.59
					Section 6: All	
					Section 7: All	
					Section 8: All	
52002	6/9/2011	6/30/2021	Grand County, Utah	T16S, R22E	Section 10: All	2560
					Section 11: All	
					Section 13: All	
					Section 14: All	
52003	7/1/2011	6/30/2021	Grand County, Utah	T16S, R22E	Section 15: All	2539.23
					Section 16: All	
					Section 17: All	
					Section 18: All	
52004	7/1/2011	6/30/2021	Grand County, Utah	T16S, R22E	Section 19: All	1260.24
					Section 20: All	
52005	6/9/2011	6/30/2021	Grand County, Utah	T16S, R22E	Section 21: All	2560
					Section 22: All	
					Section 27: All	
					Section 28: All	
52006	7/1/2011	6/30/2021	Grand County, Utah	T16S, R22E	Section 29: All	1900.52
					Section 30: All	
					Section 32: All	
52007	7/1/2011	6/30/2021	Grand County, Utah	T16S, R22E	Section 23: NE1/4, W1/2, NESE, NWSE, SWSE	2480
					Section 24: All	
					Section 25: All	
					Section 26: NWNE, SENE, SWNE,W1/2, SE1/4	
52008	7/1/2011	6/30/2021	Grand County, Utah	T16S, R22E	Section 33: All	1920
					Section 34: All	
					Section 35: All	
52009	7/1/2011	6/30/2021	Grand County, Utah	T16S, R23E	Section 16: All	1960
					Section 17: All	
					Section 20: E1/2, NW1/4, NWSW	
					Section 21: NW1/4	
52010	7/1/2011	6/30/2021	Grand County, Utah	T16S, R23E	Section 18: All	1227.02
					Section 19: NE1/4, E1/2NW1/4, Lots 1-4, E1/2SW1/4, N1/2SW1/4	
					Section 30: NENW, Lot 1	

APPENDIX B

Correspondence

State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Amanda Smith
Executive Director

DIVISION OF WATER QUALITY
Walter L. Baker, P.E.
Director

FILE COPY

OCT 0 7 2014

Mr. Barclay Cuthbert
U.S. Oil Sands
Suite #1600, 521 – 3rd Avenue SW
Calgary, AB T2P 3T3
Canada

Dear Mr. Cuthbert:

Subject: SPLP Analytical Results for Oil Sands and Tailings, PR Springs Mine, Uintah and Grand Counties, Utah

The Division of Water Quality (DWQ) has reviewed the information submitted by Doug Thornton on August 18, 2014 on analytical results for testing samples of tailings from the PR Springs Mine. The intent of this sampling was to identify contaminants that could leach out of the tailings from contact with precipitation. When Earth Energy Resources, U.S. Oil Sands' predecessor, submitted a request for determination of permit-by-rule status for the PR Springs mine in 2008, information on the chemical characteristics of the mine tailings was provided based on analysis of samples from the Asphalt Ridge tar sands deposit near Vernal rather than from PR Springs samples. Tar sands refining was not operating at PR Springs at the time and site specific samples of PR Springs tailings could not be obtained. DWQ approved the permit-by-rule status for tailings disposal on the basis that the Asphalt Ridge samples would provide a representative analog to PR Springs samples; however, DWQ also requested that samples of PR Springs tailings be analyzed when they became available.

The original samples were analyzed using a Toxicity Characteristic Leaching Procedure (TCLP) extraction. Because this extraction method uses an acidic extraction solution intended to mimic conditions within a municipal landfill, DWQ does not consider TCLP extraction to be representative of conditions that prevail in the PR Springs area, where evidence indicates that water reacting with rocks in that area would be alkaline. Instead, DWQ prefers to use the Synthetic Precipitation Leaching Procedure (SPLP), which uses an extraction liquid of deionized water with pH adjusted to 5.0, intended to mimic precipitation. It should be noted that no laboratory analytical method can predict the concentrations of contaminants that would be present in leachate generated under actual field conditions; the intent is to identify which contaminants would be present in leachate and to have a standard for comparison between different samples, because the same extraction procedure is used.

U.S. Oil Sands submitted analytical results for three sample types from PR Springs:

1) Un-refined, naturally-occurring tar sands ore;
2) Coarse sand tailings; and
3) Clay fines tailings.

Document Date 10/7/2014

DWQ-2014-013195

195 North 1950 West • Salt Lake City,
Mailing Address: P.O. Box 144870 • Salt Lake City, UT 84114-4870
Telephone (801) 536-4300 • Fax (801) 536-4301 • T.D.D. (801) 536-4414
www.deq.utah.gov

The results of the analyses show that the SPLP extract solutions had the following.

Low levels

- total organic carbon
- total petroleum hydrocarbons- gasoline and diesel range organics
- toluene, oil and grease; and

Non-detectable levels

- Volatile organic compounds
- Semi-volatile organic compounds
- Metals from Table 1 of UAC R317-6, and
- Fluorine.

All contaminants present in the tailings samples were also present in the unprocessed tar sands and the highest levels of leachable contaminants were in the clay fines tailings.

These results are consistent with those reported for the TCLP extractions used in Earth Energy Resources' 2008 Demonstration, and do not change DWQ's determination that disposal of these tailings according to U.S. Oil Sands' mine plan (burial in the unsaturated zone) qualifies for permit-by-rule status under UAC R317-6-6.2.A(25), by having *de minimis* actual or potential effect on ground water quality.

This permit-by-rule determination only applies to tailings with similar chemical characteristics disposed at the PR Springs mine site by burial in the unsaturated zone. If any of these factors change or if U.S. Oil Sands starts a new mining operation at another site, a new evaluation of whether the tailings disposal still qualifies for permit-by rule status will have to be made by DWQ.

If you have any questions about this letter or permit-by-rule status, please contact me at (801) 536-4358 or at mnovak@utah.gov.

Sincerely,

/Mark C. Novak

Mark Novak, P.G., Environmental Scientist
Ground Water Protection Section

MN:pe

cc: Paul Baker, DOGM
Scott Hacking, District Engineer

DWQ-2014-012625

U.S. OIL SANDS
www.usoilsandsinc.com

August 18, 2014

Mark Novak
195 North 1950 West
Salt Lake City, Utah 84114-4870

Re: Analytical Testing of the PR Spring Mine Ore and Processed Sand

Dear Mark:

We write today in furtherance of our on-going commitment to provide the Division of Water Quality (DWQ) current information regarding our PR Spring project. As you know, U.S. Oil Sands (Utah), Inc.'s (U.S. Oil Sands) PR Spring project qualifies for Permit-by-Rule status under Utah Admin. Code R317-6-6.2(A)(25). This status was confirmed in letters from your office dated March 8, 2008 and February 15, 2011, and upheld by both the Utah Water Quality Board and the Utah Supreme Court.

In support of the original Permit-by-Rule determination U.S. Oil Sands submitted various analytical results from testing conducted on raw and processed material from the PR Spring project area and from a nearby location. U.S. Oil Sands also committed to provide DWQ with updated analytical information as they became available during project development. Specifically, you requested additional testing of processed sands using both Synthetic Precipitation Leaching Procedure (SPLP) and Toxicity Characteristic Leaching Procedure (TCLP). We note that both of these methods are extraction procedures and that results based on these methods do not represent the concentration of constituents in the tailings.

In May of 2014, U.S. Oil Sands ran several test runs of ore from the PR Spring project at its test facility in Grand Prairie, Alberta to gather final test data as we move from our pilot plant into construction of our commercial plant. We contracted with America West Analytical Laboratories (AWAL) to conduct the additional testing described above on unprocessed ore and processed coarse sands and clay fines from these test runs. The analytical report for this testing is enclosed.

Suite #1600, 521 – 3rd Avenue SW, Calgary, AB, T2P 3T3 CANADA Office 403-233-9366 Fax 587-353-5373

U.S. OIL SANDS
www.usoilsandsinc.com

Should you have any questions, please feel free to contact me at doug.thronton@usoilsandsinc.com.

Best regards,
U.S. Oil Sands (Utah), Inc.

Doug Thornton
HSE & Regulatory Manager

Enclosure

cc: Dan Hall, DWQ-Groundwater Protection
Mike George, DWQ-UPDES Storm Water

Suite #1600, 521 – 3rd Avenue SW, Calgary, AB, T2P 3T3 CANADA Office 403-233-9366 Fax 587-353-5373

State of Utah
GARY R. HERBERT
Governor

GREG BELL
Lieutenant Governor

Department of
Environmental Quality

Amanda Smith
Executive Director

DIVISION OF WATER QUALITY
Walter L. Baker, P.E.
Director

February 15, 2011

Mr. Barclay Cuthbert
Earth Energy Resources, Inc.
Suite # 950
633- 6 Avenue SW
Calgary, AB T2P 2Y5 Canada

Dear Mr. Cuthbert:

Subject: PR Spring Tar Sands Project, Uintah/Grand Counties, Utah
Revised Ground Water Discharge Permit-By-Rule

The Division of Water Quality (DWQ) has reviewed the information submitted by Earth Energy Resources, Inc. (Earth Energy) on February 8, 2011 regarding planned changes to the PR Spring Tar Sands Project since DWQ's original ground water discharge permit-by-rule determination was issued on March 4, 2008. The proposed operation consists of open-pit mining of tar sands, extraction of bitumen, and storage of tailings and waste rock.

Below are the changes that Earth Energy had made to its plans for this project since the original permit-by-rule determination, including DWQ's response to each change.

1. The stabilizer component that was originally planned as part of the cleaning emulsion used for bitumen extraction will not be used. DWQ does not consider this change to affect the original finding of *de minimis* effect on ground water quality, which was made considering use of the stabilizer.

2. Earth Energy will use a horizontal belt filter to remove process water from tailings sands, and a disk filter to dewater fines. The expected water content of the blended tailings will be less than 15% by weight. The original proposal was to use a "shale shaker (or similar device)" to produce tailings with a water content ranging from 10 to 20 percent, which would not be free-draining. As the proposed change will still produce tailings within the original estimated range for water content, this change does not affect the determination of *de minimis* effect on ground water quality.

3. The original request stated that there would be two overburden/interburden storage areas approximately 25 acres each. Since then, Earth Energy has changed the storage areas for overburden/interburden from two areas of 25 acres each to two areas of 34 and 36 acres, respectively. This change does not affect our original permit-by-rule determination for having a *de minimis* effect on ground water quality.

4. The original project plan was to backfill the open pit with tailings. However, Earth Energy has determined this to be infeasible during the early stages of mine development. Earth Energy now plans to dispose of some tailings in the overburden/interburden storage area. The revised plan is to place tailings generated during the early stages of mine development within the overburden/interburden storage areas, in cells surrounded by coarser waste rock. The original permit-by-rule determination found that natural precipitation leaching through tailings would have *de minimis* effect on ground water quality. Also, proper reclamation of waste rock disposal areas would minimize any potential for increased dissolution of salts and hydrocarbons caused by the increased surface area of the broken-up rock. The proposed changes to the original plan should not affect the original determination that disposal of tailings and waste rock would have *de minimis* effect on ground water quality at this site.

In summary, the proposed changes to the mining and bitumen extraction project do not change the March 4, 2008 permit-by rule determination for having a *de minimis* potential effect on ground water quality and the project still qualifies for permit-by-rule under UAC R317-6-6.2.A(25). If any of the factors considered when making this determination change because of changes in your operation or from additional knowledge of site conditions, this permit-by-rule determination may not apply and you should inform DWQ of the changes. If future project knowledge or experience indicates that ground water quality is threatened by this operation, the Executive Secretary may require the submission of an application for a ground water discharge permit in accordance with UAC R317-6-6.2.C.

If you have any questions about this letter, please contact Mark Novak at (801) 536-4358.

Sincerely,

Robert F. Herbert

Rob Herbert, P.G., Manager
Ground Water Protection Section

RFH/MTN/mhf

cc: Paul Baker, DOGM
Scott Hacking, District Engineer
Dave Ariotti, District Engineer
Tri-County Health Department
Southeastern Utah Health Department

DWQ-2011-002122

www.earthenergyresources.com

February 08, 2011

Mr. Rob Herbert,
Utah Division of Water Quality
288 North 1460 West
P.O. Box 144870
Salt Lake City, Utah 84114-4870

Subject: PR Spring Tar Sands Project, Uintah and Grand Counties, Utah
Ground Water Discharge Permit-by-Rule

Dear Mr. Herbert:

I write to identify some changes in our PR Spring Tar Sands Project ("Project"), which have been made since the March 4, 2008 letter informing Earth Energy Resources, Inc. ("Earth Energy") of the Project's Ground Water Discharge Permit-By-Rule status from the Utah Department of Environmental Quality, Division of Water Quality ("DWQ"). The letter, a copy of which is attached, enumerated four factors used in determining that the Project "will have a *de minimis* effect on ground water quality or beneficial uses of ground water resources."

First, based on Material Safety Data Sheets, (which are attached), the reagent used in the extraction process is non-toxic, volatile, and most of it will be recovered and recycled in the extraction process.

Second, extraction will occur using tanks and equipment at a processing facility at the mine site, no impoundments or process water ponds are planned, and most of the water used in the process will be recovered and recycled.

Third, the process tailings will not be free draining, with moisture content in the 10-20% range, and "will not contain any added constituents that are not present naturally in the rock, other than trace amounts of the reagent used for bitumen extraction."

Fourth, the letter addressed the hydrologic setting of the Project.

The letter also states that "[i]f any of these factors change because of changes in your operation or from additional knowledge of site conditions, this permit-by-rule determination may not apply and you should inform DWQ of the changes."

Since the PR Spring Mine, Request for Permit-by-Rule Determination ("Request") was submitted on February 21, 2008 by JBR Environmental Consultants, Inc. on behalf of Earth

Suite # 950, 633 – 6 Avenue SW, Calgary, AB T2P 2Y5 Canada Office: 403.233.9366 Facsimile: 403.290.0045

Energy, Earth Energy has continued to refine the process for extracting bitumen from tar sand to improve recovery and reduce the potential for impacts to the environment.

First, we have removed the stabilizer component from the cleaning emulsion used for bitumen extraction. Page 5 of the Request provides details of the mixing of the cleaning emulsion and the tar sands. In our development of this "Ophus Process," we have determined that the emulsion can be formed concurrently with introduction to the tar sands, so pre-mixing and stabilization of the emulsion is no longer required. The stabilizer, known as Witconate, is an alkyl aryl sulphonate and is oil soluble, so when the cleaning emulsion was mixed with tar sand, the stabilizer dissolved into the oil phase and was not present in the tailings. The use of a stabilizer was not among the factors that DWQ used in determining that the Project will have a *de minimis* effect on ground water quality, and its omission from the cleaning emulsion removes a chemical from the process stream.

Second, we have identified de-watering equipment that we plan to use on the Project. Page 6 of the Request includes details of methods to de-water sand and fines remaining after bitumen is removed from the tar sands, and we identified a "shale shaker (or similar device)." With a global supplier of mine processing equipment, we have identified equipment that will economically recover water from the sand and fines. For the sand, we now expect to use a horizontal belt filter, and for the fines we expect to use a disk filter. With these components, the aggregate water content of the blended tails should be less than 15% by weight – maximizing our recovery of available water while providing a material at near optimum moisture content for compaction. The shale shaker that we initially contemplated using was not among the four factors that DWQ used to determine that the Project will have a *de minimis* effect on ground water quality.

Third, working with the Utah Department of Natural Resources Division of Oil, Gas and Mining ("DOGM"), we have finalized the size of the overburden/interburden storage areas and provided more detail on the sequencing of mining and backfilling. Page 5 of the Request stated that the overburden/interburden storage areas would be approximately 25 acres each. Our final approved site design includes two overburden/interburden storage areas of 36 and 34 acres. The sizes of these storage areas were not among the four factors, on which DWQ relied in determining that the Project will have a *de minimis* effect on ground water quality.

Fourth, working with DOGM, we have determined it is necessary to dispose of some processed sands and fines in the overburden/interburden storage areas. On page 6 of the Request, we stated that the processed sands and fines remaining after bitumen extraction would be used to backfill the open pit. During initial operations, the pit opening will not be sufficiently large to accept processed sands and fines, so some of these tailings will be placed in the overburden/interburden storage areas. Earth Energy has worked closely with JBR Environmental Consultants and DOGM to ensure that the final design will isolate and

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encapsulate the tailings within the coarser overburden and interburden, so that they will not migrate and will not impact surface or ground water below the storage areas. The disposal of these tailings was not among the four factors that DWQ used to determine that the Project will have a *de minimis* impact on ground water quality.

None of these process improvements affect the factors used in determining the Projects permit-by-rule status, and, for that reason, had not been reported to DWQ. However, in a challenge to the DOGM's approval of Earth Energy's Notice of Intent to Commence Large Mining Operations ("NOI"), by Living Rivers and its counsel, Western Resources Advocates, these improvements have been raised in an attempt to show that DOGM should not have relied on DWQ's determination in approving the NOI.

Living Rivers and its counsel also focus on the portion of the Request which states: "There are no springs in the Earth Energy leased area." Our understanding of this statement was that there are no springs within the approximately 200-acre Project area, which is accurate. Earth Energy's lease encompasses a much broader area: 5,930 acres, and there are two USGS mapped springs in that much larger area, as described on page 2 of the Request. A map submitted and approved by DOGM, which shows water features in the vicinity, is attached.

Please review this information in conjunction with the original Request and confirm that the Ground Water Discharge Permit-By-Rule status granted on March 4, 2008 remains valid and in effect. If you have any questions or require further information, please contact either the undersigned or Mr. Robert Bayer of JBR Environmental Consultants, Inc. (801.943.4144).

Yours truly,
Earth Energy Resources, Inc.

Barclay Cuthbert

Barclay Cuthbert
Vice President

Enclosure(s)

cc: Robert J. Bayer, JBR Environmental Consultants, Inc.
Dana Dean, Utah Division of Oil, Gas and Mining
Paul Baker, Utah Division of Oil, Gas and Mining
A. John Davis, Holme Roberts & Owen LLP

Suite # 950, 633 – 6 Avenue SW, Calgary, AB T2P 2Y5 Canada Office: 403.233.9366 Facsimile: 403.290.0045

State of Utah

Department of
Environmental Quality

Richard W. Sprott
Executive Director

DIVISION OF WATER QUALITY
Walter L. Baker, P.E.
Director

JON M. HUNTSMAN, JR.
Governor

GARY HERBERT
Lieutenant Governor

March 4, 2008

Mr. Barclay Cuthbert
Earth Energy Resources, Inc.
Suite 740, 404 – 6th Avenue SW
Calgary, Alberta, Canada T2P 0R9

Subject: PR Spring Tar Sands Project, Uintah and Grand Counties, Utah
Ground Water Discharge Permit-By-Rule

Dear Mr. Cuthbert:

The Division of Water Quality (DWQ) has reviewed the information submitted by JBR Environmental Consultants, Inc. on February 22, 2008 requesting ground water discharge permit-by-rule for the proposed Earth Energy Resources, Inc. PR Spring tar sands project. The proposed operation consists of open-pit mining of tar sands, extraction of bitumen, and disposal of tailings and waste rock.

Below are several relevant factors for determining whether the proposed operation will have a *de minimis* effect on ground water quality or beneficial uses of ground water resources.

1. Based on Material Safety Data Sheets and other information that you sent to DWQ in January 2007, the reagent to be used for bitumen extraction is generally non-toxic and volatile, and most of it will be recovered and recycled in the extraction process. (Because the extraction process is proprietary at this time, this reagent will not be identified in public documents.)

2. Bitumen extraction will be done using tanks and equipment at the processing facility located at the mine site, and no impoundments or process water ponds are planned. Most of the water used in the process will be recovered and recycled.

3. Processed tailings will not be free-draining and will have moisture content in the 10 to 20 percent range. The tailings will not contain any added constituents that are not present naturally in the rock, other than trace amounts of the reagent used for bitumen extraction. Analysis of processed tailings using the Synthetic Precipitation Leachate Procedure indicates that leachate derived from the tailings by natural precipitation would have non-detectable levels of volatile and semi-volatile organic compounds. Unprocessed tar sands and processed tailings were analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) with an extraction process that uses a much lower pH than is likely to occur at the mine site. Analytical results indicate that TCLP metals would not be leached from the tailings at detectable levels except for barium, which was detected at levels below the Utah ground water quality standard of 2.0 milligrams per liter (Table 1 of UAC 317-6). Based on these data, the tailings will be disposed by backfilling into the mine pit.

4. The uppermost geologic formations at the site are the Parachute Creek and Douglas Creek Members of the Green River Formation, which consist of fluvial-deltaic and lacustrine-deltaic deposits of claystone, siltstone, fine-grained sandstone, and limestone. The Parachute Creek Member outcrops over most of the Earth Energy lease and is the 0 to 50-foot thick overburden above the tar sand deposits of the Douglas Creek Member. Shallow ground water at the site is not part of a regional aquifer but occurs in localized laterally discontinuous perched sandstone lenses of the Douglas Creek Member. Exploration drilling did not encounter ground water within 150 feet of the land surface. Based on records from the Division of Oil, Gas, and Mining, the closest major aquifer is the Mesa Verde Formation, which occurs approximately 2000 feet below ground surface in the area of the proposed mine. The topography of the project area is characterized by mesas incised by deep, narrow canyons, and limited shallow ground water discharges as springs in the canyon bottoms. There are no springs in the Earth Energy leased area and the nearest spring is PR Spring located slightly less than a mile east of the project site.

Considering the factors described above, the proposed mining and bitumen extraction operation should have a *de minimis* potential effect on ground water quality and qualifies for permit-by-rule status under UAC R317-6-6.2.A(25). If any of these factors change because of changes in your operation or from additional knowledge of site conditions, this permit-by-rule determination may not apply and you should inform the DWQ of the changes. If future project knowledge or experience indicates that ground water quality is threatened by this operation, the Executive Secretary may require that you apply for a ground water discharge permit in accordance with UAC R317-6-6.2.C.

This operation may require a storm water permit under the Utah Pollutant Discharge Elimination System (UPDES). Please contact Mike George of this office at (801) 538-9325 to determine if a storm water permit is required.

Disposal of domestic wastewater from the operation should be done in a manner approved by the appropriate local health department; Tri-County Health Department for Uintah County or Southeastern Utah Health Department for Grand County.

If you have any questions about this letter, please contact Mark Novak at (801) 538-6518.

Sincerely,

Robert F. Herbert

Rob Herbert, P.G., Manager
Ground Water Protection Section

cc: Robert Bayer, IBR
Paul Baker, DOGM
Carl Adams, DWQ-TMDL
Mike George, DWQ-UPDES Storm Water
Dave Ariotti, Southeastern Utah District Engineer
Scott Hacking, Tri-County District Engineer
Southeastern Utah Health Department
Tri-County Health Department

F:/MNovak/WP/EarthEnResPBR.Ltr

Florachem Corporation
PO Box 5366
Jacksonville, FL 32247
Phone: 904-733-5759
Fax: 904-733-5950

Material Safety Data Sheet

------ Section 1 • Chemical Product and Company Identification ------

Product Name: d-Limonene

Company:
Florachem Corporation
5209 San Jose Blvd., Suite 202
Jacksonville, FL 32207 USA
Phone 904-733-5759

Emergency Telephone Numbers:
24 hrs Chem-Tel 800-255-3924 [within continental US]
24 hrs 813-248-0585 (collect) [outside continental US]

Revised August 2001

------ Section 2 • Composition, Information on Ingredients ------

Component	CAS No.	OSHA HCS Hazard(s)
d-Limonene	5989-27-5	Flammable Liquid. Skin and eye irritant.

EC Classifications:

Xi	Irritant
R36	Irritating to eyes.
R38	Irritating to skin.
S24	Avoid contact with skin.
S25	Avoid contact with eyes.

------ Section 3 • Hazards Identification ------

Emergency Overview:

Appearance:	Colorless to pale yellow liquid
Odor:	Fresh citrus orange
Risk Summary:	Moderate eye and skin irritant. This substance is flammable and will sustain combustion at temperatures above its flashpoint. Avoid heat, sparks and open flame.

Potential Health Effects:

Inhalation:	Vapors may cause respiratory passage irritation in confined spaces. No known long-term hazards.
Eyes:	Irritating to eyes.
Skin:	Irritating to skin.
Ingestion:	Will be irritating to tissues. May be harmful or fatal if swallowed in sufficient quantity. See Section 11 (Toxicological information) for further information.
Chronic:	Not considered a carcinogen by NTP, IARC, or OSHA. No known chronic indications.

Environmental Hazards:
Marine Pollutant

------ Section 4 • First Aid Measures ------

Inhalation:	Remove person to a ventilated area. See a physician if breathing difficulty persists.
Eyes:	Remove contact lenses. Flush with water for at least 15 minutes. See a physician if irritation persists.
Skin:	Remove contaminated clothing. Wash affected areas with soap and water. See a physician if irritation persists.
Ingestion:	Drink lots of water to dilute substance. See a physician.

------ Section 5 • Fire Fighting Measures ------

Flammable Properties:	Flashpoint 46°C (115°F) TCC. Vapors can combust and liquids can burn when temperatures reach or exceed the flashpoint.
Extinguishing Media:	Carbon dioxide, dry chemical, foam.

Fire Fighting Instructions:

Use CO2, foam or dry chemical. Use water as a spray only to lower temperature. This substance floats on water. Treat as an oil fire.

------ Section 6 • Accidental Release Measures ------

Personal Precautions:	See Section 8, Personal Protection.
Environmental Precautions:	Do not discharge into surface waters. May be toxic to aquatic organisms. See Section 3 (Environmental Hazards) and Section 12 (Ecological Information) for further information.

Containment and Cleanup Techniques:

Exercise caution as hard floors coated with this material may be slippery. Small spills may be absorbed by sand or oil-absorbing materials. Large spills should be collected by pumping into closed containers for recovery or disposal. Spills over water will float and may be collected by oil absorbants or by skimming.

------ Section 7 • Handling and Storage ------

Handling:	Wear chemical safety glasses or goggles and chemically resistant gloves. A chemically resistant apron may be used to protect clothing. A respirator may be worn to prevent breathing spray mists or heated fumes.
Storage:	Store in tightly closed metal or glass containers. Containers should be full or blanketed by inert gas. Do not store in plastic. Avoid heat, sparks, and open flames.

------ Section 8 • Exposure Controls, Personal Protection ------

Ventilation:	Mechanical ventillation may be necessary at elevated temperatures to control odor.
Respiratory Protection:	Organic vapor cartridge may be used to prevent irritation from mists and vapors and for odor elimination.
Skin Protection:	Wear chemically resistant rubber gloves and apron (viton, nitrile, and or PVC) to minimize exposure.
Eye Protection:	Wear chemical safety glasses, goggles, or face shield to prevent eye contact.

------ Section 9 • Physical and Chemical Properties ------

Appearance:	Colorless to pale yellow liquid.
Boiling Point:	154°C (310°F).
Flashpoint:	46°C (115°F) TCC.
Odor:	Fresh citrus orange
Oxidizing Properties:	This substance combusts in the presence of strong oxidizers.
pH:	None (not water soluble).
Physical State:	Liquid.
Solubility in water:	less than 0.1%.
Specific Gravity:	0.84 @ 25°C.
Vapor Pressure:	2 mmHg at 20°C.
Vapor Density:	>1 (air = 1.0).

------ Section 10 • Stability and Reactivity ------

Conditions to Avoid:	Excessive temperatures and/or contact with air may cause decomposition or oxidation.
Materials to Avoid:	Avoid contact with strong acids, strong bases, and oxidizing agents. Reacts explosively with iodine pentafluoroethylene.
Decomposition Products:	Incomplete decomposition product may include CO. Ultimate decomposition products are CO_2 and water.

------ Section 11 • Toxicological Information ------

Target Organs:	Eyes and skin.
Routes of Entry:	Eye and skin contact.
Acute Toxicity:	LPR-Mus TD_{LO}: 4800mg/kg/8W-I:ETA. ORL-Mus TD_{LO}: 67g/kg/39W-I:ETA.
Chronic Toxicity:	No known chronic indications.

------ Section 12 • Ecological Information ------

Biodegradability:	Not determined. Related chemicals are known to be biodegradable.
Aquatic Toxicity:	Marine Pollutant. This substance is immiscible with water. This substance is known to evaporate quickly and biodegrade and should not cause long-term effects.
Bioaccumulation Potential:	Not Determined. Related chemicals are known to be non-accumulating in the environment.

------ Section 13 • Disposal Considerations ------

RCRA Hazardous Waste:	Classified as a RCRA Hazardous waste (flammability characteristic).
Disposal Methods:	Dispose of this material by incineration or recovery at a government-approved disposal facility.

------ Section 14 • Transport Information ------

DOT:

Proper Shipping Name:	Terpene hydrocarbons, n.o.s., 3, UN2319, PG III
Exceptions:	Chemicals, n.o.i. (Not Regulated) - allowable for shipment in non-bulk containers.
IMO:	DIPENTENE., 3, UN2052, PGIII, MARINE POLLUTANT.
IATA:	Terpene hydrocarbons, n.o.s., 3, UN2319, PGIII.

------ Section 15 • Regulatory Information ------

OSHA – Hazardous by definition of 29CFR1910.1200 for flammability.

CERCLA – (SARA Title III) Hazard Category – Fire hazard.

------ Section 16 • Other Information ------

Hazard Ratings (0 = minimal, 1 = slight, 2 = moderate, 3 = serious, 4 = severe)
HMIS: Health = 2 Flammability = 2 Reactivity = 1 Personal Protection = C
NFPA: Health = 1 Flammability = 2 Reactivity = 0

Frutech
International Corporation
P.O. Box 2219
Covina, CA. 91722-8219
Phone (818) 966-8361 Fax (818) 332-7921

MATERIAL SAFETY DATA SHEET

Emergency Response 800 424 9300

I.- PRODUCT IDENTIFICATION

Manufacturer :	Frutech International Corporation 3/8-Mile East Expressway 83 Mission, TX. 78572
Trade Name :	Orange Terpenes
Formula :	N/A
Chemical and Common Name :	Orange Terpenes.
CAS Number :	8028-48-6

II.- TYPICAL PHYSICAL AND CHEMICAL CHARACTERISTICS

Appearance and Odor :	Colorless liquid with mildly Citrus odor.
Boiling Point (@ 760 mm Hg) :	176.7C (350°F)
Vapor Pressure (Torr @ 25°C) :	Not Available
Vapor Density (Air = 1) :	0.0123 @ 20°C (68°F)
Specific Gravity :	0.840
Solubility in Water :	Negligible

III.- FIRE, EXPLOSION AND REACTIVITY HAZARD DATA

Flash Point (Tag closed up) :	46°C (115°F) Class III Flammable liquid
Ignition Temperature :	237°C (458°F)
Flammable Limits (% by volume) :	Lower : 0.7 Upper : 6.1
Fire Extinguishing Media :	Use media for Class B fires : foam CO2 or dry compound Avoid direct contact with water.
Special fire fighting procedures :	If confined in a container, cool de exterior with water spray.
Unusual fire and explosion hazards :	Dense black smoke produced.
Hazardous products of combustion :	None. NFPA health hazard rating = 0
Stability considerations :	Stable.
Incompatibility with :	Oxidizing agent, acids, peroxides, halogens, vinyl chloride, iodine pentafluoride.
Hazardous polymerization :	Avoid high temperature, contact with reactive monomers (i.e. methacrylates or vinyl chloride)
Hazardous decomposition products:	None
Conditions to avoid :	In typical flavoring uses, no contact with inflammable or explosive chemicals likely.

IV.- HEALTH HAZARD DATA

OSHA permissible exposure limit :	Not listed.
ACGIH threshold limit value :	Not listed.

Frutech
International Corporation
P.O. Box 2219
Covina, CA. 91722-8219
Phone (818) 966-8361 Fax (818) 332-7921

IV.- HEALTH HAZARD DATA

Carcinogenicity : Not listed in NTP, IARC, or OSHA directories of carcinogenic materials.

Effects of overexposure :

Acute : Vapor irritates eyes and mucous membranes. Skin contact with liquid may cause localized itching.

Chronic : Frequent exposure may induce dermatitis in sensitive individuals. Prolonged contact has caused photosensitivity in some cases.

Primary route of Exposure : Skin contact

Emergency first aids procedures :

Eyes : Flush with water for at least 15 minutes. If irritation

Skin : Wash with soap and water. If persists, see a physician.

Ingestion : See a physician.

Medical conditions generally recognized

As being aggravated by exposure : None known.

V.- SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled :

Shut off source, if possible to do so without hazard. Keep open flames and spark sources away. Do not allow liquid to enter municipal sewage system.

Water disposal method :

Contain and absorb spilled liquid with sand or earth. Remove spend absorbent and dispose in accordance to State, federal and Local disposal laws.

VI.- PERSONAL PROTECTION, HANDLING AND STORAGE INFORMATION

Personal Protective Equipment :	Protective gloves. Safety glasses.
Appropriate Hygienic Practice :	Wash thoroughly after handling.
Ventilation :	Mechanical ventilation recommended.
Restrictions :	No open flames, smoking or unshielded lights
Handling and storage precautions :	Store in cool, well ventilated place away from reactive chemicals, spark sources, or open flames. Container should be kept closed and plainly labeled.

Date of Issue : March 05, 1997 Prepared By : V. Onchi

Frutech
International Corporation

Technical Specification Sheet

Orange Terpenes

Product description

This product is the solvent and oil phase of the cold pressed orange oil that is produced by fractionanted vacuum destillation. Its composition is mainly monoterpenic hydrocarbons.

Chemical and Physical characteristics

Prercent of D-Limonene (HP5890 SPB-5)	94.20 - 97.99
Aldehydes (%) w/w - expressed as decanal	0.3 to 0.8
Optical Rotation - 100 mm tube (25°C)	+99.0° to +100.0°
Specific Gravity (25/25°C)	0.840 to 0.841
Refractive Index (20°C)	1.4726 to 1.4740
Evaporation Residue (%) w/w	N.D.

Organoleptic characteristics

Color	Colorless, crystal clear.
Odor	Mildly Citrus odor

Packaging

386 pound fill in a closed, nitrogen sealed, epoxy lined steel drum.

Storage recommendations

= Orange terpenes deteriorate with exposure to air (oxidation), light, heat and water (humidity). Transfer oil from a larger partially filled container to a smaller, well filled container to reduce headspace to a minimum at all times.

= This product is best when used within six months from date of purchase, if it is stored at 45°F (7.2°C) to 65°F (18.3°C) in the unopened original container.

Last revision September 5 th, 1997.

Frutech
International Corporation

QUALITY ASSURANCE CERTIFICATE

Orange Terpenes

Product description

This product is the solvent and oil phase of the cold pressed orange oil that is produced by fractionanted vacuum destillation. Its composition is mainly monoterpenic hydrocarbons.

Product Lot : 09060501 ***Bill of Lading:*** 1609

Chemical and Physical characteristics	Average	Analysis
Aldehydes (%) w/w - expressed as decanal	0.3 to 0.8	**0.45%**
Optical Rotation - 100 mm tube (25°C)	+99.0° to +100.1°	**100.0°**
Specific Gravity (25/25°C)	0.840 to 0.841	**0.840**
Refractive Index (20°C)	1.4726 to 1.4740	**1.4740**

Organoleptic characteristics

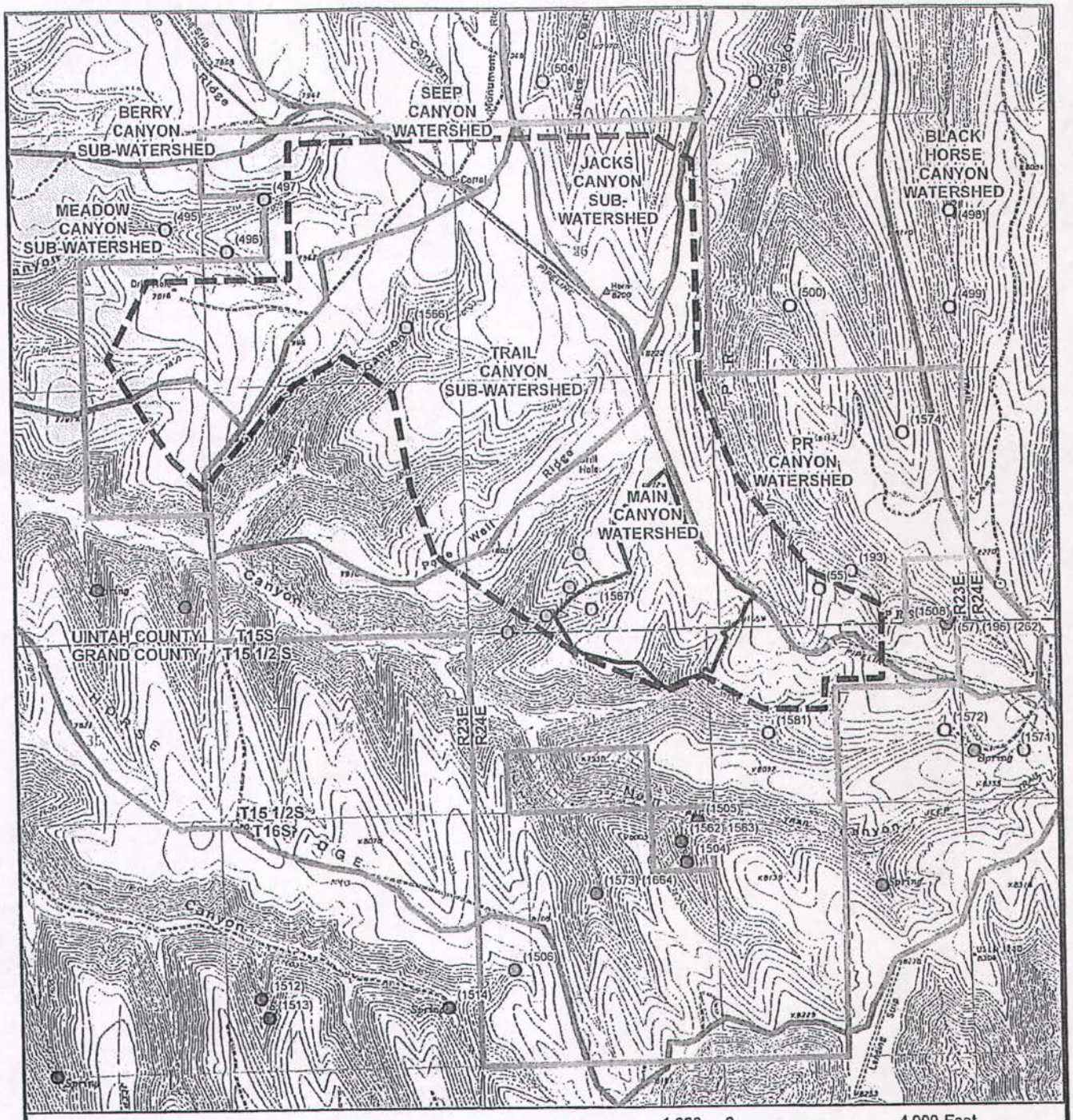
Color	Colorless, crystal clear.
Odor	Mildly Citrus odor

Chromatographic Analysis	Analysis
Chem Station HP 6890 GC, HP 5MS, 30 M, 0.32 mm,0.25 um	SHIPPING091505B1.D
Percent of α-Pinene :	**0.569**
Percent of Sabinene	**0.277**
Percent of β-Pinene :	**0.020**
Percent of Myrcene :	**1.984**
Percent of Octanal :	**0.270**
Percent of D-Limonene :	**96.332**
Percent of Linalool :	**0.169**
Percent of Decanal :	**0.000**

Storage recommendations

= Orange terpenes deteriorate with exposure to air (oxidation), light, heat and water (humidity). Transfer oil from a larger partially filled container to a smaller, well filled container to reduce headspace to a minimum at all times.

= This product is best when used within six months from date of purchase, if it is stored at 45°F (7.2°C) to 65°F (18.3°C) in the unopened original container.



1,000 0 4,000 Feet

1,000 0 1,000 Meters

Contour Interval 40 Feet

N

Legend

- Earth Energy Lease Boundary
- Property Excluded from Lease
- Study Area Boundary
- Affected Area
- Watershed Boundary
- USGS Mapped Spring
- Water Right Filing for Seep or Spring
- Surface Water Right Point of Diversion
- Seep Identified in Field
- (1506) Water Right Number

APPROVED

SEP 19 2008

DIV. OIL GAS & MINING

EARTH ENERGY RESOURCES, INC.

PR SPRING TAR SANDS DEVELOPMENT PROJECT

FIGURE 7
WATER FEATURES

jbr environmental consultants, inc.

DESIGN BY	DRAWN BY	SCALE	DATE DRAWN	REVISIONS
KK	CP	1:36,000	9/11/07	4/03/08
				10/31/08

drawings\Earth Energy\Fig7 Water Features

JON M. HUNTSMAN, JR.
Governor

GARY HERBERT
Lieutenant Governor

State of Utah

Department of
Environmental Quality

Richard W. Sprott
Executive Director

DIVISION OF WATER QUALITY
Walter L. Baker, P.E.
Director

March 4, 2008

Mr. Barclay Cuthbert
Earth Energy Resources, Inc.
Suite 740, 404 – 6th Avenue SW
Calgary, Alberta, Canada T2P 0R9

Subject: PR Spring Tar Sands Project, Uintah and Grand Counties, Utah
Ground Water Discharge Permit-By-Rule

Dear Mr. Cuthbert:

The Division of Water Quality (DWQ) has reviewed the information submitted by JBR Environmental Consultants, Inc. on February 22, 2008 requesting ground water discharge permit-by-rule for the proposed Earth Energy Resources, Inc. PR Spring tar sands project. The proposed operation consists of open-pit mining of tar sands, extraction of bitumen, and disposal of tailings and waste rock.

Below are several relevant factors for determining whether the proposed operation will have a *de minimis* effect on ground water quality or beneficial uses of ground water resources.

1. Based on Material Safety Data Sheets and other information that you sent to DWQ in January 2007, the reagent to be used for bitumen extraction is generally non-toxic and volatile, and most of it will be recovered and recycled in the extraction process. (Because the extraction process is proprietary at this time, this reagent will not be identified in public documents.)

2. Bitumen extraction will be done using tanks and equipment at the processing facility located at the mine site, and no impoundments or process water ponds are planned. Most of the water used in the process will be recovered and recycled.

3. Processed tailings will not be free-draining and will have moisture content in the 10 to 20 percent range. The tailings will not contain any added constituents that are not present naturally in the rock, other than trace amounts of the reagent used for bitumen extraction. Analysis of processed tailings using the Synthetic Precipitation Leachate Procedure indicates that leachate derived from the tailings by natural precipitation would have non-detectable levels of volatile and semi-volatile organic compounds. Unprocessed tar sands and processed tailings were analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) with an extraction process that uses a much lower pH than is likely to occur at the mine site. Analytical results indicate that TCLP metals would not be leached from the tailings at detectable levels except for barium, which was detected at levels below the Utah ground water quality standard of 2.0 milligrams per liter (Table 1 of UAC 317-6). Based on these data, the tailings will be disposed by backfilling into the mine pit.

4. The uppermost geologic formations at the site are the Parachute Creek and Douglas Creek Members of the Green River Formation, which consist of fluvial-deltaic and lacustrine-deltaic deposits of claystone, siltstone, fine-grained sandstone, and limestone. The Parachute Creek Member outcrops over most of the Earth Energy lease and is the 0 to 50-foot thick overburden above the tar sand deposits of the Douglas Creek Member. Shallow ground water at the site is not part of a regional aquifer but occurs in localized laterally discontinuous perched sandstone lenses of the Douglas Creek Member. Exploration drilling did not encounter ground water within 150 feet of the land surface. Based on records from the Division of Oil, Gas, and Mining, the closest major aquifer is the Mesa Verde Formation, which occurs approximately 2000 feet below ground surface in the area of the proposed mine. The topography of the project area is characterized by mesas incised by deep, narrow canyons, and limited shallow ground water discharges as springs in the canyon bottoms. There are no springs in the Earth Energy leased area and the nearest spring is PR Spring located slightly less than a mile east of the project site.

Considering the factors described above, the proposed mining and bitumen extraction operation should have a *de minimis* potential effect on ground water quality and qualifies for permit-by-rule status under UAC R317-6-6.2.A(25). If any of these factors change because of changes in your operation or from additional knowledge of site conditions, this permit-by-rule determination may not apply and you should inform the DWQ of the changes. If future project knowledge or experience indicates that ground water quality is threatened by this operation, the Executive Secretary may require that you apply for a ground water discharge permit in accordance with UAC R317-6-6.2.C.

This operation may require a storm water permit under the Utah Pollutant Discharge Elimination System (UPDES). Please contact Mike George of this office at (801) 538-9325 to determine if a storm water permit is required.

Disposal of domestic wastewater from the operation should be done in a manner approved by the appropriate local health department; Tri-County Health Department for Uintah County or Southeastern Utah Health Department for Grand County.

If you have any questions about this letter, please contact Mark Novak at (801) 538-6518.

Sincerely,

Robert L. Herbert

Rob Herbert, P.G., Manager
Ground Water Protection Section

cc: Robert Bayer, JBR
Paul Baker, DOGM
Carl Adams, DWQ-TMDL
Mike George, DWQ-UPDES Storm Water
Dave Ariotti, Southeastern Utah District Engineer
Scott Hacking, Tri-County District Engineer
Southeastern Utah Health Department
Tri-County Health Department

F:/MNovak/WP/EarthEnResPBR.Ltr

jbr environmental consultants, inc.
www.jbrenv.com
8160 South Highland Drive • Sandy, Utah 84093 [P] 801.943.4144 [F] 801.942.1852

February 21, 2008

Mr. Mark Novak
Utah Division of Water Quality
288 North 1460 West
P.O. Box 144870
Salt Lake City, Utah 84114-4870

RE: PR Spring Mine, Request for Permit-by-Rule Determination

Dear Mr. Novak:

On behalf of Earth Energy Resources, Inc. (Earth Energy), thank you for your involvement in the permitting process for the proposed PR Spring tar sands mining and processing operation. As you are aware, Earth Energy's PR Spring project is located primarily in southern Uintah County, and extends into northern Grand County. The project area lands and minerals are under lease from Utah State Institutional Trust Lands Administration.

This letter transmits a brief report with attachments, intended to provide information to support Earth Energy's request for a determination that the proposed means of ore processing and processed sand disposal be considered permitted by rule under Utah's Ground Water Protection Rules (UAC R317.6-6). In part, this information was compiled to address items discussed in the initial January 10, 2007 meeting at the Division of Water Quality (DWQ) office with you, Tom Rushing, and Jodi Gardberg, and additional comments in your e-mail dated March 30, 2007 (attached).

Please contact either the undersigned or Mr. Barclay Cuthbert with Earth Energy Resources, Inc. (403.233.9366) with any questions you may have. Thank you very much.

Sincerely,

Robert J. Bayer, PG
Managing Principal

Enclosure(s)
cc: Barclay Cuthbert/Earth Energy Resources, Inc.

Subject: FW: sampling plan

-----Original Message-----
From: Barclay Cuthbert
[mailto:barclay.cuthbert@earthenergyresources.com]
Sent: Thursday, April 05, 2007 3:46 PM
To: Bob Bayer; Linda Matthews
Subject: FW: sampling plan

Copy of response from Mark Novak.

Regards,

Barclay

Best regards,
Earth Energy Resources Inc.

Barclay Cuthbert
Vice President, Operations
Tel: + 1.403.233.9366
Cell: + 1.403.619.4230
Fax: + 1.403.668.5097
E-mail: barclay.cuthbert@earthenergyresources.com
Suite # 740, 404 - 6 Avenue SW
Calgary, Alberta T2P 0R9

-----Original Message-----
From: Mark Novak [mailto:mnovak@utah.gov]
Sent: March 30, 2007 4:41 PM
To: Barclay Cuthbert
Cc: Jodi Gardberg; Paul Baker
Subject: sampling plan

Using Crown Ridge samples for the testing would be acceptable for the permit application, but you should mention the sample source in the application, and any known differences between it and the PR Spring tar sand. (for example, stratigraphic position) Once the operation is up and running, I would like similar tests run on the PR Spring tailings, and the proposed tailings management plan modified if the results are any different from the Crown Ridge samples.

I am also concerned with salinity, and would like the SPLP leachate analyzed for TDS and major ions (Na, Ca, Mg, K, Cl, SO4 and alkalinity).

I should be in the office all next week if you would like to call (801 538 6518).

Thank you for this information.

Mark

>>> Barclay Cuthbert <barclay.cuthbert@earthenergyresources.com>
>>> 3/30/2007

10:34 AM >>>
Hi Mark,

I've put together a proposal for the SPLP and Oil & Grease testing required for our permit application and I'd like to discuss this proposal with you.
Once you've had a chance to review the attachment, please let me know of a good time to call and we can discuss.

Hope you have a good weekend.

Regards,

Barclay

Best regards,

Earth Energy Resources Inc.

Barclay Cuthbert

Vice President, Operations

Tel: + 1.403.233.9366

Cell: + 1.403.619.4230

Fax: + 1.403.668.5097

E-mail: barclay.cuthbert@earthenergyresources.com

Suite # 740, 404 - 6 Avenue SW

Calgary, Alberta T2P 0R9

-----Original Message-----
From: Mark Novak [mailto:mnovak@utah.gov]
Sent: January 31, 2007 8:43 AM
To: barclay.cuthbert@earthenergyresources.com
Cc: Jodi Gardberg
Subject: RE: MSDS received

Because the material is an oil, your management plan for the spent tailings should prevent it from being released to surface water. This should include covering the tailings with topsoil for final disposal and establishing a vegetative cover, and preventing runoff from the tailings from discharging into surface water while the tailings are exposed before final burial.
(Berms around the temporary storage area should take care of this.) When you characterize the tailings leachate (from Synthetic Precip. Leaching
Procedure) for the permit application, you should analyze it for the parameter Oil & Grease (EPA Method 1664A).

Thank you for sending in this information, and please contact me if you have any questions about other material needed for the permit application.

Best Wishes,

Mark

Earth Energy Resources, Inc.
PR Spring Operation, Uintah and Grand Counties, Utah
Ground Water Discharge Permit-by-Rule Demonstration

Introduction

Earth Energy Resources, Inc. (Earth Energy) is in the process of acquiring all required state and federal permits prior to opening and operating a tar sands mine and process plant in northeastern Utah. Known as the PR Spring operation, the mine and plant would initially disturb approximately 200 acres of lands that Earth Energy has leased from Utah State Institutional Trust Lands Administration (SITLA). The project would be located in T15S, R23E, SLB&M, Uintah County, Sections 35 & 36, and T15½S, R24E, Grand County, Sections 31& 32 (**Figure 1**).

This report provides information to support Earth Energy's request to the Utah Division of Water Quality (DWQ) for a determination that the PR Spring operation be considered as a permitted-by-rule facility under Utah's Ground Water Protection Rules (UAC R317-6). UAC R317-6-6.2.A.1 states that "*facilities with effluent or leachate which has been demonstrated to the satisfaction of the Executive Secretary to conform and will not deviate from the applicable class TDS limits, ground water quality standards, protection levels or other permit limits and which does not contain any contaminant that may present a threat to human health, the environment or its potential beneficial uses of the ground water*" are considered to be permitted by rule. Also permitted by rule (at UAC R317-6-6.2.A.25) are "*facilities and modifications thereto which the Executive Secretary determines after a review of the application will have a de minimis actual or potential effect on ground water quality.*" Earth Energy believes that the proposed means of tar sands processing, processed sand disposal, and other aspects of the PR Spring operation meet these criteria, as described in detail below.

Environmental Setting

Earth Energy's PR Spring project would be located on the Tavaputs Plateau along the southeastern rim of the Uinta Basin. The site is within the Willow Creek sub-basin of the Green River watershed. The proposed disturbances would be located on a relatively flat interfluve between PR Canyon and Main Canyon, extending into the heads of two small ephemeral tributaries to Main Canyon. Average elevation at the project site is approximately 8,100 feet. The small headwater drainages contain very small active-channel cross-sections, and typically show no evidence of live water or riparian vegetation. Precipitation in this area is estimated at about 12 inches annually (Price and Miller 1975), which is generally not sufficient to sustain perennial flow in the smaller watersheds in this region. Instead, much of the area is dissected by numerous ephemeral drainages located in large canyons with steep side slopes.

Thick, cross-bedded sandstone, mapped by Gaultieri (1988) as the Renegade Member of the Wasatch Formation, crops out in the bottom of Main Canyon. These beds are overlain by the Green River Formation, which contains lenticular beds of lacustrine sandstone saturated with bitumen separated by intervals of barren sandstone, siltstone, shale, mudstone and calcareous

marl. The Parachute Member of the Green River Formation is the surface bedrock formation found throughout much of Earth Energy's lease, and the underlying Douglas Creek member of that formation contains the tar sands deposit that would be mined during this project. Five distinct asphalt impregnated sands, labeled "A", "B", "C", "D" and "E" with "E" the highest strata, occur in the upper portion of the Douglas Creek Member (Byrd, William D. 1970; Clem, K. 1984). The "E" bed is regionally known, but is not present locally. The remaining beds crop out in PR Canyon to the northeast and Main Canyon to the southwest of Earth Energy's proposed operations. All four beds occur in an interval 240 to 290 feet thick (Murphy, Leonard A., 2003 private report). Earth Energy's primary targets at this time are the "C" and "D" beds. The Douglas Creek Member forms the uppermost recognized aquifer in the project area.

BLM wrote the following about the geology and hydrogeology in the general vicinity of the project area (USDI BLM 2007):

> The Douglas Creek Aquifer receives recharge mainly by infiltration of precipitation and surface water in its outcrop area, with little leakage from underlying bedrock aquifers. It discharges locally to springs in the outcrop area and to alluvium along major drainageways such as the Green and White Rivers. In the study area, flow is generally to the north and northwest. The unit is roughly 500 ft thick, although in the center of the Uinta Basin it is as thick as 1,000 ft. Maximum well yields are less than 500 gpm. Water type is typically sodium sulfate to sodium bicarbonate. TDS levels range from 640 to 6,100 mg/L (Holmes and Kimball 1987).

Previous geologic exploration drilling at the site, at maximum depths of approximately 150 feet below ground surface, did not encounter ground water. However, there are several nearby springs and/or seeps that provide evidence of localized, shallow ground water. Most springs in the area, including the nearby PR Spring, are reported to discharge from the Parachute Creek Member of the Green River Formation (Price and Miller 1975), and represent isolated, perched aquifers. PR Spring is located slightly less than one mile east of Earth Energy's proposed operation, and is associated with several water rights for stock watering uses. It issues in the canyon bottom near the head of PR Canyon. Other springs mapped by the USGS and within a similar proximity to the site are located south of the proposed operation in the bottom of Main Canyon and its tributaries. PR Spring issues at an elevation of approximately 8,040 feet; other nearby springs issue at elevations ranging from about 7,700 to 8,160 feet.

While the Green River Formation includes various other water bearing zones (including the Birds Nest zone of the Parachute Creek Aquifer and the Douglas Creek Aquifer), the State Water Plan (Utah Division of Water Resources 1999) does not include any aquifers within this formation as significant enough to be targets for ground water development. Further, information from Green River Formation water wells and springs indicates generally low yields (Price and Miller 1975). Instead, the underlying Wasatch Formation and the Mesa Verde Formation (Group) are the nearest aquifers of a regional extent.

Price and Miller (1975) indicate that the potentiometric surface in the general area is 1,500 feet below ground level (BGL) or greater, with a gradient to the north. The Division of Oil, Gas and Mining's (DOGM) oil and gas well log records (DOGM 2007) were searched for relevant information on stratigraphy and ground water. Two of the well records (Webb (API #43-047-

30097, drilled in 1970-71), Lindisfarne (API #43-047-35567) drilled in 2006)) and other reports (Howells et al. 1987) describe the Mesa Verde as the nearest fresh water aquifer, under the low-permeability Green River and Wasatch formations. The average distance from ground level to the Mesa Verde was 2,011 feet, based on DOGM records of oil/gas wells within 3.3 miles of the project site and surrounding it in all directions. Table 1 shows the distance from ground level to the top of the Mesa Verde, taken from DOGM well files. Only recorded data is entered (e.g., if surface formation was not described it was left blank, if surface was described as the Green River Formation, zero (0) was entered in column 5).

Table 1. Distance BGL to Aquifer (from DOGM well files)

		Location Relative to Project Site		Distance BGL (in ft)			
Well Name	T-R-S	Direction	Distance (mi)	Green River Formation	Wasatch Formation	Mesa Verde Formation	Noted Water Occurrence
Lindisfarne	15-23-26	NNW	1.35	0	1,282	1,966	
Black Horse Canyon	15-24-31	ENE	1.2			1,905	
Webb	15-24-31	E	1.3			1,266	1,266
Divide 32-32	15.5-24-32	ESE	0.7	0		2,148	
UTFEE	15.5-24-32	SE	1.1	0	710	1,768	
UTON	16-24-5	SSE	1.8	0	600	1,800	
Horse Point	16-24-6	SSW	1.2			2,123	
Little Berry	16-23-2	SW	3.3			2,108	
Duncan 3	15-23-28	W	2.8	0	900	2,100	
Duncan 14	15-23-28	WNW	3.1	0		2,465	
Main 1	15-23-28	NW	2.35	0	1,365	2,475	

The nearest water well in the State water rights database (DWR 2007) is a BLM well (water right #49-1597) approximately three miles east in T15S, R24E, SESE Section 32; BLM initially drilled and abandoned a dry well (822 feet deep), then drilled a second well six feet away from the first and finished the well at 98 feet (static water level 60.9 ft; pumping at two gallons per minute (gpm) for one hour caused a 15-foot drop) (DWR 2007). According to the database, no proof of beneficial use was ever submitted for the water right associated with this well, and the right lapsed in 2002. The current physical status of the well is not known; there is no record in the database of the well having been plugged and abandoned.

A water rights application (No. 49-1567) has been filed with the State Engineers Office by a private party on a small spring located within Earth Energy's proposed disturbance area, as well as several other nearby springs; in general, these springs are ones that are not shown on USGS mapping. To date, the State Engineer has not granted this water right, in part because there were official protests filed and in part because the applicant has not submitted requested information to the State Engineer. A May 16, 2007 reconnaissance trip to locate the on-site spring and determine a flow rate found no evidence of ground water discharge at this site. It is not known whether such a spring previously discharged at this location or whether the site location associated with the water right application was reported incorrectly. A very minor seep, with

flow too small to be measured, was found approximately 100 vertical feet down from, and ¼ mile west of, the spring identified with the water right. No other water was found in the immediate vicinity during this survey. Further, as noted above, exploration drilling in the vicinity, to depths of 150 feet, did not encounter ground water.

The baseline water quality of ground water underlying the project area is not known. However, the BLM (1984) notes that known springs within the combined Hill Creek and PR Springs Special Tar Sands Area (STSA) typically range from fresh to moderately saline, with total dissolved solids (TDS) ranging from about 300 mg/L to 6,100 mg/L (BLM 1984). Generally, the springs are freshest near the southern extent of the STSA, in the vicinity of the Project Area, with TDS concentrations of less than 500 mg/L (Price and Miller 1975). In 1964, PR Spring was discharging at 5.6 gpm and had a dissolved solids concentration of 380 mg/L (Price and Miller 1975).

More recently BLM has written the following (USDI BLM 2007):

> Dissolved salt in the rivers is a major concern in the Uinta Basin. The salts originate from marine and lacustrine sedimentary rocks and their derived soils that have high salt content. Surface runoff, irrigation return flow, saline groundwater discharges, and evapotranspiration are the major causes of the elevated TDS concentrations in the surface water (Price and Miller 1975). The concentrations of dissolved salt in streams generally are low near headwater areas, but increase dramatically near the lower reaches of the streams. This is magnified during low-flow periods.

In spring 2008, Earth Energy plans to drill a test water well approximately 1¼ mile east of the proposed PR Spring operation, in order to develop a source for its process water requirements. Geologic logging will include observations on specific locations where ground water is encountered, an aquifer pump test will be conducted, and water quality samples of the target aquifer will be collected. These will help to further define the location and the baseline chemistry of the area's ground water.

Surface water quality data for nearby streams is lacking. However, Willow Creek, to which Main Canyon is tributary, is listed as an impaired stream on Utah's 303(d) list. The listed pollutant is total dissolved solids (DWQ 2006).

PR Spring Operation Description

Earth Energy plans to mine tar sands from a 62-acre open pit (**Figure 2**), from which it will also remove overburden and interburden. Under the terms of the SITLA lease, mining may occur up to a maximum depth of 500 feet below ground surface; the current pit design, which will mine the D and C beds, extends to a maximum depth of about 150 feet. Based upon exploration boreholes and a five-acre test pit, overburden varies from 0 to 50-feet thick, and interburden thickness averages 15 feet. The "D" bed averages 21 feet thick, and the "C" bed averages 24 feet thick.

The mined tar sands would be stockpiled adjacent to the processing facility; up to about 40,000 yd^3 of tar sands (a two-week supply) could be stockpiled at any one time. Overburden and interburden would initially be placed in overburden/interburden disposal sites, which will be constructed as small valley fills. As the tar sands are processed and mining progresses, sand and fines remaining after extraction of the bitumen will be used to backfill the open pit. The waste sand and fines will be alternately placed with the available over/interburden rock to provide stability. At the end of this phase of mining, two external overburden/interburden disposal sites (approximately 25 acres each) will remain, and the open pit will have been backfilled to about 50-percent of capacity.

The processing facility (**Figure 3**) will be adjacent to the open pit, covering approximately 15 acres, and will include a mine office and associated parking area; a maintenance shop, warehouse, power plant, equipment parking and service area; process equipment, sand de-watering equipment, a tank farm, tank truck loading area, and a lined water storage pond that will serve as a reserve process water pond and plant-site runoff collection pond; and stockpiles for processed sand, reject materials (ore loads that contain too much interburden or overburden to be viable for processing), and ore. The mine office will be a modular building placed on a gravel pad. The process equipment will be skid-mounted. The warehouse and maintenance shop will be "Sprung-type" semi-permanent structures placed on concrete pads. The tank farm will be designed, constructed, and operated as required by the Spill Prevention, Control, and Countermeasures (SPCC) regulations at 40 CFR 112. Among other requirements, these regulations set forth requirements for secondary containment of stored oil products (i.e. 110 percent of the capacity of the largest tank). Because the tank truck loading area will involve the transfer of large quantities of hydrocarbons, Earth Energy's SPCC Plan will also address best management practices (BMPs) to prevent or manage releases from this area as well as from the tank farm.

Earth Energy has patented a chemical method for extracting hydrocarbons from tar sands. Known as the Ophus Process, this production method produces clean (chemically inert), "damp-dry" sand tailings that can be backfilled into the quarry. The method relies upon a proprietary cleaning emulsion, whose specifications and Material Safety Data Sheet (MSDS) have been provided to DWQ as confidential information. As indicated in the MSDS, while the cleaning emulsion's biodegradability has not been determined, related chemicals are known to be biodegradable. Further, the emulsion evaporates rapidly when exposed to air and is insoluble in water.

Figure 4 shows the process flow diagram (confidential). The extraction process begins when the mined tar sand is sent through a crusher or de-lumper and reduced to a two-inch-minus aggregate size. From there, the crushed ore is augered to a heated slurry mixer where the cleaning emulsion is introduced along with water and the ore slurried to the consistency of a thick, gritty milkshake. The oil sand slurry is then moved by screw conveyor to the slurry tank where primary separation of the bitumen from the sand occurs. The produced sand with residual bitumen is then pumped through a series of separation towers where the last traces of bitumen are removed. All of the liberated bitumen is captured, polished with cyclones and/or centrifuges and then pumped to a storage tank for heated storage prior to transport. The cleaning chemical is then removed from the bitumen by distillation and recycled to the front of the process.

Although this is a closed system, Earth Energy is coordinating with EPA and the Utah Division of Air Quality in regard to possible air emissions due to fugitive or other losses. The chemical is not changed as a result of processing – it acts as a diluting and a cleaning agent, but is not itself altered by bitumen extraction operations.

Approximately 85 percent of the total water used during the extraction of bitumen from oil sand will be recycled. The chemically cleaned produced sand is de-watered on a shale shaker (or similar device) and the recovered water is pumped to a holding tank for recycle to the front of the process. Additional cleaning agent is added to the re-cycled water to bring it back to full strength. De-watered sand and fines represent the two solid streams of residual waste material that will then be conveyed to a stockpile for loading and backhaul to the mine pit. The first stream, coarse solids, is primarily quartz sand which has particle sizes large enough to separate from the hydrocarbon phase and gravimetrically separate from the liquids. This phase is collected at the bottom of the separation towers and dewatered. The second stream is the fines (including clays), which typically remain entrained in the hydrocarbon phase during the initial bitumen separation. After the bitumen is extracted from the oil sands, a combination of hydrocarbon phase, water, and clays and fines are routed to the separation/polishing components of the Ophus Process where they are separated. The dewatered sands and fines are placed in a temporary storage pile, from which they are back-hauled to the pit backfill every 24 hours. The dewatered residual solids in the storage pile will contain approximately 15 to 20 percent moisture and when mixed will have a plastic consistency that will not release free water while in the stockpile. This material will be near optimum moisture for compaction when it is returned to the pit.

The final grading plan for the plant site will ensure that all plant site run off, including any free water from the residual solids storage pile (after a precipitation event, for example) will flow to the reserve water pond. The water in the reserve pond will be used during outages of the main water supply system, and may also be used for dust suppression on haul roads and in the open pit.

Water is expected to be consumed at a rate of approximately 1.5-2 barrels for each barrel of produced bitumen. The 2,000 barrel/day operation would use approximately 4,000 barrels of water, or 116 gpm based upon 24-hour processing. All of the water that is not recycled would either evaporate or be returned to the open pit as moisture within the processed sand, which would be mixed with returned overburden and interburden as pit backfill. The backfill would be unsaturated and non-free-draining.

In Utah, discharge of process waters, wastewaters, and storm water runoff from industrial facilities to surface water is typically regulated by DWQ through the Utah Pollutant Discharge Elimination System (UPDES) program, except where Tribal Land is involved, in which case EPA has regulatory authority over such discharges. Earth Energy's PR Spring operation will be located partially on Tribal Land and partially on non-tribal land, thus both EPA and DWQ have jurisdiction over any such discharges to surface water. As there will be no discharge of process water or wastewater to surface waters, a permit for these types of discharges will not be required from either agency. The need to obtain a permit for storm water discharges is currently being investigated with both EPA and DWQ. However, regardless of whether a permit is required by

either or both agencies, storm water generated on-site will be managed so as to prevent its release to surface water (through BMPs such as grading, impoundment, and re-use).

Demonstration of Permit-by-Rule Conformance

Earth Energy believes that all aspects of the PR Spring operation will conform to the requirements stated at UAC R317-6-6.2.A.1 and A.25 (quoted above), thus allowing it to be considered as permitted by rule. First, the facility design and the nature of the operation minimize the potential for contaminant release. Second, the characteristics of residual water associated with the tar sands process do not suggest an environmental threat. Last, the hydrogeologic setting of the area in combination with various aspects of the project design limits the vulnerability of the aquifer to direct or leached contamination. In sum, Earth Energy's PR Spring operation is expected to have no more than a *de minimis* effect on ground water or surface water. These subjects are discussed in detail below.

Potential for Contaminant Release

As described above, the 15-acre process facility would include a fuel farm with full secondary containment capacity, a lined water pond, and self-contained process equipment. All of these facilities are designed to prevent release of fuels, process water, or process chemical. Any inadvertent release due to an accident or upset condition would be properly contained and mitigated. Temporary stockpiles of raw or processed tar sands would be protected from storm water run-on: the site is located atop a flat ridge with little or no up-gradient watershed, and berms would be used to control what runoff is produced from local precipitation. Further, as noted above, the process chemical itself is not water soluble and does not pose a threat other than that due to its flammability. There would be no effluent released during the operations; water would be used and recycled in a closed-loop fashion, with only a small portion exposed and lost to the environment as unrecoverable entrained moisture in the pore spaces of the produced sand and fines.

The overburden/interburden disposal sites would contain excavated non-oil-bearing sedimentary rock that would be chemically inert. The western-most of these disposal sites would be located on the area for which a water right (discussed above) has been filed on a small spring. Although there is no sign that such a spring exists at this location, the disposal site has been designed with a drain system to accommodate any flow from such a spring, should one be located within its footprint. Any such outflow would be routed down-slope along the eastern limit of the fill to a discharge point below the toe of the disposal site.

In sum, all of the above-described aspects of the PR Spring operation represent a negligible potential for contaminant release.

The processed tar sands that would be disposed back into the open pit represent the material with the characteristics most likely to contaminate water that contacts the material. Petroleum compounds associated with bitumen residual, entrained process water, or remaining process chemical represent, in theory, potential sources of contamination. To further investigate this

potential, lab analyses -- using Toxicity Characteristic Leaching Procedure (TCLP Method 1311) and Synthetic Precipitate Leachate Procedure (SPLP Method 8270C/3510C and GC/MS 8260B), as well as leaching procedures using other solvents (EPA Method 8015B/3545), were run on unprocessed tar sands, processed sands and processed fines. Results of those tests are described below.

Characteristics of Residual

After processing, the tar sands will be nearly dry (10 to 20-percent moisture remaining from entrained process water); they will also contain some residual hydrocarbon due to a less-than-100-percent processing efficiency, and some residual process chemical. Processing produces two streams of residual material: 1) eighty percent in the sand size-class (d_{50} = 117 μm), and 2) twenty percent fines (d_{50} = 18 μm)[1]. This material would be placed back into the open pit and layered with removed overburden and interburden as a disposal/reclamation practice. Once the backfill is complete, the area would be topsoiled and revegetated. Any residual extraction fluid would be expected to evaporate quickly, due to its high volatility.

To investigate the chemical characteristics and leaching potential of the processed tar sands, two sets of samples were collected and analyzed. In 2005, samples of unprocessed tar sand were obtained from the Leonard Murphy #1 pit at the PR Spring site. The Leonard Murphy #1 pit is a small (approximately five acres) test pit located within the footprint of the proposed 62-acre quarry. One of the tar sands samples was analyzed in its raw state, and one was processed through a shop-scale demonstration plant prior to laboratory analysis. In 2007, additional tar sands samples were obtained from Asphalt Ridge, located approximately 40 miles north of the PR Spring site. One of the tar sands samples was analyzed in its raw state, and one was processed at Earth Energy's pilot-scale plant in Grande Prairie, Alberta prior to analysis; the produced sands and fines were analyzed separately because they are generated as two separate waste streams, as described above. For both the 2005 and the 2007 sampling events, the tar sands were processed using the same Ophus Process that was described above and proposed for the upcoming PR Spring operation. The Asphalt Ridge samples are assumed to be a valid stand-in for the PR Spring operation because of their similarity geologically and analytically. Results from both sets of analyses are provided in Tables 2 and 3 and the discussion that follows. The full laboratory analysis reports for the 2007 samples are attached.

Table 2 Leonard Murphy #1 Tar Sands Analytical Summary

Analytical Parameter (units)	Unprocessed Tar Sand	Processed Sand
Total Petroleum Hydrocarbon – Diesel Range Organics		
TPH-DRO (mg/kg)	19,000	2,700
TCLP Volatiles [1]		
Benzene (mg/L)	NA	<0.042
Ethylbenzene (mg/L)	NA	<0.042
Toluene (mg/L)	NA	<0.042
Xylenes, total (mg/L)	NA	<0.042

[1] Note that the unmilled PR Spring ore has a d_{50} of 173 μm.

Analytical Parameter (units)	Unprocessed tar Sand	Processed Sand
TCLP Metals		
Arsenic (mg/L)	<0.10	<0.10
Barium (mg/L)	0.47	1.6
Cadmium (mg/L)	<0.030	<0.030
Chromium (mg/L)	<0.050	<0.050
Lead (mg/L)	<0.10	<0.10
Mercury (mg/L)	<0.0010	<0.0060
Selenium (mg/L)	<0.10	<0.10
Silver (mg/L)	<0.10	<0.10
TRPH		
TRPH (mg/L)	3.3	<3.0

(Source: American West Analytical Laboratories)
[1]Sample was received with headspace, which could compromise results

Table 3 Asphalt Ridge Tar Sands Analytical Summary

Analytical Parameter (units)	Unprocessed tar Sand	Processed Sand	Processed Fines
Total Petroleum Hydrocarbon – Diesel Range Organics			
TPH-DRO (mg/kg)	12,000	930	3,400
SPLP Semi-volatiles[1]			
3&4-Methyphenol (mg/L)	<0.025	<0.025	<0.025
2-Methylphenol (mg/L)	<0.025	<0.025	<0.025
2,4-Dinitrotoluene (mg/L)	<0.025	<0.025	<0.025
Hexachlorobenzene (mg/L)	<0.025	<0.025	<0.025
Hexachlorobutadiene (mg/L)	<0.025	<0.025	<0.025
Hexachloroethane (mg/L)	<0.025	<0.025	<0.025
Nitrobenzene (mg/L)	<0.025	<0.025	<0.025
Pentachlorophenol (mg/L)	<0.025	<0.025	<0.025
Pyridine (mg/L)	<0.025	<0.025	<0.025
2,4,5-Trichlorophenol (mg/L)	<0.025	<0.025	<0.025
2,4,6-Trichlorophenol (mg/L)	<0.025	<0.025	<0.025
SPLP Volatiles[1]			
Benzene (mg/L)	<0.040	<0.040	<0.040
Carbon tetrachloride (mg/L)	<0.040	<0.040	<0.040
Chlorobenzene (mg/L)	<0.040	<0.040	<0.040
Chloroform (mg/L)	<0.040	<0.040	<0.040
1,4-Dichlorobenzene (mg/L)	<0.040	<0.040	<0.040
1,2-Dichloroethane (mg/L)	<0.040	<0.040	<0.040
1,1-Dichloroethane (mg/L)	<0.040	<0.040	<0.040
2-Butanone (mg/L)	<0.020	<0.020	<0.020
Tetrachloroethene (mg/L)	<0.040	<0.040	<0.040
Trichloroethene (mg/L)	<0.040	<0.040	<0.040
Vinyl chloride (mg/L)	<0.020	<0.020	<0.020
TCLP Metals			
Calcium (mg/L)	2.1	0.71	3.1
Magnesium (mg/L)	<0.50	<0.50	0.77
Potassium (mg/L)	<0.50	<0.50	1.2
Sodium (mg/L)	3.8	9.9	29
Inorganic Analysis			
Alkalinity (as $CaCO_3$) (mg/kg)	<20	63	75
Bicarbonate (as $CaCO_3$)	<20	63	66

Analytical Parameter (units)	Unprocessed Tar Sand	Processed Sand	Processed Fines
(mg/kg)			
Carbonate (as $CaCO_3$) (mg/kg)	<10	<14	<12
Chloride (mg/kg)	<5.0	19	21
Sulfate (mg/kg)	<5.0	60	61
Total Dissolved Solids (mg/kg)	24	300	6,100
Other Hydrocarbons			
Oil & Grease (mg/kg)	140,000	3,000	30,000
TRPH (mg/kg)	64,000	1,100	9,500

(Source: American West Analytical Laboratories)
[1] Holding times were exceeded

Volatile and Semi-Volatile Organics

All sample results – before and after processing – show that both volatile and semi-volatile organics were below detection in the leachate, confirming that the organics present are among the least mobile. However, it may be relevant to note that the analyses for these parameters were compromised to an unknown extent: the 2005 samples were received with headspace in the vials, which does not meet sampling protocol, and the 2007 samples were not analyzed by the lab within the allowable holding times. In addition to these sampling and lab errors, reporting limits for volatiles and semi-volatiles were generally above the applicable ground water standard for these analytes. Thus, it is possible that greater concentrations than those measured by the lab were actually present in the samples. Tar sands are comprised of bitumen, which is the non-volatile end member of the petroleum maturation process. By definition, then, bitumen contains little or no volatile or semi-volatile constituents. Therefore, it is believed that the results still indicate a *de minimis* effect on ground water from volatile or semi-volatile components, particularly given the hydrogeologic setting as described below.

Non-volatile Hydrocarbons

As expected, all sample results show that TRPH, TPH-DRO, and oil and grease were very high in the unprocessed ore and significantly reduced by processing. In spite of these reductions, some levels remain relatively high, particularly in the processed fines. In fact, the lab analytical reports note that the results for oil and grease are outside the method limits for the unprocessed ore and the processed fines, as well as for TRPH for the processed fines. Note that both of these analyses used EPA Method 1664a, which uses n-Hexane as the solvent; while this may be useful in characterizing the processed tar sand material, it does not characterize the likely leachate from precipitation. The absence of volatile or semi-volatile constituents in the processed material indicates that the organic compounds in the residual material are likely to be no more mobile than the *in situ* tar sands themselves.

One way of considering the environmental effects of the residual material is to compare it with the Utah's Department of Environmental Quality, Division of Environmental Response and Remediation's clean-up standards for petroleum-contaminated soils at underground storage tank sites. The initial screening and Tier 1 risk-based screening levels for oil and grease or TRPH are 1,000 mg/kg and 10,000 mg/kg, respectively. Of the total petroleum analyses preformed on the Asphalt Ridge samples, only the oil and grease analysis for the processed fines sample exceeded the Tier 1 screening level. However, when the processed fines are mixed with the processed

sands in their produced ratio of 1:4, the combined result would be 8,400 mg/kg, which complies with the applicable Tier 1 screening level. Table 4 shows the effect of recombining the processed sands and fines for the three types of total petroleum analyses performed on the Asphalt Ridge samples.

Table 4 Comparison of Total Petroleum Analyses with Tier 1 Screening Levels

Analysis	Processed Sand	Processed Fines	((b*.708)+(c*.177))/(.708+.177)	Tier 1 Screening Criteria
TPH-DRO	930	3,400	1,424	5,000
Oil & Grease	3,000	30,000	8,400	10,000
TRPH	1,100	9,500	2,780	10,000
All analyses are in mg/kg				

Metals and Other Inorganics

The 2005 samples were analyzed for TCLP trace metals, and non-detects were reported for all of the analyzed metal constituents except barium. At DWQ's request, the 2007 samples were analyzed for TCLP calcium, magnesium, potassium, and sodium as a means of determining the potential of the leachate to cause salinity in any ground water it might enter. The results were detectable, but levels of the constituents were unremarkable. In regard to ground water quality standards, for those parameters for which TCLP metals were analyzed in 2005, the following is noted: barium, chromium, lead, and silver concentrations met ground water quality standards. The detection limits for the TCLP extract from analysis of arsenic, cadmium, mercury, and selenium were greater than the ground water quality standards for these parameters; therefore, comparison of these analyses with ground water quality standards is not possible.

It is believed that the results indicate a *de minimis* effect on ground water from the analyzed metals, particularly given the hydrogeologic setting as described below.

Total Dissolved Solids

Because the project is located within the Colorado River Basin, salinity (as measured by total dissolved solids) is a concern for any potential discharges to surface waters or ground water. Further, ground water in the State is classified according to its TDS, which, in-turn, drives protection levels established in a ground water permit. The TDS concentration of ground water in the general project vicinity varies by an order of magnitude (from 300 to 6,000 mg/L as described above), but site-specific TDS data for ground water underlying the project area are not available. The TDS analyses in Table 3 are reported in mg/kg and result from a non-standard analytical method; therefore these results are not considered relevant for estimation of the TDS of leachate from the process residuals. The expected TDS of leachate that might develop from the processed oil sands is not known, however, the Orphus process affects organic compounds and does not possess the acid or caustic qualities necessary to dissolve inorganic compounds. In addition containment of the residual material in the open pit will generally prevent the release of any fluids from the waste material.

Extraction Fluid Residual

In addition to the residual product characterized in the above tables, there would likely be some residual extraction fluid in the processed residual. The previously provided MSDS for the proprietary extraction fluid supports the contention that, in the unlikely event that leaching by rain water mobilizes residual extraction fluid, the fluid poses virtually no ecological or human health risk. Given the nature of this emulsion and the concentration in which it will occur in the produced sands and fines, no impact to water quality would be expected as a result of its use and the subsequent placement of dried produced sands and fines at the proposed disposal site.

Hydrogeologic Setting

Another factor in assessing risk to ground water is the vulnerability of the aquifer to direct or leached contamination from the storage site. The lack of water wells in the area complicates this task, but also suggests that no productive aquifer has been located close enough to the ground surface to provide an economical water source. As discussed above, the relevant major, regional aquifer in this area is likely to be associated with the Mesa Verde Formation (Group). The vertical distance between the placed processed sands and this aquifer is documented in oil and gas well logs to be in the range of 1,500 to 2,000 feet, which would provide a sufficient interval of protection from any leachate.

At the same time, there is evidence of shallower, localized ground water in the area (see the Environmental Setting section, above). While the presence of such ground water directly underlying the storage site is thought to be unlikely (no springs have been noted and exploration drilling did not encounter ground water between the surface and 150 feet), it is not possible to preclude its presence.

To analyze the potential for precipitation falling on the disposed processed residual material to migrate through the depository to native materials at the bottom of the pit excavation, the following factors need to be considered. The processed sand will be dry (10-20 percent moisture content), and because of the low rainfall in the area, breakthrough of infiltrating precipitation to the base of the pit waste deposits is not anticipated to occur. In order for breakthrough to occur, the dried sand and clay fines would have to exceed their field capacity. The addition of the intervening layers of waste rock, which is comprised primarily of shale, will help to further reduce infiltration as time goes on.

State and federal publications (Price and Miller 1975; Howells, Longson & Hunt 1987) describe the Green River, Mesa Verde and Wasatch formations as intermixed strata of sandstone, shale, siltstone, and mudstone, with permeabilities ranging from very low to high. This profile is in keeping with the documented springs in the area, localized/perched aquifers, fresh to briny ground water quality, and lack of ground water developments. While none of this precludes the possibility of shallower localized ground water in the area, it reduces the likelihood that leachate from the processed sands could reach and contaminate an aquifer of economic significance. It should also be noted that the maximum surface area of exposed residual material at any one time will be approximately 25 acres, since areas would be reclaimed (topsoil and vegetation) as soon as they are "filled."

Nevertheless, to err on the side of caution, Earth Energy will implement several measures during the initial operations. First, the additional exploration drilling scheduled for the spring of 2008, within a wider area of the proposed pit (and storage site for processed sands), will provide more information on subsurface conditions and encountered water, if any. Should evidence of shallow ground water be discovered, Earth Energy will coordinate with DWQ to further investigate this issue. When pit excavations begin, visual monitoring for the presence of intercepted ground water will be performed routinely. While precipitation will also be contributing water to the pit, careful observation, along with sampling, should allow the two sources to be distinguished from each other. Again, if it appears that ground water has been intercepted, Earth Energy will coordinate with DWQ to further investigate this issue.

Summary

The above information supports Earth Energy's request that DWQ find the PR Spring operation to be permitted by rule as allowed by the Ground Water Protection rules. The operation is not expected to generate contaminants in quantities that would present a threat to human health or the environment, and the hydrogeologic setting of the operation greatly reduces the potential for any water associated with the operation to commingle with ground water. Chemical analyses of leachate from processed materials revealed no problematic results, except where leaching was performed using solvents that would not accurately characterize leachate from precipitation. Further, the operation will manage process water and storm water so as to avoid discharge of either to surface waters. We believe this demonstrates a *de minimis* impact from the proposed operation.

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Laboratory Director

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QA Officer

August 24, 2007

Barclay Cuthbert
Earth Energy Resouces, Inc.
Suite 704, 404 - 6th Avenue SW
Calgary, Alberta T2P 0R9

TEL: (403) 233-9366
FAX: (403) 668-5097

RE: RJN #028-Asphalt Ridge

Lab Set ID: L79307

Dear Barclay Cuthbert:

American West Analytical Labs received 3 samples on 8/10/2007 for the analyses presented in the following report.

All analyses were performed in accordance to National Environmental Laboratory Accreditation Program (NELAP) protocols unless noted otherwise. If you have any questions or concerns regarding this report please feel free to call. The abbreviation "Surr" found in organic reports indicates a surrogate compound that is intentionally added by the laboratory to determine sample injection, extraction and/or purging efficiency.

Thank you.

Approved by: _____
Laboratory Director or designee

STATE OF UTAH -- DIVISION OF WATER RIGHTS -- DATA PRINT OUT for t39101(49-2274)

CHANGE: t39101 WATER RIGHT: 49-2274 CERT. NO.: AMENDATORY? No COUNTY TAX ID: 0

BASE WATER RIGHTS: 49-2274

RIGHT EVIDENCED BY: 49-2274(A30414doo, a33805)

CHANGES: Point of Diversion [X], Place of Use [X], Nature of Use [X], Reservoir Storage [ ].

NAME: Uintah Water Conservancy District
ADDR: 78 West 3325 North
Vernal, UT 84078
INTEREST: 100% REMARKS: Owner

NAME: US Oil Sands (Utah) Inc.
ADDR: Suite 1600, 521-3rd Avenue SW
Calgary, Alberta, Canada T2P 3T3
REMARKS: Water User

FILED: 06/17/2013	PRIORITY: 06/17/2013	ADV BEGAN:	ADV ENDED:	NEWSPAPER: No Adv Required
ProtestEnd:	PROTESTED: [No]	HEARNG HLD:	SE ACTION: [Approved]	ActionDate:01/23/2014 PROOF DUE:
EXTENSION:	ELEC/PROOF:[ ]	ELEC/PROOF:	CERT/WUC:	LAP, ETC: 01/23/2015 LAPS LETTER:
RUSH LETTR:	RENOVATE:	RECON REQ:	TYPE: [ ]	

Status: Approved

**********HERETOFORE********** **********HEREAFTER**********

HERETOFORE	HEREAFTER
FLOW: 360.0 acre-feet	FLOW: 360.0 acre-feet
SOURCE: Underground Water Well	SOURCE: Underground Water Wells (existing)
COUNTY: Uintah	COUNTY: Uintah COM DESC: 38 miles southwest of Bonanza
	This temporary change application proposes to allow the use of water from at least one of two existing water wells for construction activities on the Seep Ridge Road in Uintah County. It is anticipated that the water used for the road constuction project will only be pumped from the well drilled in Section 35 of Township 15 South and Range 23 East of the SLB&M. The hereafter place of use includes segments 6 through 10 of the Seep Ridge Road project. It is unknown at the time of the filing of this temporary change application which portions of segments 6 through 10 will be serviced by this temporary change application. The amount of water utilized for road construction and/or mining activities will be monitored and recorded.
POINT(S) OF DIVERSION ------>	CHANGED AS FOLLOWS: (Click Location link for WRPLAT)
Point Underground:	Point Underground:

(1) N 750 ft E 500 ft from SW cor, Sec 31, T 15S, R 24E, SLBM
Diameter: 12 ins. Depth: 1500 to 1900 ft. WELL ID#: 000000
COMMENT:

(1) N 2030 ft W 530 ft from S4 cor, Sec 34, T 15S, R 23E, SLBM
Diameter: 10 ins. Depth: 2550 to ft. WELL ID#: 000000
COMMENT: Non-Production Application Number 1249008M00
(2) S 303 ft E 185 ft from W4 cor, Sec 35, T 15S, R 23E, SLBM
Diameter: 6 ins. Depth: 2200 to ft. WELL ID#: 000000
COMMENT: Non-Production Application Number 1149007M00

PLACE OF USE ------>

	--NW≈--	--NE≈--	--SW≈--	--SE≈--
	N N S S | N N S S | N N S S | N N S S			
	W E W E | W E W E | W E W E | W E W E			
Sec 35 T 15S R 23E SLBM	* : : : ** : : : ** : : : **X:X:X:X*			

SAME AS HERETOFORE, AND IN ADDITION TO:

	--NW≈--	--NE≈--	--SW≈--	--SE≈--
	N N S S | N N S S | N N S S | N N S S			
	W E W E | W E W E | W E W E | W E W E			
Sec 04 T 13S R 22E SLBM	*X:X:X:X**X:X:X:X**X:X:X:X**X:X:X:X*			
Sec 05 T 13S R 22E SLBM	*X:X:X:X**X:X:X:X**X:X:X:X**X:X:X:X*			
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Sec 32 T 14S R 23E SLBM	*X:X:X:X**X:X:X:X**X:X:X:X**X:X:X:X*			
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Sec 27 T 15S R 23E SLBM	*X:X:X:X**X:X:X:X**X:X:X:X**X:X:X:X*			
Sec 35 T 15S R 23E SLBM	*X:X:X:X**X:X:X:X**X:X:X:X** : : : *			
Sec 36 T 15S R 23E SLBM	*X:X:X:X**X:X:X:X**X:X:X:X**X:X:X:X*			

NATURE OF USE ------>

IRR = values are in acres.
STK = values are in ELUs meaning Cattle or Equivalent.
DOM = values are in EDUs meaning Equivalent Domestic Units (or Families).

SUPPLEMENTAL to Other Water Rights: No

Historical Uses to be Discontinued during the Implementation of this Application:

MIN: District: USED 01/01 - 12/31
Name: P. R. Spring
Ores: tar sand in Green River Formation

SAME AS HERETOFORE, AND IN ADDITION TO:

SUPPLEMENTAL to Other Water Rights: No

OTH: ROAD MAINTENANCE: Road Construction USED 01/01 - 12/31
Operations for the Seep Ridge Road Project

**********END OF DATA**********

State of Utah
GARY R. HERBERT
Governor

GREG BELL
Lieutenant Governor

Department of
Environmental Quality

Amanda Smith
Executive Director

DIVISION OF WATER QUALITY
Walter L. Baker, P.E.
Director

December 02, 2009

CERTIFIED MAIL
(Return Receipt Requested)

Mr. Barclay Cuthbery
Earth Energy Resources, Inc.
Suite 740, 404-6th Avenue SW
Calgary, Alberta, Canada T2P 0R9

Dear Mr. Cuthbery:

Subject: Site Review and Inspection of the PR Spring Tar Sands Project facility located in Uintah and Grand Counties, Utah. Inspection of the site was conducted on October 29th by Mike George, Harry Campbell, and Scott Hacking with the Utah Department of Environmental Quality.

Currently Utah does not require a UPDES storm water permit for this industrial sector (Oil and Gas Extraction Facilities, major group 13), specifically, 40 CFR 122.26 [c] [1] [iii] and UAC R317-8-3.9 (1) (b).

If you have any questions concerning this matter do not hesitate to contact me at (801) 538-9325. Thank you.

Sincerely,

Mike George, Environmental Scientist
UPDES IES Section

Enclosure: 3560 Report/inspection report

cc: Amy Clark, US EPA Region 8, w/enclosure.
Scott Hacking, DEQ District Engineer, w/enclosure.
Tom Munson, State of Utah, Division of Oil, Gas, & Mining, w/enclosure.
A. John Davis III, Attorney, Holme Roberts, & Oven, W/enclosure.

United States Environmental Protection Agency
Washington, D.C. 20460

Water Compliance Inspection Report

Section A: National Data System Coding *(i.e., ICIS)*

Transaction Code	NPDES	yr/mo/day	Inspection Type	Inspector	Fac. Type
N (1)	(2)	NOPERMIT (3–11)	091029 (12–17)	(18)	S (19)	5 (20)

Remarks (21–66)

Inspection Work Days	Facility Self-Monitoring Evaluation Rating	BI	QA	Reserved
2.5 (67–69)	(70)	N (71)	N (72)	(73–74) (75–80)

Section B: Facility Data

Name and Location of Facility Inspected *(For industrial users discharging to POTW, also include POTW name and NPDES permit number)*

PR SPRINGS TAR SANDS PROJECT
UINTAH AND GRAND COUNTIES
BOOK CLIFFS, UTAH

Entry Time/ Date	Permit Effective Date
10/29/2009 11:30	N/A
Exit Time/ Date	**Permit Expiration Date**
10/29/2009 14:15	N/A

Name(s) of On-Site Representative(s)/Title(s)/Phone and Fax Number(s)

NO ONE ON-SITE

Other Facility Data *(e.g., SIC NAICS, and other descriptive information)*

SIC 1311

Name, Address of Responsible Official/Title/Phone and Fax Number

MR. BARCLAY CUTHBERT
EARTH ENERGY RESOURCES, INC.
SUITE, 740, 404-6TH AVENUE SW
CALGARY, ALBERTA, CANADA T2P 0R9

Contacted: [X] Yes [ ] No

Section C: Areas Evaluated During Inspection *(Check only those areas evaluated)*

[ ] Permit	[ ] Self Monitoring Program	[ ] Pretreatment	[ ] MS4
[ ] Records/Reports	[ ] Compliance Schedule	[ ] Pollution Prevention	
[X] Facility Site Review	[ ] Laboratory	[ ] Storm Water	
[ ] Effluent/Receiving Waters	[ ] Operations & Maintenance	[ ] Combined Sewer Overflow	
[ ] Flow Measurement	[ ] Sludge Handling/Disposal	[ ] Sanitary Sewer Overflow	

Section D: Summary of Findings/Comments

(Attach additional sheets of narrative and checklists, including Single Event Violation codes, as necessary)

SEV Codes	SEV Description

Name(s) and Signature(s) of Inspector(s)	Agency/Office/Phone and Fax Number(s)	Date
MIKE GEORGE, ENVIRONMENTAL SCIENTIST	DIVISION OF WATER QUALITY, (801) 538-9325	NOVEMBER 30, 2009
HARRY CAMPBELL, ENVIRONMENTAL ENGINEER	DIVISION OF WATER QUALITY (801) 538-6923	NOVEMBER 30, 2009
Name and Signature of Management Q A Reviewer	Agency/Office/Phone and Fax Number(s)	Date
MIKE HERKIMER, MANAGER UPDES IES SECTION	DIVISION OF WATER QUALITY (801) 538-6058	NOVEMBER 30, 2009

INSTRUCTIONS

Section A: National Data System Coding *(i.e., ICIS)*

Column 1: Transaction Code: Use N, C, or D for New, Change, or Delete. All inspections will be *new* unless there is an error in the data entered.

Columns 3-11: NPDES Permit No. Enter the facility's NPDES permit number - third character in permit number indicates permit type for U=unpermitted, G=general permit, etc. *(Use the Remarks columns to record the State permit number, if necessary.)*

Columns 12-17: Inspection Date. Insert the date entry was made into the facility. Use the year/month/day format (e.g., 04/10/01 = October 01, 2004).

Column 18: Inspection Type*. Use one of the codes listed below to describe the type of inspection:

- A Performance Audit
- B Compliance Biomonitoring
- C Compliance Evaluation (non-sampling)
- D Diagnostic
- F Pretreatment (Follow-up)
- G Pretreatment (Audit)
- I Industrial User (IU) Inspection
- J Complaints
- M Multimedia
- N Spill
- O Compliance Evaluation (Oversight)
- P Pretreatment Compliance Inspection
- R Reconnaissance
- S Compliance Sampling
- U IU Inspection with Pretreatment Audit
- X Toxics Inspection
- Z Sludge - Biosolids
- # Combined Sewer Overflow-Sampling
- $ Combined Sewer Overflow-Non-Sampling
- + Sanitary Sewer Overflow-Sampling
- & Sanitary Sewer Overflow-Non-Sampling
- \ CAFO-Sampling
- = CAFO-Non-Sampling
- 2 IU Sampling Inspection
- 3 IU Non-Sampling Inspection
- 4 IU Toxics Inspection
- 5 IU Sampling Inspection with Pretreatment
- 6 IU Non-Sampling Inspection with Pretreatment
- 7 IU Toxics with Pretreatment
- ! Pretreatment Compliance (Oversight)@ Follow-up (enforcement)
- { Storm Water-Construction-Sampling
- } Storm Water-Construction-Non-Sampling
- : Storm Water-Non-Construction-Sampling
- ~ Storm Water-Non-Construction-Non-Sampling
- < Storm Water-MS4-Sampling
- - Storm Water-MS4-Non-Sampling
- > Storm Water-MS4-Audit

Column 19: Inspector Code. Use one of the codes listed below to describe the *lead agency* in the inspection.

- A- State (Contractor)
- B- EPA (Contractor)
- E- Corps of Engineers
- J- Joint EPA/State Inspectors—EPA Lead
- L- Local Health Department (State)
- N- NEIC Inspectors
- O- Other Inspectors, Federal/EPA (Specify in Remarks columns)
- P- Other Inspectors, State (Specify in Remarks columns)
- R- EPA Regional Inspector
- S- State Inspector
- T- Joint State/EPA Inspectors—State lea

Column 20: Facility Type. Use one of the codes below to describe the facility.

- 1- Municipal. Publicly Owned Treatment Works (POTWs) with 1987 Standard Industrial Code (SIC) 4952.
- 2- Industrial. Other than municipal, agricultural, and Federal facilities.
- 3- Agricultural. Facilities classified with 1987 SIC 0111 to 0971.
- 4- Federal. Facilities identified as Federal by the EPA Regional Office.
- 5- Oil & Gas. Facilities classified with 1987 SIC 1311 to 1389.

Columns 21-66: Remarks. These columns are reserved for remarks at the discretion of the Region.

Columns 67-69: Inspection Work Days. Estimate the total work effort (to the nearest 0.1 work day), up to 99.9 days, that were used to complete the inspection and submit a QA reviewed report of findings. This estimate includes the accumulative effort of all participating inspectors; any effort for laboratory analyses, testing, and remote sensing; and the billed payroll time for travel and pre and post inspection preparation. This estimate does not require detailed documentation.

Column 70: Facility Evaluation Rating. Use information gathered during the inspection (regardless of inspection type) to evaluate the quality of the facility self-monitoring program. Grade the program using a scale of 1 to 5 with a score of 5 being used for very reliable self-monitoring programs, 3 being satisfactory, and 1 being used for very unreliable programs.

Column 71: Biomonitoring Information. Enter D for static testing. Enter F for flow through testing. Enter N for no biomonitoring.

Column 72: Quality Assurance Data Inspection. Enter Q if the inspection was conducted as follow-up on quality assurance sample results. Enter N otherwise.

Columns 73-80: These columns are reserved for regionally defined information.

Section B: Facility Data

This section is self-explanatory except for "Other Facility Data," which may include new information not in the permit or PCS (e.g., new outfalls, names of receiving waters, new ownership, other updates to the record, SIC/NAICS Codes, Latitude/Longitude).

Section C: Areas Evaluated During Inspection

Check only those areas evaluated by marking the appropriate box. Use Section D and additional sheets as necessary. Support the findings, as necessary, in a brief narrative report. Use the headings given on the report form (e.g., Permit, Records/Reports) when discussing the areas evaluated during the inspection.

Section D: Summary of Findings/Comments

Briefly summarize the inspection findings. This summary should abstract the pertinent inspection findings, not replace the narrative report. Reference a list of attachments, such as completed checklists taken from the NPDES Compliance Inspection Manuals and pretreatment guidance documents, including effluent data when sampling has been done. Use extra sheets as necessary.

*Footnote: In addition to the inspection types listed above under column 18, a state may continue to use the following wet weather and CAFO inspection types until the state is brought into ICIS-NPDES: K: CAFO, V: SSO, Y: CSO, W: Storm Water 9: MS4. States may also use the new wet weather, CAFO and MS4 inspections types shown in column 18 of this form. The EPA regions are required to use the new wet weather, CAFO, and MS4 inspection types for inspections with an inspection date (DTIN) on or after July 1, 2005.

UINTAH COUNTY PLANNING COMMISSION

****

IN THE MATTER OF:
EARTH ENERGY RESOURCES, INC.
APPLICATION FOR: CUP FOR A TAR SANDS MINING AND PROCESSING FACILITY ON PROPERTY LOCATED AT SECTIONS 35&36 TOWNSHIP 15 South RANGE 23 EAST, Uintah County.

FINDINGS OF FACT, STATEMENT OF LAW AND RECOMMENDATION

****

Applicable Law

17.76.060 Determination.

A. The planning commission may deny or permit a conditional use to be located within any zone in which the particular conditional use is listed. In authorizing any conditional use, the planning commission shall impose such requirements and conditions necessary for the protection of adjacent properties and the public welfare.
B. The Uintah County zoning administrator may permit or deny applications for home occupations in accordance with the regulations contained herein. The zoning administrator may forward any application to the planning commission for a decision.

Decision

On May 16, 2007, in light of the Finding of Fact and Statement of Law, the Uintah County Planning Commission recommended APPROVAL of the CUP, with the above mentioned stipulations, to the Uintah County Commission.

We, the Uintah County Commission on May 21, 2007, do hereby APPROVE this Conditional Use Permit, for Applicant Earth Energy Resources with the above mentioned stipulations.

Chair, Uintah County Planning Commission

Michael J. McKee
Chair, Uintah County Commission

Connie Lee Deputy
Attest, Clerk-Auditor, Uintah County

UINTAH COUNTY PLANNING COMMISSION

****

IN THE MATTER OF:
EARTH ENERGY RESOURCES, INC.
APPLICATION FOR: CUP FOR A TAR SANDS MINING AND PROCESSING FACILITY ON PROPERTY LOCATED AT SECTIONS 35&36 TOWNSHIP 15 South RANGE 23 EAST, Uintah County.

FINDINGS OF FACT, STATEMENT OF LAW AND RECOMMENDATION

****

Facts

1. On May 16, 2007 Earth Energy Resources, Inc. appeared before the Uintah County Planning Commission requesting a Conditional Use Permit (CUP) to allow a tar sands mining and processing facility at Range 23E, Township 15S, Sections 35 & 36 in Uintah
2. Property is zoned MG-1.
3. A tar sands mining and processing facility is a conditional use in the MG-1 Zoning District.
4. The property is about 3,440 acres with about 200 acres being used for this purpose.
5. Meeting was advertised in the Vernal Express and Uintah Basin Standard, posted on the Uintah County website & posted in three (3) public places.
6. The Uintah County Planning Department has not received any comments from the public in regards to this CUP.

Decision and conditions issued

We, the Uintah County Planning Commission on May 16, 2007, do hereby recommend to the Uintah County Commission APPROVAL of this Conditional Use Permit, for Applicant **Earth Energy Resources** to use the property currently known as or described as **Sections 35 & 36, Township 15 South, Range 23 East, Uintah County,** for the following purpose: **to operate a tar sands mining and processing facility.**

Due to the unique characteristics of the use of the property or the potential impact on the county, surrounding neighbors or adjacent land, to mitigate or eliminate the detrimental impacts and for protection of adjacent properties and the public welfare (see Sections 17.76.010, 17.76.040, and 17.76.050 of the Uintah County Planning and Zoning Ordinance), we hereby find it necessary to and do hereby impose the following conditions, which must be complied with to establish and continue the use:

1. All tar and mining agency regulations and applicable laws and reclamation regulations imposed by DOGAM must be followed.

creating solutions for today's environment

JBR Environmental Consultants, Inc.
Corporate Headquarters
8160 S. Highland Dr.
Sandy, Utah 84093
[p] 801.943.4144
[f] 801.942.1852
www.jbrenv.com

May 6, 2014

U.S. Oil Sands, Inc. (Utah)
Attn: Doug Thornton
HSE & Regulatory Manager
170 South Main
Salt Lake City, Utah 84101

Dear Mr. Thornton,

Enclosed is a copy of the cultural resource inventory report for the PR Spring plant site expansion, pit expansions, water lines, gas pipeline relocation, and potential well sites/access. No cultural resource sites were encountered during the inventory, therefore clearance has been recommended. Montgomery Archaeological Consultants has submitted the report to Kristine Curry at SITLA for her review.

If you have any questions, please contact me or Linda Matthews at your convenience.

Sincerely,

J. Prince Mahoney

Jenni Prince Mahoney
NEPA Specialist/Archaeologist
530-620-7022 direct line
530-417-5515 cell

MONTGOMERY
ARCHAEOLOGICAL
CONSULTANTS

Box 219, 322 East 100 South, Moab, Utah 84532 (435) 259-5764 Fax (435) 259-5608

May 17, 2011

Mr. Barclay Cuthbert
Earth Energy Resources, Inc.
Suite 950, 633 - 6th Avenue SW
Calgary, AB T2P 2Y5
Canada

Dear Mr. Cuthbert,

Enclosed are two copies of the report entitled "Cultural Resource Inventory of Earth Energy Resources' Proposed PR Springs #2 Water Well and Drill Camp (Township 15S, Range 23E, Sections 26 and 27) in Uintah County, Utah." The inventory resulted in the documentation of no cultural resources. Based on the findings archaeological clearance is proposed for the project pursuant to Section 106, CFR 800.

If you have any questions, please call or email. We appreciate this opportunity to provide archaeological consulting services.

Sincerely,

Keith R. Montgomery

Keith R. Montgomery
Principal Investigator

cc: Kristine Curry, School and Institutional Trust Lands Administration, Salt Lake City, Utah

MONTGOMERY
ARCHAEOLOGICAL
CONSULTANTS
Box 219, 322 East 100 South, Moab, Utah 84532 (435) 259-5764 Fax (435) 259-5608

June 7, 2007

Linda J. Matthews
JBR Environmental Consultants, Inc.
8100 S. Highland Drive
Sandy, UT 84003

Dear Ms. Matthews:

Enclosed please find two copies of the report entitled "Class I Literature Review and Class III Inventory of Earth Energy Resources, Inc.'s PR Spring Oil Sand Project in Uintah and Grand Counties, Utah." The Class I literature search indicated that 17 previous cultural resource inventories were conducted in the EER's. Lease Area resulted in the documentation of one ineligible lithic scatter (42Un1788). The Class III inventory of EER's PR Spring Oil Sand Mine resulted in no previously documented sites. Hence archaeological clearance is recommended for this undertaking.

We appreciate the opportunity in providing consulting services for this project. We have sent a PDF and WORD version documents of the report to you.

Sincerely,

Jacki Montgomery
Project Archaeologist

GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Division of Wildlife Resources
GREGORY SHEEHAN
Division Director

October 16, 2014

Jenni Prince-Mahoney
Stantec
8160 South Highland Drive
Sandy, Utah 84093

Subject: Species of Concern Near the U.S. Oil Sands Project, Uintah County and Grand County, Utah

Dear Jenni Prince-Mahoney:

I am writing in response to your email dated October 2, 2014 regarding information on species of special concern proximal to the proposed U.S. Oil Sands project located in Sections 26, 35 and 36 of Township 15 South, Range 23 east, Sections 31 and 32 of Township 15 ½ South, Range 24 East, and Sections 5 and 6 of Township 16 South, Range 24 East, SLB&M and Uintah County and Grand County, Utah.

Within a ½-mile radius of the project area noted above, the Utah Division of Wildlife Resources (UDWR) has recent records of occurrence for greater sage-grouse, and historical records of occurrence for spotted owl. All of the aforementioned species are included on the *Utah Sensitive Species List*.

The information provided in this letter is based on data existing in the Utah Division of Wildlife Resources' central database at the time of the request. It should not be regarded as a final statement on the occurrence of any species on or near the designated site, nor should it be considered a substitute for on-the-ground biological surveys. Moreover, because the Utah Division of Wildlife Resources' central database is continually updated, and because data requests are evaluated for the specific type of proposed action, any given response is only appropriate for its respective request.

In addition to the information you requested, other significant wildlife values might also be present on the designated site. Please contact UDWR's northeastern regional habitat manager, Miles Hanberg, at (435) 247-1557 if you have any questions.

Please contact our office at (801) 538-4759 if you require further assistance.

Sincerely,

Sarah Lindsey

Sarah Lindsey
Information Manager
Utah Natural Heritage Program

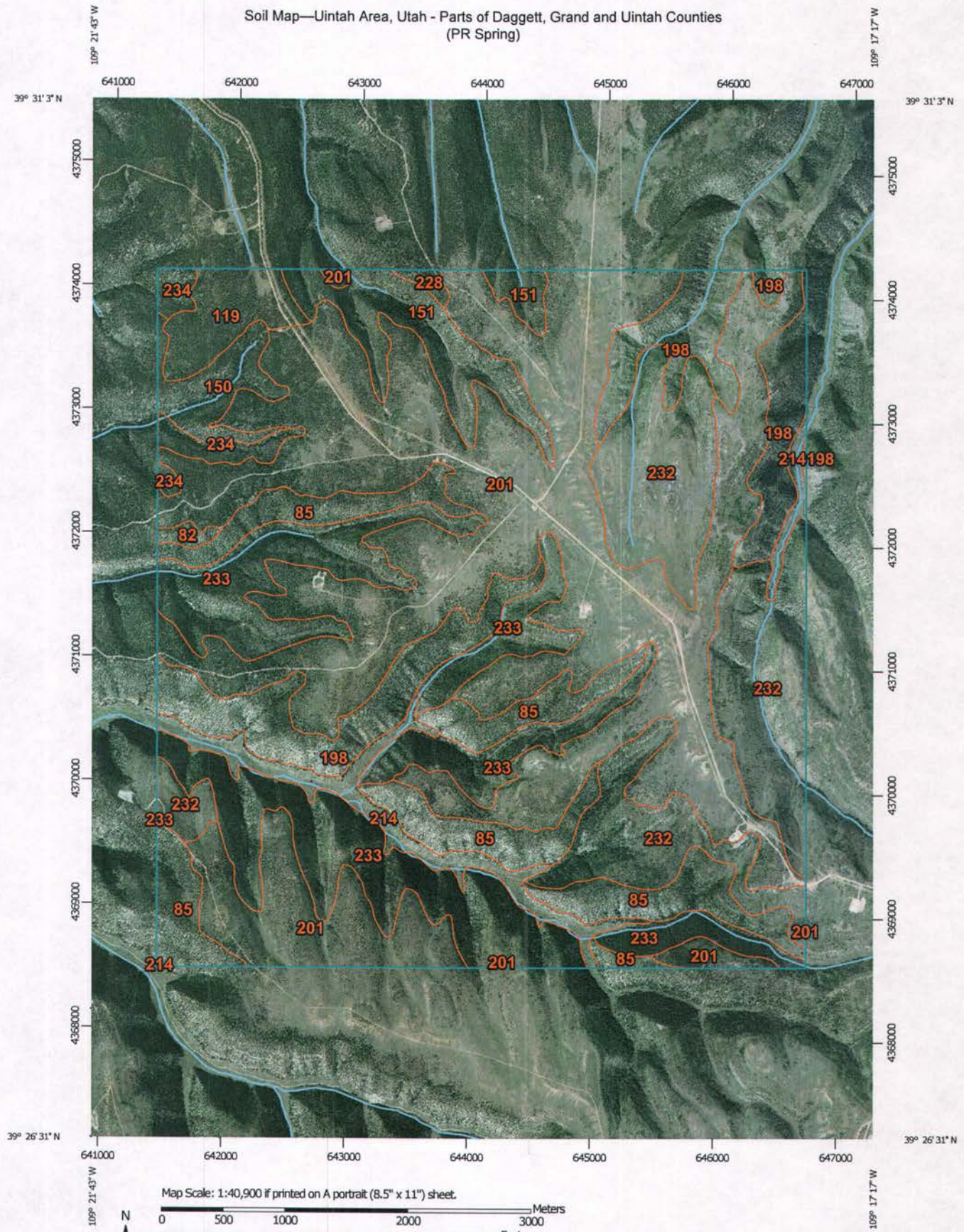
cc: Miles Hanberg

1594 West North Temple, Suite 2110, PO Box 146301, Salt Lake City, UT 84114-6301
telephone (801) 538-4700 • facsimile (801) 538-4709 • TTY (801) 538-7458 • *www.wildlife.utah.gov*

APPENDIX C

Soils Descriptions & Vegetation Data

Soil Map—Uintah Area, Utah - Parts of Daggett, Grand and Uintah Counties
(PR Spring)



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: http://websoilsurvey.nrcs.usda.gov
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: Uintah Area, Utah - Parts of Daggett, Grand and Uintah Counties
Survey Area Data: Version 8, Dec 14, 2013

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

Date(s) aerial images were photographed: Jun 22, 2010—Sep 7, 2010

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

Uintah Area, Utah - Parts of Daggett, Grand and Uintah Counties (UT047)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
82	Gompers very channery silt loam, 25 to 50 percent slopes	16.8	0.2%
85	Gompers-Rock outcrop complex, 50 to 80 percent slopes	661.8	9.0%
119	Jagon-Rock outcrop complex, 3 to 8 percent slopes	146.8	2.0%
150	Moonset-Saddlehorse association, 8 to 50 percent slopes	128.0	1.7%
151	Moonset-Whetrock association, 8 to 50 percent slopes	288.1	3.9%
198	Saddlehorse-Rock outcrop-Pathead association, 50 to 80 percent slopes	640.2	8.7%
201	Seeprid-Utso complex, 4 to 25 percent slopes	2,979.3	40.4%
214	Soward sandy loam, 3 to 15 percent slopes	216.8	2.9%
228	Tabyago-Cedarknoll association, 2 to 8 percent slopes	15.2	0.2%
232	Tosca gravelly sandy loam, 25 to 40 percent slopes	1,053.4	14.3%
233	Tosca gravelly sandy loam, 40 to 80 percent slopes	1,148.2	15.6%
234	Towave-Gompers-Rock outcrop association, 45 to 80 percent slopes	87.1	1.2%
Totals for Area of Interest		**7,381.7**	**100.0%**

VEGETATION SURVEY FORM

Property: Earth Energy Resources

Quadrat #: 1 Date: 08/16/07

Location: SO. 15° Slope
Mixed Tall Shrub Community

Observers: JS, MS

Shrubs & Trees	Percent
Mountain mahogany	20%
Douglas rabbitbrush	3%
Wyoming big sage	2%
Total	
Forbs	**Percent**
Snowberry	5%
Pussy toes	Trace
Total	
Grasses	**Percent**
Western wheatgrass	6%
Bottlebrush squirreltail	2%
Indian ricegrass	2%
Total	
Other	**Percent**
Litter	10%
Rock	10%
Bare Ground	35%
Total Cover (should equal 100%)	100%

VEGETATION SURVEY FORM

Property: Earth Energy Resources

Quadrat #: 2 Date: 08/16/07

Location: SW. 10° Slope
Mixed Tall Shrub Community

Observers: JS, MS

Shrubs & Trees	Percent
Wyoming big sage	25%
Snowberry	5%
Gambel aak	5%
Serviceberry	2%
Total	
Forbs	**Percent**
Globe Mallow	1%
Total	
Grasses	**Percent**
Undifferentiated bunchgrasses	17%
Total	
Other	**Percent**
Litter	25%
Rock	10%
Bare Ground	10%
Total Cover (should equal 100%)	100%

VEGETATION SURVEY FORM

Property: Earth Energy Resources

Quadrat #: 3 Date: 08/16/07

Location: NW 15° Slope
Sagebrush-Grass Community

Observers: JS, MS

Shrubs & Trees		Percent
Wyoming big sagebrush		25%
Snowberry		3%
Douglas rabbitbrush		2%
	Total	
Forbs		**Percent**
Lupine		1%
Dandilion		Trace
	Total	
Grasses		**Percent**
Undifferentiated bunchgrasses		55%
Bluegrass	20%	
Western wheatgrass	20%	
Needle-and-thread grass	15%	
	Total	
Other		**Percent**
Litter		9%
Rock		
Bare Ground		5%
	Total Cover (should equal 100%)	100%

VEGETATION SURVEY FORM

Property: Earth Energy Resources

Quadrat #: 4 Date: 08/16/07

Location: SW 2% Slope
Mixed Tall Shrub Community

Observers: JS, MS

Shrubs & Trees	Percent
Mountain mahogany	20%
Snowberry	5%
Utah juniper	20%
Gambel oak	2%
Total	
Forbs	**Percent**
Total	
Grasses	**Percent**
Western wheatgrass	5%
Bluegrasses	8%
Needle-and-thread Grass	7%
Total	
Other	**Percent**
Litter	13%
Rock	10%
Bare Ground	10%
Total Cover (should equal 100%)	100%

VEGETATION SURVEY FORM

Property: Earth Energy Resources

Quadrat #: 5 Date: 08/16/07

Location: SW 1% Slope
Sage Brush-Grass Community

Observers: JS, MS

Shrubs & Trees	Percent
Snakeweed	5%
Total	
Forbs	**Percent**
Pussy toes	2%
Marsh sowthistle	5%
Unknown Forb	1%
Arenaria	2%
Total	
Grasses	**Percent**
Western wheatgrass	20%
Total	
Other	**Percent**
Litter	5%
Rock	30%
Bare Ground	30%
Total Cover (should equal 100%)	100%

VEGETATION SURVEY FORM

Property: Earth Energy Resources

Quadrat #: 6 Date: 08/16/07

Location: WSW 7% Slope Observers: JS, MS
Sagebrush-grass Community

Shrubs & Trees	Percent
Wyoming big sagebrush	30%
Douglas rabbitbrush	
Total	
Forbs	**Percent**
Agoseris Glauca	Trace
Total	
Grasses	**Percent**
Undifferentiated bucnhgrasses	25%
Total	
Other	**Percent**
Litter	35%
Rock	5%
Bare ground	
Total Cover (should equal 100%)	100%

VEGETATION SURVEY FORM

Property: Earth Energy Resources

Quadrat #: 7 Date: 08/16/07

Location: Observers: JS, MS

Shrubs & Trees	Percent
Gambel oak	90%
Serviceberry	5%
Total	
Forbs	**Percent**
Total	
Grasses	**Percent**
Bluegrasses	1%
Total	
Other	**Percent**
Litter	4%
Rock	
Bare Ground	
Total Cover (should equal 100%)	100%

VEGETATION SURVEY FORM

Property: Earth Energy Resources

Quadrat #: 8 Date: 08/16/07

Location: W 3% Slope
Sagebrush-grass Community

Observers: JS, MS

Shrubs & Trees	Percent
Sagebrush	20%
Snowberry	Trace
Total	
Forbs	**Percent**
Pussy toes	15%
Total	
Grasses	**Percent**
Koeleria sp.	5%
Needle-and-thread grass	10%
Total	
Other	**Percent**
Litter	10%
Rock	
Bare Ground	40%
Total Cover (should equal 100%)	100%

VEGETATION SURVEY FORM

Property: Earth Energy Resources

Quadrat #: 9 Date: 08/16/07

Location: NW 5% Slope Observers: JS, MS

Shrubs & Trees	Percent
Wyoming big sagebrush	80%
Snowberry	8%
Total	
Forbs	**Percent**
Hedesarum Boreale	Trace
Total	
Grasses	**Percent**
Bottlebrush squirreltail	3%
Total	
Other	**Percent**
Litter	9%
Rock	
Bare Ground	
Total Cover (should equal 100%)	100%

VEGETATION SURVEY FORM

Property: Earth Energy Resources

Quadrat #: 10 Date: 08/16/07

Location: NNW 3% Slope
Mixed Tall Shrub Community

Observers: JS, MS

Shrubs & Trees	Percent
Serviceberry	30%
Coyote willow	50%
Gambel oak	5%
Mountain mahogany	5%
Total	
Forbs	**Percent**
Total	
Grasses	**Percent**
Total	
Other	**Percent**
Litter	10%
Rock	
Bare Ground	
Total Cover (should equal 100%)	100%

VEGETATION SURVEY FORM

Property: Earth Energy Resources

Quadrat #: 11 Date: 08/16/07

Location: SW 2% Slope Observers: JS, MS
Sage Brush-grass grading to P/J/Doug Fir Community

Shrubs & Trees	Percent
Wyoming big sagebrush	5%
Total	
Forbs	**Percent**
Water leaf	1%
Arenaria sp.	1%
Total	
Grasses	**Percent**
Bottlebrush squirreltail	5%
Bluegrasses	3%
Total	
Other	**Percent**
Litter	15%
Rock	35%
Bare Ground	35%
Total Cover (should equal 100%)	100%

VEGETATION SURVEY FORM

Property: Earth Energy Resources

Quadrat #: 12 Date: 08/16/07

Location: W 2% Slope Observers: JS, MS
P/J/Doug Fir Community

Shrubs & Trees	Percent
Pinyon pine	100%
Total	
Forbs	**Percent**
Total	
Grasses	**Percent**
Total	
Other	**Percent**
Litter	
Rock	
Bare Ground	
Total Cover (should equal 100%)	100%

VEGETATION SURVEY FORM

Property: Earth Energy Resources

Quadrat #: 13 Date: 08/16/07

Location: NW 3% Slope Observers: JS, MS
P/J/Doug Fir grading to sagebrush-grass Community

Shrubs & Trees	Percent
Wyoming big sagebrush	25%
Bitterbrush	30%
Pinyon pine	15%
Total	
Forbs	**Percent**
Pussy toes	3%
Figwort	3%
Total	
Grasses	**Percent**
Western wheatgrass	4%
Bluegrasses	5%
Stipa Comata	5%
Total	
Other	**Percent**
Litter	7%
Rock	
Bare Ground	3%
Total Cover (should equal 100%)	100%

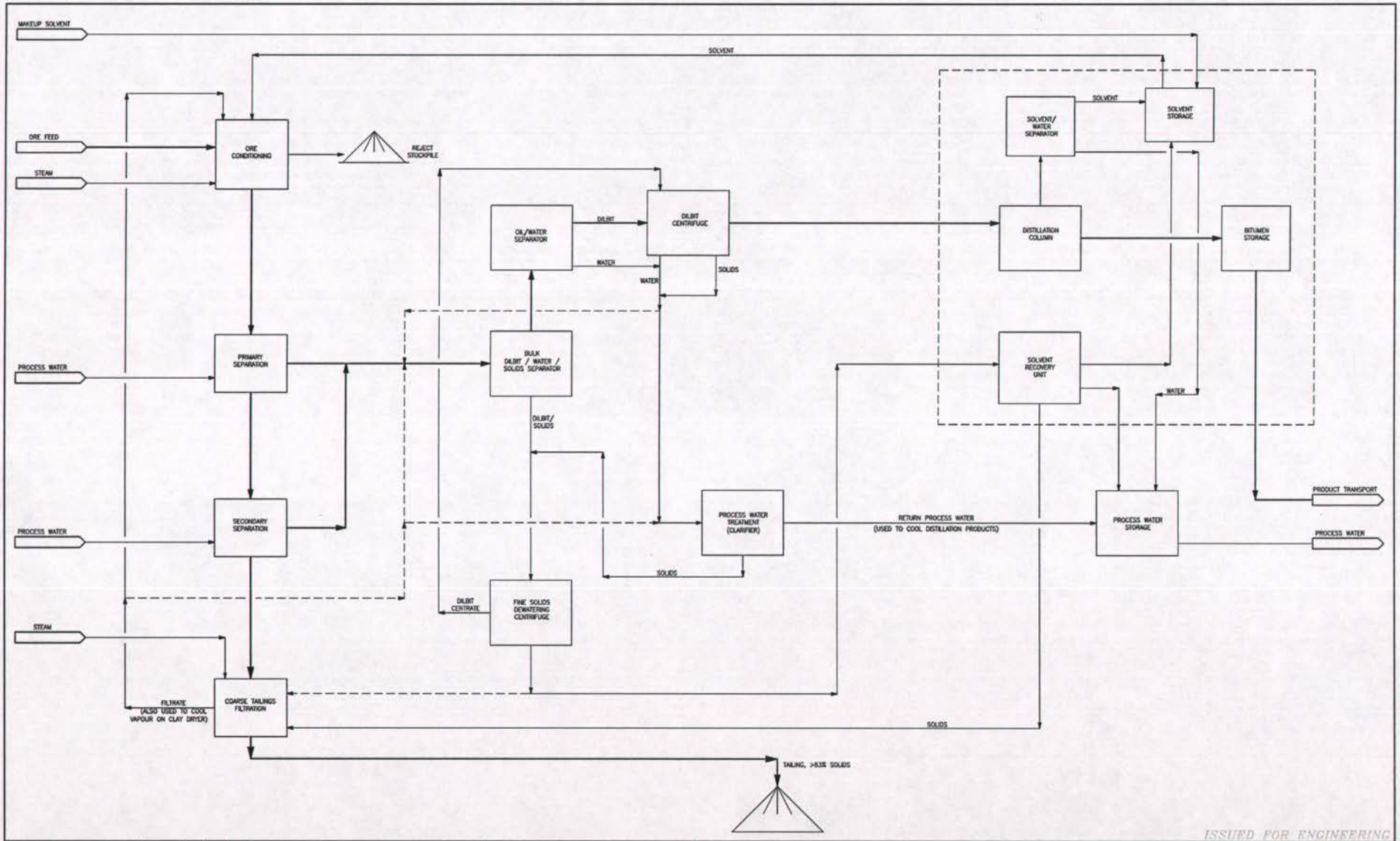
APPENDIX D

Equipment List & Plant Flow Sheet

U.S. Oil Sands – PR Spring Mine

List of Equipment (Rev. 8)

Quantity	Description
	Mining Equipment
1	Wirtgen 2200SM Surface Miner
2	Mine haul truck (60 ton cap)
1	Wheel Loader (Cat 988G or equiv.)
2	Dozer (Cat D8R c/w ripper))
1	Grader (Cat 16H or equiv.)
2	Wheel Loader (Cat 966G or equiv.)
1	5"-6" Blast Hole Drill (Atlas DM30)
1	Water Truck (7k gal or 295 bbl)
1	Equip. Service truck (1 ton)
1	Fuel/Lube Truck (5 ton)
4	Pick-up trucks
1	Crew van
2	Plant Generator (natural gas/diesel, 4.1 MW)
1	Camp Generator (diesel, 0.25 MW)
4	Light Towers (diesel, 100 kW)
1	Electric Welder (diesel, 45 kW)
1	Submersible Water Pump (diesel/electric)
3	Water Pumps (3 inch, gas)
3	CAT 631 modified (MES34) Elevating scraper
1	Skid Steer Loader (CAT 272D)
1	Blasting Truck (10 tons)
	Process Equipment
1	Process Heater (gas fired, 10MM Btu)
1	Process Water Heater (gas fired, 10MM Btu)
1	TAI Distillation boiler (gas fired, 10MM Btu)



ISSUED FOR ENGINEERING

REV	DATE	DES CHK	ENG CHK	DIS APPR	DESCRIPTION
A	07/03/14	SD	EB	SS	ISSUED FOR ENGINEERING

U.S. OIL SANDS

KBR

PFD
BLOCK FLOW DIAGRAM

PR SPRING
U.S. OIL SANDS, INC.

LEAD DESIGNER	SD
LEAD ENGINEER	EB
PROJECT MGR.	DJS
SCALE (UNLESS SHEET SIZE):	NONE
DATE:	07/10/14
DRAWING NUMBER:	F714-400-PFD-PR002
REV.	A
SHEET:	1
OF:	1
PROJECT No.:	F714

APPENDIX E

Surety Calculation

(PLACEHOLDER)

APPENDIX F

SPCC Plan

(PLACEHOLDER)

APPENDIX G

Storm Water Management Plan

(PLACEHOLDER)

APPENDIX H

Site Photographs

Aerial view of Seep Ridge Road and project area; plant site is in central part of photo; exploration disturbance shows in various areas.

Aerial view of Seep Ridge Road and project area from north looking south; man camp shows in lower right corner of photo; plant site shows in upper central part of photo.