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	

State of Utah

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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 T. 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
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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

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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, 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

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

For emergency information or further questions, contact Chemtrec ® at 1 (800) 424-9300, for International Emergencies call collect (202) 483-7616. No guarantee is made as to the accuracy of any data or statement contained herein. While this information is furnished in good faith, and is accurate to the best of our knowledge, no warranty, express or implied, of merchantability, fitness, or other use is made. This information is offered only for your consideration, investigation, and verification ; Frutech International Corporation, shall not in any event be liable for special, incidental, or consequential damages in connection with its publication. Likewise, no statement made herein shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents.

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.

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 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

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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.

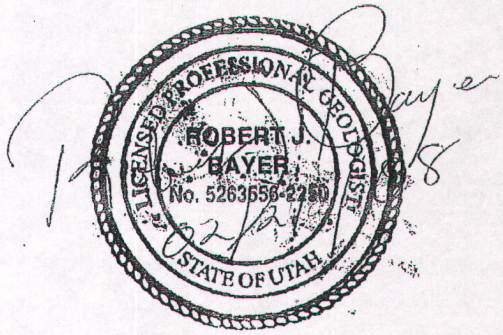
To analyze the potential for precipitation falling on the disposed processed residual material to migrate through the depository to native materials at the bottom of the pit excavation, the following factors need to be considered. The processed sand will be dry (10-20 percent moisture content), and because 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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USDI BLM. 1984. Utah Combined Hydrocarbon Leasing Regional Final Environmental Impact Statement. Volume I: Regional Analyses.

USDI BLM. 2007. *Draft Oil Shale and Tar Sands Resource Management Plan Amendments to Address Land Use Allocations in Colorado, Utah, and Wyoming and Programmatic Environmental Impact Statement*, DES 07-60. U.S. Department of Interior Bureau of Land Management, December 2007.

AMERICAN
WEST
ANALYTICAL
LABORATORIES

463 West 3600 South
Salt Lake City, Utah
84115

(801) 263-8686
Toll Free (888) 263-8686
Fax (801) 263-8687
e-mail: awal@awal-Labs.com

Kyle F. Gross
Laboratory Director

Peggy McNicol
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*
Sec 09 T 13S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 10 T 13S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 11 T 13S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 14 T 13S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 23 T 13S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 26 T 13S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 35 T 13S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 02 T 14S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 03 T 14S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 11 T 14S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 14 T 14S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 23 T 14S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 24 T 14S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 25 T 14S R 22E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 30 T 14S R 23E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 31 T 14S R 23E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 32 T 14S R 23E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 04 T 15S R 23E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 05 T 15S R 23E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 08 T 15S R 23E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 09 T 15S R 23E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 16 T 15S R 23E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 21 T 15S R 23E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 22 T 15S R 23E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
Sec 26 T 15S R 23E SLBM	*X:X:X:X	**X:X:X:X	**X:X:X:X	**X:X:X:X*
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

**********E N D O F D A T A**********

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)	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.

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

creating solutions for today's environment

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*

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
Sagebrush-grass Community

Observers: JS, MS

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 Observers: JS, MS
Sagebrush-grass Community

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

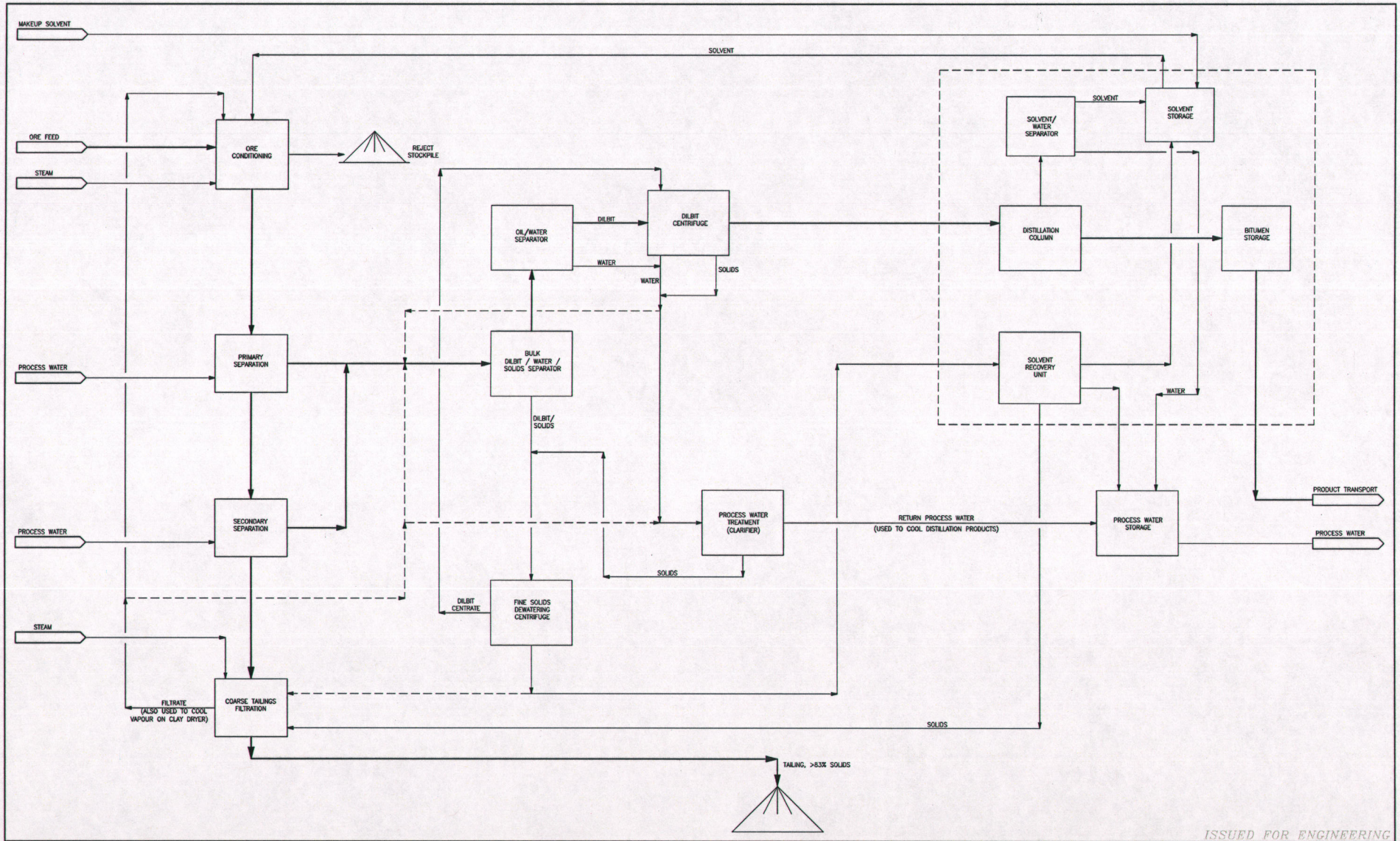
Location: NW 3% Slope Observers: JS, MS
P/J/Doug Fir grading to sagebrush-grass Community

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%

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	DES 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 (OTHER SHEET SIZE):	NONE
DATE:	07/10/14
DRAWING NUMBER:	F714-400-PFD-PR002
REV:	A
SHEET:	1
OF:	1
PROJECT No.:	F714