In the Matter of
PR Spring Tar Sands Project, Ground Water Discharge Permit-by-Rule
No. WQ PR-11-001

PREFILED DIRECT TESTIMONY
OF
MARK NOVAK P.G.

ON BEHALF OF
THE EXECUTIVE SECRETARY OF THE
UTAH WATER QUALITY BOARD

February 29, 2012

Prefiled Testimony of Mark Novak, P.G.

Q Please state your name and employment.

A Mark Novak, Environmental Scientist, Ground Water Protection Section in the Division of Water Quality, Utah Department of Environmental Quality.

Q What is your education and professional experience?

A I have a Bachelor of Science degree in Geology from Cleveland State University (1976), and a Master of Science degree in Geology from the University of Utah (1980).

My professional experience includes working as a hydrogeologic field assistant for the U.S. Geological Survey; a geologist in gold mining exploration, development, and mine dewatering; and an environmental scientist in the DWQ Ground Water Protection Section since 1990. I am a licensed professional geologist in the state of Utah.

Q What are your job responsibilities at Division of Water Quality?

A I review applications for ground water discharge permits, prepare original and 5-year renewals of ground water discharge permits, and administer ground water discharge permits after their issuance by the Executive Secretary. This includes reviewing compliance ground water monitoring reports, addressing noncompliances, and if necessary, reviewing source and contaminant assessment reports for facilities determined to be out-of-compliance. I also review information to determine if facilities or operations qualify for permit-by-rule status; review site assessments reports, subsurface investigation reports, and cleanup reports for existing soil and ground water contamination; and prepare appropriate regulatory responses.

Q What is your experience issuing ground water discharge permits?

A I have been preparing ground water discharge permits since I started working for DWQ in 1990.

Q What is your experience conducting other permit-by-rule reviews?

A I have been doing permit-by-rule reviews since 1990.

Q What is the purpose of your testimony?

A I performed the permit-by-rule reviews for the proposed U.S. Oil Sands tar sands mining project which is to be located out in the Uintah Basin. My testimony is to explain DWQ's determination of permit-by-rule status for the proposed tar sands mine and bitumen extraction process.

Q What was your role in this review process?

A I reviewed the information submitted by U.S. Oil Sands (formerly Earth Energy Resources) and determine if the mining operation as proposed met the criteria for permit-by-rule status or whether it required other regulatory response.

Q What type of project is being proposed?

A A tar sands mine with a bitumen extraction process, and disposal of tar sand processed tailings.

Q How did this first come to DWQ?

A DWQ's evaluation of this project goes back to the original pilot project by Earth Energy Resources in 2005. EER was going through the licensing process before the Utah Division of Oil, Gas and Mining (DOGM) and the project was referred to DWQ for a determination whether the facility would require a ground water discharge permit.

Q What permit-by-rule reviews has DWQ performed on this facility?

A A 2008 permit-by-rule review of the mining operation as proposed and in February 2011, DWQ did a permit-by-rule review of proposed modifications to the operation.

Q What was your job?

A My job was to review the U.S. Oil Sands' proposed extraction process to evaluate potential impact upon ground water quality to determine whether the operation met the criteria for permit-by-rule or whether a ground water discharge permit or some other regulatory response was required. I have been reviewing U.S. Oil Sands' activities since their 2005 pilot project. This included information related to their permit-by-rule request in 2008, and modifications to that determination in 2011.

Q In general terms, what criteria must be met to be permitted by rule?

A Either the discharge is compatible with existing ground water quality; or it is regulated under another program; or it will have a *de minimis* actual or potential effect on ground water quality.

Q What are the rules that govern a permit-by-rule review?

A UAC R317-6-6.2, Ground Water Discharge Permit-by-rule.

Q How did DWQ come to revisit this facility in February 2011?

A The March 4, 2008 permit-by-rule determination letter included the caveat that "[i]f any of these factors change because of changes in [the] operation or from additional knowledge of site conditions, this permit-by-rule determination may not apply and [the applicant] should inform the DWQ of the changes." In February 2011, US Oil Sands informed DWQ of some changes to the proposed operation since the 2008 determination. Information was provided by the applicant outlining the proposed modifications which DWQ evaluated to determine whether it would affect the permit-by-rule status.

Q What modifications were being proposed?

A 1. Removal of the stabilizer compound Witconate from the cleaning emulsion used for bitumen extraction.

2. Use of a horizontal belt filter to dewater the sand fraction and a disk filter to dewater the fines fraction of the tailings.

3. Changed the size of the overburden/interburden storage areas from two 25 acre areas to two areas of 36 and 34 acres.

4. Disposal of initial tailings in the overburden/interburden storage areas.

Q What did you conclude from your review?

A I concluded that the proposed changes did not affect the facility's permit-by-rule status.

Q What was the basis for your conclusions?

A Under both the original and revised proposals, tailings would be stored under unsaturated conditions and not be in contact with ground water.

Q **In reviewing the potential impact of the modifications, to what extent did you rely upon what you knew about the facility and the operation from your 2008 permit-by-rule review?**

A That was the foundation.

Q In what way?

A Primarily, the hydrogeology at the site. My review which resulted in the March 4, 2008 permit-by-rule determination, concluded that the operation qualified for a ground water discharge permit-by-rule because it would have a de minimis effect on ground water quality. The primary premise of this determination was the absence of ground water in the project area to a depth of 1,500 to 2,000 feet below ground surface. This premise was supported by multiple sources including: 1) the hydrogeology and climate data for the area in U.S. Geological Survey Technical Publication 49 (Price and Miller, 1975); 2) well log records from the Division of Oil, Gas and Mining (JBR, 2008); 3) twenty-five exploratory borings drilled to depths up to 150 feet through the Upper Parachute Creek Member and tar sands contained in the Lower Douglas Creek Member of the Green River Formation (NOI, 2009); and 4) a water rights review of the project area (JBR, 2008). In June 2008, at the height of the spring runoff, DWQ monitoring staff conducted a field visit to locate and sample any seeps and springs in the PR Spring area downgradient of the mine site. Results of this field visit indicated the seeps in the Affected Area were not flowing in sufficiently to sample, although they did sample PR Spring at the bottom of PR Spring Canyon located approximately one mile away. More recently, the absence of ground water to a depth of 1,500 to 2,000 feet was confirmed by the extensive drilling and coring program conducted by U.S. Oil Sands in 2011, which consisted of 180 borings to depths up to 305 feet, and five ground water test wells ranging in depth from 1,780 to 2,610 feet.

Q What definition of ground water were you applying in your permit-by-rule determinations?

A The definition in R317-6-1.19 of the Ground Water Quality Protection Rules, which states that "*Ground Water" means subsurface water in the zone of saturation including perched ground water*. See Definitions, Exhibit A.

Q What is "perched" groundwater?

A Ground water in an isolated zone of saturation that has an unsaturated zone below it, between it and a major aquifer.

Q What is the definition of "aquifer"?

A The definition in UAC R317-6-1.1 of the Ground Water Quality Protection

Rules, which states that an *"Aquifer" means a geologic formation, group of geologic formations or part of a geologic formation that contains sufficiently saturated permeable material to yield usable quantities of water to wells and springs.* See Exhibit A.

Q What is your response to the contention that the proposed mining operation threatens shallow ground water?

A The March 4, 2008 permit-by-rule letter references shallow ground water at the site as not being part of a regional aquifer but occurring in localized, laterally discontinuous perched sandstone lenses. The geology at the site led me to conclude that the permeable sandstone units that exist there are fluvial deltaic stream-channel deposits with a lens-shaped geometry in cross section, that are enclosed by finer-grained sedimentary rocks of lower permeability, such as siltstones and mudstones. With the regional Mesa Verde aquifer located 1,500 to 2,000 feet below ground surface at the site, ground water contained in such a sandstone lens under saturated conditions would have unsaturated rocks below it, and so would be an isolated, localized, laterally discontinuous perched lens.

At my request, DWQ monitoring staff visited the site in June 2008 to sample alleged seeps that may discharge from such perched lenses, but the alleged seeps were dried up by then, a short time after the spring runoff. This indicated that any perched aquifers issuing to these alleged seeps did not yield usable quantities of ground water. This is not consistent with the definition of an aquifer, which does not include intermittent seeps. The 180 core logs from the 2011 U.S. Oil Sands drilling program confirmed this geologic interpretation.

Q Did you consider potential impact of the mining project on springs in the area?

A Yes. All known springs in the Green River Formation, such as PR Spring, issue from the Parachute Creek Member, which is located stratigraphically above the lenticular oil sands contained in the underlying Douglas Creek Member (Price and Miller, 1975). Based on the topography and hydrologic drainage boundaries of the area, I determined that the saturated zone that discharges at PR Spring is not hydrologically connected to the mine site, and is located in a different watershed as depicted in Figure 7 of the DOGM NOI. All available evidence suggests that the Parachute Creek and Douglas Creek Members at the mine site are under unsaturated conditions. According to Freeze and Cherry (1979), water can be transferred from the unsaturated zone to the atmosphere by evaporation and transpiration, but natural outflows such as springs must come from the saturated zone. PR Spring is the nearest spring that issues usable

quantities of water.

The 2011 drilling and coring program by U.S. Oil Sands, which included a dense grid of 59 borings in the initial 3-pit mine area, confirmed the lack of any perched aquifers at the mine site.

Q **What other factors did you consider in your 2008 review?**

A I had evaluated toxicity and volatility, evaluated the containment design and also the leaching characteristics of the processed tailings and concluded there would be a de minimis actual or potential impact on ground water quality.

Q **In what form was DWQ's review of the proposed modifications communicated to the company?**

A In a letter from DWQ to Barclay Cuthbert of Earth Energy Resources dated February 15, 2011. Exhibit B.

Q **What was your role in the production of that letter?**

A I drafted it and Rob Herbert approved and signed it.

Q **Who is Robert Herbert?**

A Rob Herbert is the manager of the Ground Water Protection Division and my supervisor.

Q **Did the February 15, 2011 permit-by-rule determination go out for public comment?**

A No. Unlike ground water discharge permits, the rules do not require that permit-by-rule determinations go out for public comment.

Q **Under what permit-by-rule criteria was the PR Spring Tar Sands Mining Project being measured?**

A The JBR Permit-by-rule Demonstration which DWQ accepted as the original application requested from the DWQ a determination that the PR Spring operation be considered as a permitted-by-rule facility under both UAC R317-6-6.2A.1 and UAC R317-6-6.2.A.25. Exhibit C.

Q **Do the rules require that a formal ground water discharge permit application be submitted for a permit-by-rule?**

A No. Unlike for a ground water discharge permit, R317-6-6.1 does not require a ground water discharge permit application for a permit-by-rule review. See Exhibit C.

Q How do you determine what information be provided by the applicant?

A There should be sufficient information to determine if a potential discharge qualifies for permit-by-rule status under UAC R317-6-6.2.

Q What did your February 2011 review entail?

A It entailed the applicant outlining for me the proposed changes, which it provided in a letter dated February 8, 2011. I then reviewed the information provided by the applicant and also information in the 2009 Notice of Intent filed with the Division of Oil, Gas and Mining (DOGM). Exhibit D.

Q How was it determined what information the applicant would be required to submit for your evaluation?

A. We requested that they inform us of any changes made to the proposed operation since it was originally presented to us in 2008.

Q Was the February 8, 2011 letter treated as the application for the review of the modifications?

A Yes. In addition to the information that had been provided by the applicant in connection with the initial review.

Q Which of the criteria under R317-6-6.2 did you conclude that the project met?

A The criteria in subpart 25: "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."

Q How was the initial permit-by-rule determination communicated to the company?

A In a letter from DWQ to Earth Energy Resources dated March 4, 2008. Exhibit E.

Q Did you draft that letter?

A Yes. And it was also reviewed and signed by Rob Herbert.

Q **It was that letter that stated that any modifications to the operation would have to be reviewed and approved by DWQ?**

A Yes.

Q **How did you define *de minimis* in your evaluation?**

A Having an insignificant effect on ground water resources.

Q **You stated that the JBR Demonstration had requested a permit-by-rule determination under both UAC R317-6-6.2A.1 and UAC R317-6-6.2.A.25. Why did you not also conclude that the proposed facility met the criteria of subpart 1 of the rule?**

A Any discharge from the buried tailings cannot be considered compatible with the receiving ground water because there is no shallow ground water at the site.

Q **In its Request for Agency Action, Living Rivers is seeking the applicant be required to submit a ground water discharge permit application. Do the rules require a ground water discharge permit applicant for a permit-by-rule review?**

A No.

Q **What is your response to the contention that DWQ's evaluation of the ground water system at the mining site was incomplete?**

A I understand one of the contentions to be that the description of the ground water system at the PR Springs mine site is inadequate because exploratory drill holes were not drilled deep enough. The permeable sandstone that exists at the mine site, that could contain ground water, exists in isolated, lenticular beds surrounded by fine-grained sedimentary rocks of low permeability. If ground water was not encountered in sandstone close to the surface, there is no reason to suspect that lower sandstone beds would contain ground water.
According to well log records of the Utah Division of Oil, Gas and Mining, the Mesa Verde Formation is the nearest fresh water aquifer, which is located below the low-permeability Green River and Wasatch Formations. The average depth to the Mesa Verde aquifer was 2,011 feet based on records of oil and gas wells within 3.3 miles of the project site (JBR, 2008). Ground water in the Mesa Verde aquifer is probably

recharged where permeable units of the Mesa Verde Formation crop out in the Book Cliffs south of the mine site, and is conveyed northward by the northward dip of the rocks (Price and Miller, 1975). The absence of shallow ground water was confirmed by the extensive drilling performed by the company in 2011 throughout the area to be mined.

Q What explains the absence of shallow usable ground water out on this part of the Green River Formation?

A The geology of the southern Uinta Basin has been intensely studied for its oil and gas production, and for the evaluation of oil sands and oil shale deposits in the Green River Formation. The Green River Formation in the mine area is comprised of the upper Parachute Creek Member and the Lower Douglas Creek Member. The Parachute Creek Member is the surface bedrock formation beneath a thin veneer of soil at the project site, and the underlying Douglas Creek Member contains the lenticular oil sands that will be mined by U.S. Oil Sands. The Green River Formation is a heterogeneous geologic formation composed of interbedded, fine-grained, low-permeability rocks including shales, mudstones, limestones, siltstones, and very fine-grained to fine-grained sandstones deposited in a lacustrine (lake) environment (Price and Miller, 1975).

The Green River Formation is not water bearing in the project area due to its overall low permeability, and because the area is deeply dissected and drained by canyons (Price and Miller, 1975). In addition, potential evapotranspiration in the southern Uinta Basin is high with average annual lake evaporation in most of the area over 36 inches, which is three times greater than the 12 inches of average annual precipitation (Price and Miller, 1975). Because of the predominantly fine-grained low-permeability rocks in the recharge area, percolation rates are very slow, with only 3% of the 12 inches of annual precipitation becoming ground water recharge, which is equal to 0.36 inches per year (Price and Miller, 1975).

Q What is the purpose of a State water rights data review and how was that factored into your evaluation?

A This is information required for a ground water discharge permit application under UAC R317-6-6.3(D), to identify ground water users who might be affected by the proposed operation. The nearest water well in the Utah Division of Water Rights database is a BLM well (water right #49-1597) approximately three miles east of the mine site in a different watershed. This well was drilled adjacent to the stream in South Canyon to

a depth of 98 feet with a static water level of 61 feet measured in August 1996 (Utah Division of Water Rights well log).

Q Did your evaluation include potential discharges to surface water?

A Yes. In some cases, ground water may discharge to surface water as a nonpoint source that would not be regulated under the Utah Pollutant Discharge Elimination System (UPDES) program. Ground water discharge permits offer an opportunity to regulate such discharges.

Q How did you factor this into your evaluation?

A The 62-acre initial mine pit will be located on the relatively flat interfluve between PR Canyon and Main Canyon extending into the heads of two small ephemeral tributaries to Main Canyon. As a result, there is negligible upgradient watershed area that could contribute run-on.

In the NOI filed with DOGM, U.S. Oil Sands has committed to using best management practices (BMPs) and mitigative measures throughout all phases of the project to control runoff and erosion. As long as these BMPs are effectively implemented by U.S. Oil Sands under the DOGM NOI, I anticipate little potential for surface water discharges. Specifically, the Storm Water Pollution Prevention Plan requires good housekeeping practices, preventative maintenance for both equipment and structural BMPs, weekly inspections of sediment control measures, and monitoring for runoff. Further, the highwall safety berms will prevent outside runoff from entering the pit. Surface water will be restricted to that generated by onsite precipitation since little or no runoff will enter the site. All precipitation falling within the mine pit will be collected in collection sumps located in the bottom of the pit thereby preventing runoff from leaving the mine site. The accumulated precipitation will be removed from the pit and transported to the process plant site or used for dust suppression on mine and plant roads. Runoff from the overburden/interburden storage areas will be controlled in rip-rap armored areas at the margins and energy dissipation at the toes of their slopes. These structures as with all site BMPs, will be maintained to ensure that they are functional.

Q How did your evaluation factor in the moisture content of the tailings, and what was its relevance to your evaluation?

A One of the four operational changes made by U.S. Oil Sands was to improve tailings dewatering by using a belt filter for the sand component and a disk filter for the fines and recycle recovered water to the front of the process. These water filtration methods are efficient for removing

water by using vacuum methods to produce a filter cake The dewatered tailings will have a moisture content of 15% and will be stored in a tailings handling area within the bermed plant site shown in Figure 3 of the NOI. Barclay Cuthbert of U.S. Oil Sands stated that the after the tailings have been dewatered, they will be stored temporarily on a liner of some kind, and any water draining from them will be captured for recycling. U.S. Oil Sands has not determined the specific type of liner that will be used.

Climatic factors are also favorable for dewatering with a high potential for evapotranspiration with average annual lake evaporation over 36 inches, which is three times greater than the average annual precipitation (Price and Miller, 1975). Residual water is anticipated to evaporate from the loosely consolidated produced sand/fines mix with no free-water run-off (NOI, p. 17).

Blended sand/clay fine tailings will be placed in relatively thin lifts estimated at 1-3 feet, and in conjunction with the arid climate of the mine area, the deposited tailings will readily dry out to even lower ultimate moisture content. In addition to promoting maximum drying, the specified lifts will enhance compaction and subsequent stability (NOI, p. 19). The tailings will be buried in the unsaturated zone and, as fine-grained sand mixed with fines, the tailings will contain air within their pore space, allowing evaporation and promoting biodegradation.

Q **What is your response to the suggestion that the potential impacts to ground water quality from seepage in the tailings from the overburden dumps are not evaluated in either the NOI or in the Demonstration and that the Demonstration only reports that tailings will be placed as backfill in the pit?**

A There is no significant difference between placement of tailings in waste rock dumps or backfilled pits in regards to impacts on ground water quality. Tailings will be maintained under unsaturated conditions in both settings, which allows for evaporation and biodegradation of the d-limonene, and there are no significant aquifers to be affected. Based on the site-specific hydrogeology of the site and the 1,500 to 2,000-foot thick unsaturated zone, it would take thousands of years for infiltrating pore waters from the buried tailings to travel through the unsaturated zone to reach the Mesa Verde aquifer. After placement of the vegetated soil reclamation cover, closed tailings cell conditions will mimic natural soil texture, final grades, and vegetation to provide a long-term infiltration rate through the tailings that is equivalent or lower than regional hydrology estimates of groundwater recharge. As part of their best management practices, US Oil Sands will inspect the overburden dumps for seepage.

Q How did your evaluation factor in the potential for precipitation to percolate through the material that is placed in the backfilled pits and storage piles into underlying sedimentary rocks to water bearing aquifers?

A This will not happen based on climatic factors, the 1,500 to 2,000 foot thick unsaturated zone, and the long travel time for seepage to migrate to ground water. Average annual precipitation in the project area is only 12 inches and potential evapotranspiration is high with average annual lake evaporation over 36 inches, which is three times greater than the average annual water supply from precipitation (Price and Miller, 1975). Most of the precipitation in the southern Uinta Basin is consumed by evapotranspiration and sublimation from the winter snowpack at or near the place of fall (Price and Miller, 1975). It is estimated that only three percent of annual precipitation seeps to the zone of saturation as ground water recharge, which is equal to 0.36 inches per year (Price and Miller, 1975). Based on the site-specific hydrogeology of the site and the 1,500 to 2,000-foot thick unsaturated zone, it would take thousands of years for infiltrating pore water from the buried tailings to travel through the unsaturated zone to reach the Mesa Verde aquifer. After placement of the vegetated soil reclamation cover, closed tailings cell conditions will mimic natural soil texture, final grades, and vegetation to provide a long-term infiltration rate through the tailings that is similar to regional hydrology estimates of groundwater recharge.

Q Would down gradient monitoring serve any purpose in monitoring potential threat to ground water?

A No, because there is no aquifer or zone of saturation that would be affected by activities at the mine site that could be monitored. The closest ground water is the Mesa Verde aquifer, which is 1,500 to 2,000 feet below the mine site. Based on the great depth to ground water, it would take thousands of years for pore water from the buried tailings to travel through the unsaturated zone to reach ground water, which represents a de minimis effect. Based on retardation factors, contaminant transport would take much longer to reach ground water.

Q How did your evaluation factor in leaching of contaminants from the tailings and how did you determine what testing to use?

A I was concerned with compounds that could leach out of the tailings upon contact with rain water. I requested that U.S. Oil Sands determine the leachability of contaminants in the tailings using the Synthetic Precipitation Leaching Procedure (SPLP), and analyze the SPLP leachate for parameters of concern.

Q **How did you determine what testing to run on the tailings to support the permit-by-rule application and why did you run that testing?**

A This was the first tar sands mining and processing proposal that DWQ has evaluated and I was uncertain as to which parameters to analyze the tailings for. Also, U.S. Oil Sands had not processed tar sands at the mine site since their pilot project in 2005, and there was a problem accessing them in the winter. In addition, the tailings from the pilot project had been exposed to the elements for too long to provide valid test results. Instead, U.S. Oil Sands analyzed samples from a test of their process using tar sands from Asphalt Ridge near Vernal. I considered this to be an acceptable analog, but I requested that U.S. Oil Sands analyze tailings samples from processed PR Spring tar sands, when they are available, and if the results were significantly different from the Asphalt Ridge samples, they may be required to manage their tailings differently.

Q **Is there any testing that you would have liked to have seen done but was not, that you would still like to see done?**

A Yes, We will need to have the tailings analyzed for polycyclic aromatic hydrocarbons since they were not included in the previous SPLP analysis of semi-volatile organic compounds. I told Barclay Cuthbert to contact me for a list of parameters to be tested on the PR Springs tailings when some are generated.

Q **Do you agree with Professor Johnson's conclusion that combining the d-limonene with the tar sand increases the aqueous concentration and solubility and mobility of the tar compounds? How would that factor into your evaluation?**

A Whether that would or would not occur would not change my *de minimis* determination based on the 2000 feet of unsaturated zone. I strongly disagree, however, with the implication that the byproduct mixture would come directly into contact with and affect ground water in an aquifer which based on two critical false assumptions made in Professor Johnson's analysis: 1) that pore water from the tailings will flow under saturated conditions and discharge directly into ground water, and 2) his omission of the unsaturated zone transport path for migration of potential tailings leachate to ground water. A valid analysis cannot ignore the hydrogeology of the site and disregard unsaturated zone transport, which is affected by capillary forces and unsaturated moisture content and not by gravity as saturated flow would be. Principles of fate and transport make this a nonissue.

Q **What is your response to the contention that a *de minimis* determination cannot be supported without data on existing water**

quality, characterization of water quality of the seepage through the tailings in the pit and dumps, and a complete analysis of the flow of water through the waste dumps and pits into underlying and/or adjacent aquifers?

A There is no "existing water quality" to define because shallow ground water cannot be found at the mine site, thus there are no underlying and adjacent aquifers that could be affected by tailings disposal. The tailings have been characterized as accurately as needed in this case- as containing 10 to 20% moisture content and residual amounts of d-limonene and tar sands compounds. Living Rivers' contention wrongly assumes that process water contained in the tailings will discharge directly to ground or surface water, ignoring the fact that tailings will be buried in unsaturated conditions, and that disposal of organic wastes in unsaturated soils is a standard treatment used in a great variety of applications with wastes from domestic, municipal, agricultural, and remediation sources. Septic tank drain fields, land application of municipal wastewater and agricultural wastes, and land farming of petroleum-contaminated soils are examples of common techniques used to successfully dispose of organic wastes without harming ground or surface water resources.

Q **Based upon the information that you have about the absence of shallow ground water at this site, would this project be a candidate for a ground water discharge permit?**

A No. The purpose of a ground water discharge permit is to demonstrate, on an ongoing basis, that ground water protection levels (as defined by UAC R317-6-4) are not being exceeded in the shallow ground water. This demonstration is made by the periodic monitoring of a point of compliance, which may be one or more ground water monitoring wells or an engineered monitoring point such as a leak detection sump of a liner system. In this case, there is no point of compliance to monitor because it is impractical to install monitoring wells to depths of 1,500 to 2,000 feet and it would not be practical to install a leak detection system below the backfilled tailings disposal pit.

Q **Does this conclude your testimony at this time?**

A Yes.

Mark T. Novak

Mark Novak P.G.

Utah Division of Water Quality

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U.S. Oil Sands, Lithologic Core Logs, provided to Utah Division of Water Quality under Stipulation for the Production of Confidential Business Information to Counsel for the Executive Secretary, received by Utah Assistant Attorney General Paul M. McConkie from Holland & Hart LLP, Attorneys for U.S. Oil Sands, February 9, 2012.

Utah Department of Environmental Quality, Division of Water Quality, Adminstrative Rules for Ground Water Quality Protection, R317-6, Utah Administrative Code, effective date of last revision, January 19, 2007.

Utah Division of Water Rights, Well Driller's Report, Non-Production Well ID 1149002M00, WIN 434855, Earth Energy Resources Ground Water Test Well W001, Total Depth 2,000 feet, received by Utah Division of Water Rights on July 14, 2011.

EXHIBIT A

Rule R317-6. Ground Water Quality Protection.

As in effect on February 1, 2012

Table of Contents

R317-6-1. Definitions.

1.1 "Aquifer" means a geologic formation, group of geologic formations or part of a geologic formation that contains sufficiently saturated permeable material to yield usable quantities of water to wells and springs.

1.2 "Background Concentration" means the concentration of a pollutant in ground water upgradient or lateral hydraulically equivalent point from a facility, practice or activity which has not been affected by that facility, practice or activity.

1.3 "Best Available Technology" means the application of design, equipment, work practice, operation standard or combination thereof at a facility to effect the maximum reduction of a pollutant achievable by available processes and methods taking into account energy, public health, environmental and economic impacts and other costs.

1.4 "Best Available Technology Standard" means a performance standard or pollutant concentration achievable through the application of best available technology.

1.5 "Board" means the Utah Water Quality Board.

1.6 "Class TDS Limit" means the upper boundary of the TDS range for an applicable class as specified in Section R317-6-3.

1.7 "Community Drinking Water System" means a public drinking water system which serves at least fifteen service connections used by year-round residents or regularly serves at least twenty-five year-round residents.

1.8 "Comparable Quality (Source)" means a potential alternative source or sources of water supply which has the same general quality as the ground water source.

1.9 "Comparable Quantity (Source)" means a potential alternative source of water supply capable of reliably supplying water in quantities sufficient to meet the year-round needs of the users served by the ground water source.

1.10 "Compliance Monitoring Point" means a well, seep, spring, or other sampling point used to determine compliance with applicable permit limits.

1.11 "Contaminant" means any physical, chemical, biological or radiological substance or matter in water.

1.12 "Conventional Treatment" means normal and usual treatment of water for distribution in public drinking water supply systems including flocculation, sedimentation, filtration, disinfection and storage.

1.13 "Discharge" means the release of a pollutant directly or indirectly into subsurface waters of the state.

1.14 "Existing Facility" means a facility or activity that was in operation or under construction after August 14, 1989 and before February 10, 1990.

1.15 "Economically Infeasible" means, in the context of a public drinking water source, the cost to the typical water user for replacement water would exceed the community's ability to pay.

1.16 "Executive Secretary" means the Executive Secretary of the Utah Water Quality Board.

1.17 "Facility" means any building, structure, processing, handling, or storage facility, equipment or activity; or contiguous group of buildings, structures, or processing, handling or storage facilities, equipment, or activities or combination thereof.

1.18 "Gradient" means the change in total water pressure head per unit of distance.

1.19 "Ground Water" means subsurface water in the zone of saturation including perched ground water.

1.20 "Ground Water Quality Standards" means numerical contaminant concentration levels adopted by the Board in or under R317-6-2 for the protection of the subsurface waters of the State.

1.21 "Infiltration" means the movement of water from the land surface into the pores of rock, soil or sediment.

1.22 "Institutional Constraints" means legal or other restrictions that preclude replacement water delivery and which cannot be alleviated through administrative procedures or market transactions.

1.23 "Interim Action Reports For Petroleum Releases" means plans prepared specifically to document cleanup of petroleum releases resulting primarily from transportation spills not regulated by the Division of Solid and Hazardous Waste or Division of Environmental Response and Remediation that are submitted to the local health department and should include the following information: map of the location where the spill occurred, sketch of where confirmation samples were collected, quantity of fuel spilled, quantity of soil removed, soil disposal location, certified laboratory analysis report including total petroleum hydrocarbons (TPH) analyzed in the appropriate molecular weight range, and actions taken to control the source and protect public safety, public health, and water quality.

1.24 "Lateral Hydraulically Equivalent Point" means a point located hydraulically equal to a facility and in the same ground water with similar geochemistry such that the ground water at that point has not been affected by the facility.

1.25 "Limit of Detection" means the concentration of a chemical below which it can not be detected using currently accepted sampling and analytical techniques for drinking water as determined by the U.S. Environmental Protection Agency.

1.26 "Local Health Department" means a city-county or multi-county local health department established under Title 26A.

1.27 "New Facility" means a facility for which construction or modification is initiated after February 9, 1990.

1.28 "Non Sensitive Area" means industrial and manufacturing areas previously contaminated and areas not likely to affect human health and exceed groundwater standards or background concentrations.

1.29 "Permit Limit" means a ground water pollutant concentration limitation specified in a Ground Water Discharge Permit and may include protection levels, class TDS limits, ground water quality standards, alternate concentration limits, permit-specific ground water quality standards, or limits stipulated in the application and use of best available technology. For facilities permitted by rule under R317-6-6.2, a permit limit is a ground water pollutant concentration limitation specified in R317-6-6.2.B.

1.30 "Person" means any individual, corporation, partnership, association, company or body politic, including any agency or instrumentality of the federal, state, or local government.

1.31 "Point of Discharge" means the area within outermost location at which effluent or leachate has been stored, applied, disposed of, or discharged; for a diked facility, the outermost edge of the dikes.

1.32 "Pollutant" means dredged spoil, solid waste, incinerator residue, sewage, sewage sludge, garbage, munitions, trash, chemical wastes, petroleum hydrocarbons, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal and agricultural waste discharged into waters of the state.

1.33 "Pollution" means such contamination, or other alteration of the physical, chemical, or biological properties of any waters of the State, or such discharge of any liquid, gaseous, or solid substance into any waters of the state as will create a nuisance or render such waters harmful or detrimental or injurious to public health, safety, or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life.

1.34 "Professional Engineer" means any person qualified to practice engineering before the public in the state of Utah and professionally registered as required under the Professional Engineers and Professional Land Surveyors Licensing Act rules (UAC 156-22).

1.35 "Professional Geologist" means any person qualified to practice geology before the public in the State of Utah and professionally registered as required under the Professional Geologist Licensing Act rules (UAC R156- 76).

1.36 "Protection Level" means the ground water pollutant concentration levels specified in R317-6- 4.

1.37 "Sensitive Area" means those areas that are located near residences, waters of the state, wetlands, or any area where exposure to humans or significant environmental impact is likely to occur.

1.38 "Substantial Treatment" means treatment of water utilizing specialized treatment methods including ion exchange, reverse osmosis, electrodialysis and other methods needed to upgrade water quality to meet standards for public water systems.

1.39 "Technology Performance Monitoring" means the evaluation of a permitted facility to determine compliance with best available technology standards.

1.40 "Total Dissolved Solids (TDS)" means the quantity of dissolved material in a sample of water which is determined by weighing the solid residue obtained by

evaporating a measured volume of a filtered sample to dryness; or for many waters that contain more than 1000 mg/l, the sum of the chemical constituents.

1.41 "Radius of Influence" means the radial distance from the center of a well bore to the point where there is no lowering of the water table or potentiometric surface because of pumping of the well; the edge of the cone of depression.

1.42 "Upgradient" means a point located hydraulically above a facility such that the ground water at that point has not been impacted by discharges from the facility.

1.43 "Vadose Zone" means the zone of aeration including soil and capillary water. The zone is bound above by the land surface and below by the water table.

1.44 "Waste" see "Pollutant."

1.45 "Water Table" means the top of the saturated zone of a body of unconfined ground water at which the pressure is equal to that of the atmosphere.

1.46 "Water Table Aquifer" means an aquifer extending downward from the water table to the first confining bed.

1.47 "Waters of the State" means all streams, lakes, ponds, marshes, water courses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this state or any portion thereof; except bodies of water confined to and retained within the limits of private property, and which do not develop into or constitute a nuisance or a public health hazard, or a menace to fish and wildlife, shall not be considered to be "waters of the state" under this definition.

1.48 "Zone of Influence" means the area contained by the outer edge of the drawdown cone of a water well.

EXHIBIT B

State of Utah
GARY R. HERBERT
Governor

GREG BELL
Lieutenant Governor

Department of
Environmental Quality

Amanda Smith
Executive Director

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

February 15, 2011

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

Dear Mr. Cuthbert:

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

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

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

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

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

195 North 1950 West • Salt Lake City, UT
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

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,

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

EXHIBIT C

R317-6-6. Implementation.

6.1 DUTY TO APPLY FOR A GROUND WATER DISCHARGE PERMIT

A. No person may construct, install, or operate any new facility or modify an existing or new facility, not permitted by rule under R317-6-6.2, which discharges or would probably result in a discharge of pollutants that may move directly or indirectly into ground water, including, but not limited to land application of wastes; waste storage pits; waste storage piles; landfills and dumps; large feedlots; mining, milling and metallurgical operations, including heap leach facilities; and pits, ponds, and lagoons whether lined or not, without a ground water discharge permit from the Executive Secretary. A ground water discharge permit application should be submitted at least 180 days before the permit is needed.

B. All persons who constructed, modified, installed, or operated any existing facility, not permitted by rule under R317-6-6.2, which discharges or would probably result in a discharge of pollutants that may move directly or indirectly into ground water, including, but not limited to: land application of wastes; waste storage pits; waste storage piles; landfills and dumps; large feedlots; mining, milling and metallurgical operations, including heap leach facilities; and pits, ponds, and lagoons whether lined or not, must have submitted a notification of the nature and location of the discharge to the Executive Secretary before February 10, 1990 and must submit an application for a ground water discharge permit within one year after receipt of written notice from the Executive Secretary that a ground water discharge permit is required.

C. No person may construct, install, or operate any new liquid waste storage facility or modify an existing or new liquid waste storage facility for a large animal feeding operation not permitted by rule under R317-6- 6.2A.17, which discharges or would probably result in a discharge of pollutants that may move directly or indirectly into ground water, without a ground water discharge permit from the Executive Secretary. A ground water discharge permit application should be submitted at least 180 days before the permit is needed and the applicant must comply with the requirements of R317-1-2 for submitting plans and specifications and obtaining a construction permit.

6.2 GROUND WATER DISCHARGE PERMIT BY RULE

A. Except as provided in R317-6-6.2.C, the following facilities are considered to be permitted by rule and are not required to obtain a discharge permit under R317-6-6.1 or comply with R317-6-6.3 through R317-6-6.7, R317- 6-6.9 through R317-6-6.11, R317-6-6.13, R317-6-6.16, R317-6-6.17 and R317-6-6.18:

1. 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. The Executive Secretary may require samples to be analyzed for the presence of contaminants before the effluent or leachate discharges directly or indirectly into ground water. If the discharge is by seepage through natural or altered natural materials, the Executive Secretary may require samples of the solution be analyzed for the presence of pollutants before or after seepage;

2. water used for watering of lawns, gardens, or shrubs or for irrigation for the revegetation of a disturbed land area except for the direct land application of wastewater;

3. application of agricultural chemicals including fertilizers, herbicides and pesticides including but not limited to, insecticides fungicides, rodenticides and fumigants when used in accordance with current scientifically based manufacturer's

recommendations for the crop, soil, and climate and in accordance with state and federal statutes, regulations, permits, and orders adopted to avoid ground water pollution;

4. water used for irrigated agriculture except for the direct land application of wastewater from municipal, industrial or mining facilities;

5. flood control systems including detention basins, catch basins and wetland treatment facilities used for collecting or conveying storm water runoff;

6. natural ground water seeping or flowing into conventional mine workings which re-enters the ground by natural gravity flow prior to pumping or transporting out of the mine and without being used in any mining or metallurgical process;

7. leachate which results entirely from the direct natural infiltration of precipitation through undisturbed materials;

8. wells and facilities regulated under the underground injection control (UIC) program;

9. land application of livestock wastes, within expected crop nitrogen uptake;

10. individual subsurface wastewater disposal systems approved by local health departments or large subsurface wastewater disposal systems approved by the Board;

11. produced water pits, and other oil field waste treatment, storage, and disposal facilities regulated by the Division of Oil, Gas, and Mining in accordance with Section 40-6-5(3)(d) and R649-9, Disposal of Produced Water;

12. reserve pits regulated by the Division of Oil, Gas and Mining in accordance with Section 40-6- 5(3)(a) and R649-3-7, Drilling and Operating Practices;

13. storage tanks installed or operated under regulations adopted by the Utah Solid and Hazardous Waste Control Board;

14. coal mining operations or facilities regulated under the Coal Mining and Reclamation Act by the Utah Division of Oil, Gas, and Mining (DOGM). The submission of an application for ground water discharge permit under R317-6-6.2.C may be required only if the Executive Secretary, after consideration of recommendations, if any, by DOGM, determines that the discharge violates applicable ground water quality standards, applicable Class TDS limits, or is interfering with a reasonable foreseeable beneficial use of the ground water. DOGM is not required to establish any administrative or regulatory requirements which are in addition to the rules of DOGM for coal mining operations or facilities to implement these ground water regulations;

15. hazardous waste or solid waste management units managed or undergoing corrective action under R315-1 through R315-14;

16. solid waste landfills permitted under the requirements of R315-303;

17. animal feeding operations, as defined in UAC R317-8-3.5(2) that use liquid waste handling systems, which are not located within Zone 1 (100 feet) for wells in a confined aquifer or Zone 2 (250 day time of travel) for wells and springs in unconfined aquifers, in accordance with the Public Drinking Water Regulations UAC R309-600, and which meet either of the following criteria:

a) operations constructed prior to the effective date of this rule which incorporated liquid waste handling systems and which are either less than 4 million gallons capacity or serve fewer than 1000 animal units, or

b. operations with fewer than the following numbers of confined animals:

i. 1,500 slaughter and feeder cattle,

ii. 1,050 mature dairy cattle, whether milked or dry cows,

iii. 3,750 swine each weighing over 25 kilograms (approximately 55 pounds),

iv. 18,750 swine each weighing 25 kilograms or less (approximately 55 pounds),

v. 750 horses,

vi. 15,000 sheep or lambs,

vii. 82,500 turkeys,

viii. 150,000 laying hens or broilers that use continuous overflow watering but dry handle wastes,

ix. 45,000 hens or broilers,

x. 7,500 ducks, or

xi. 1,500 animal units

18. animal feeding operations, as defined in UAC R317-8-3.5(2), which do not utilize liquid waste handling systems;

19. mining, processing or milling facilities handling less than 10 tons per day of metallic and/or nonmetallic ore and waste rock, not to exceed 2500 tons/year in aggregate unless the processing or milling uses chemical leaching;

20. pipelines and above-ground storage tanks;

21. drilling operations for metallic minerals, nonmetallic minerals, water, hydrocarbons, or geothermal energy sources when done in conformance with applicable regulations of the Utah Division of Oil, Gas, and Mining or the Utah Division of Water Rights;

22. land application of municipal sewage sludge for beneficial use, at or below the agronomic rate and in compliance with the requirements of 40 CFR 503, July 1, 2000 edition;

23. land application of municipal sewage sludge for mine-reclamation at a rate higher than the agronomic rate and in compliance with 40 CFR 503, July 1, 2000 edition;

24. municipal wastewater treatment lagoons receiving no wastewater from a significant industrial discharger as defined in R317-8-8.2(12); and

25. 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.

EXHIBIT D

Document Date 2/8/2011

DWQ-2011-002290

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

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

State of Utah

Department of Environmental Quality

Richard W. Sprott
Executive Director

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

JON M. HU...SMAN, 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.

288 North 1460 West • PO Box 144870 • Salt Lake City, UT 84114-4870 • phone (801) 538-6146 • fax (801) 538-6016
T.D.D. (801) 536-4414 • *www.deq.utah.gov*

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

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

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

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

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

Sincerely,

Robert L. Herbert

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

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

F:/MNovak/WP/EarthEnResPBR.Ltr

Frutech

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.

IR - 000378

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

IV.- HEALTH HAZARD DATA

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

Effects of overexposure :

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

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

Primary route of Exposure : Skin contact

Emergency first aids procedures :

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

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

Ingestion : See a physician.

Medical conditions generally recognized

As being aggravated by exposure : None known.

V.- SPILL OR LEAK PROCEDURES

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

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

Water disposal method :

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

VI.- PERSONAL PROTECTION, HANDLING AND STORAGE INFORMATION

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

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

Frutech
International Corporation

Technical Specification Sheet

Orange Terpenes

Product description

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

Chemical and Physical characteristics

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

Organoleptic characteristics

Color	Colorless, crystal clear.
Odor	Mildly Citrus odor

Packaging

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

Storage recommendations

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

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

Last revision September 5 th, 1997.

Frutech
International Corporation

QUALITY ASSURANCE CERTIFICATE

Orange Terpenes

Product description

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

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

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

Organoleptic characteristics

Color	Colorless, crystal clear.
Odor	Mildly Citrus odor

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

Storage recommendations

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

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

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.

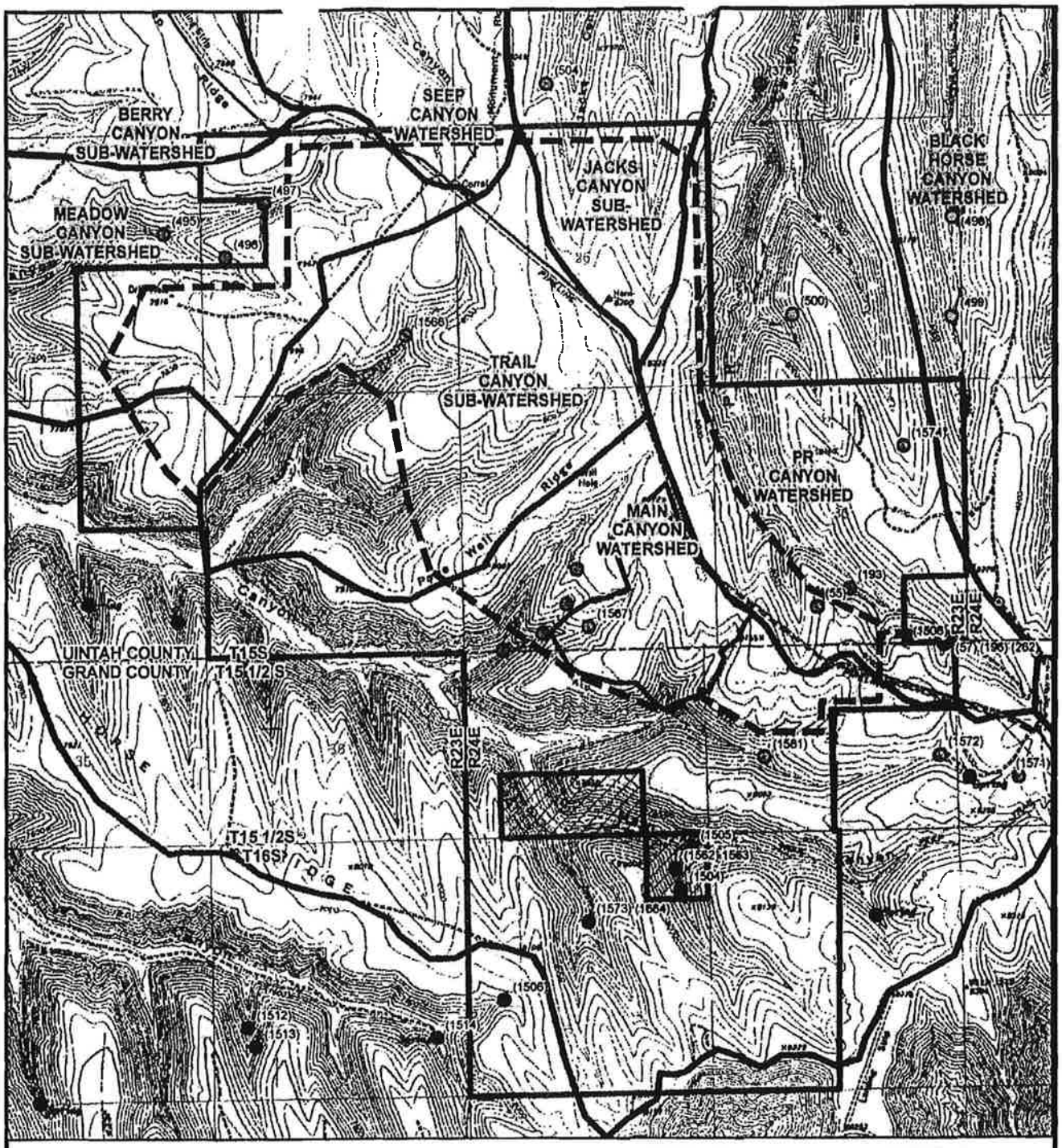
------ Section 15 • Regulatory Information ------

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



1,000 0 4,000 Feet

1,000 0 1,000 Meters

Contour Interval 40 Feet

N

Legend

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

APPROVED

SEP 19 2009

DIV. OIL GAS & MINING

EARTH ENERGY RESOURCES, INC.

PR SPRING TAR SANDS DEVELOPMENT PROJECT

FIGURE 7
WATER FEATURES

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

FEE 000585

drawings\Earth Energy\Fig7 Water Features

EXHIBIT E

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,

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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